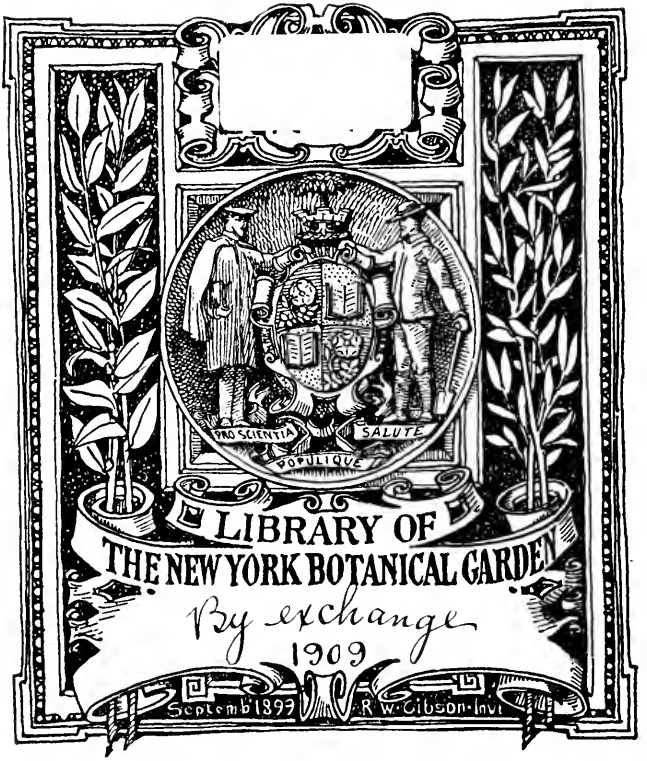
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NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. JANUARY, 1909. Number 1.

I. ANALYSES OF FERTILIZERS—FALL SEASON, 1908.

II. REGISTRATION OF FERTILIZERS.

PUBLI[illegible]ND SENT FREE TO CITIZENS ON APPLICATION.

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I. ANALYSES OF FERTILIZERS—FALL SEASON, 1908.

BY B. W. KILGORE, STATE CHEMIST,

AND

W. G. HAYWOOD, J. M. PICKEL, L. L. BRINKLEY AND S. O. PERKINS.

The analyses presented in this BULLETIN are of samples collected by the fertilizer inspectors of the Department, under the direction of the Commissioner of Agriculture, during the fall months of 1908. They should receive the careful study of every farmer in the State who uses fertilizers, as by comparing the analyses in the BULLETIN with the claims made for the fertilizers actually used, the farmer can know by, or before, the time fertilizers are put in the ground whether or not they contain the fertilizing constituents in the amounts they were claimed to be present.

TERMS USED IN ANALYSES.

Water-soluble Phosphoric Acid.—Phosphate rock, as dug from the mines, mainly in South Carolina, Florida and Tennessee, is the chief source of phosphoric acid in fertilizers.

In its raw, or natural, state the phosphate has three parts of lime united to the phosphoric acid (called by chemists tri-calcium phosphate). This is very insoluble in water and is not in condition to be taken up readily by plants. In order to render it soluble in water and fit for plant food, the rock is finely ground and treated with sulphuric acid, which acts upon it in such a way as to take from the three-lime phosphate two parts of its lime, thus leaving only one part of lime united to the phosphoric acid. This one-lime phosphate is what is known as water-soluble phosphoric acid.

Reverted Phosphoric Acid.—On long standing some of this water-soluble phosphoric acid has a tendency to take lime from other substances in contact with it, and to become somewhat less soluble. This latter is known as reverted or gone-back phosphoric acid. This is thought to contain two parts of lime in combination with the phosphoric acid, and is thus an intermediate product between water-soluble and the original rock.

Water-soluble phosphoric acid is considered somewhat more valuable than reverted, because it becomes better distributed in the soil as a consequence of its solubility in water.

Available Phosphoric Acid is made up of the water-soluble and reverted; it is the sum of these two.

Water-soluble Ammonia.—The main materials furnishing ammonia in fertilizers are nitrate of soda, sulphate of ammonia, cotton-seed meal, dried blood, tankage, and fish scrap. The first two of these (nitrate of soda and sulphate of ammonia) are easily soluble in water and become well distributed in the soil where plant roots can get at them. They are, especially the nitrate of soda, ready to be taken up by plants, and are therefore quick-acting forms of ammonia. It is mainly the ammonia from nitrate of soda and sulphate of ammonia that will be designated under the heading of water-soluble ammonia.

Organic Ammonia.—The ammonia in cotton-seed meal, dried blood, tankage, fish scrap, and so on, is included under this heading. These materials are insoluble in water, and before they can feed plants they must decay and have their ammonia changed, by the aid of the bacteria of the soil, to nitrates, similar to nitrate of soda.

They are valuable then as plant food in proportion to their content of ammonia, and the rapidity with which they decay in the soil, or rather the rate of decay, will determine the quickness of their action as fertilizers. With short season, quick-growing crops, quickness of action is an important consideration, but with crops occupying the land during the greater portion, or all, of the growing season, it is better to have a fertilizer that will become available more slowly, so as to feed the plant till maturity. Cotton-seed meal and dried blood decompose fairly rapidly, but will last the greater portion, if not all, of the growing season in this State. While cotton seed and tankage will last longer than meal and blood, none of these act so quickly, or give out so soon, as nitrate of soda and sulphate of ammonia.

Total Ammonia is made up of the water-soluble and organic; it is the sum of these two.

The farmer should suit, as far as possible, the kind of ammonia to his different crops, and a study of the forms of ammonia as given in the tables of analyses will help him to do this.

VALUATIONS.

To have a basis for comparing the values of different fertilizer materials and fertilizers, it is necessary to assign prices to the three valuable constituents of fertilizers—ammonia, phosphoric acid, and potash. These figures, expressing relative value per ton, are not intended to represent crop-producing power, or agricultural value, but are estimates of the commercial value of ammonia, phosphoric acid and potash in the materials supplying them. These values are only approximate (as the costs of fertilizing materials are liable to change, as other commercial products are), but they are believed to fairly represent the cost of making and putting fertilizers on the market. They are based on a careful examination of trade conditions, wholesale and retail, and upon quotations of manufacturers.

Relative value per ton, or the figures showing this, represents the prices on board the cars at the factory, in retail lots of five tons or less, for cash.

To make a complete fertilizer the factories have to mix together in proper proportions materials containing ammonia, phosphoric acid and potash. This costs something. For this reason it is thought well to have two sets of valuations—one for the raw or unmixed materials, such as acid phosphate, kainit, cotton-seed meal, etc., and one for mixed fertilizers.

The values used last season were:

VALUATIONS FOR 1908.

In Unmixed or Raw Materials.

For phosphoric acid in acid phosphate.....	4	cents per pound.
For phosphoric acid in bone meal, basic slag and Peruvian guano.....	3½	cents per pound.
For nitrogen	18	cents per pound.
For potash	5	cents per pound.

In Mixed Fertilizers.

For phosphoric acid	4½	cents per pound.
For nitrogen	19½	cents per pound.
For potash	5½	cents per pound.

HOW RELATIVE VALUE IS CALCULATED.

In the calculation of relative value it is only necessary to remember that so many per cent means the same number of pounds per hundred, and that there are twenty hundred pounds in one ton (2,000 pounds).

With an 8—2—1.65 goods, which means that the fertilizer contains available phosphoric acid 8 per cent, potash 2 per cent, and nitrogen 1.65 per cent, the calculation is made as follows:

Percentage, or Lbs. in 100 Lbs.	Value Per 100 Lbs.	Value Per Ton, 2,000 Lbs.
8 pounds available phosphoric acid at 4½ cents...	0.36 ×20=	$7.20
2 pounds potash at 5½ cents.....	0.11 ×20=	2.20
1.65 pounds nitrogen at 19½ cents.....	0.321×20=	6.42
Total value	0.791×20=	$15.82

Freight and merchant's commission must be added to these prices. Freight rates from the seaboard and manufacturing centers to interior points are given in the following table:

FREIGHT RATES FROM THE SEABOARD TO INTERIOR POINTS.—From the Published Rates of the Associated Railways of Virginia and the Carolinas. In car-loads, of not less than ten tons each, per ton of 2,000 pounds. Less than car-loads, add 20 per cent.

Destination.	From Wilmington, N. C.	From Norfolk and Portsmouth, Va.	From Charleston, S. C.	From Richmond, Va.
Advance	$3.20	$3.20	$3.40	$3.20
Apex	2.70		3.80	3.00
Ashboro	3.20	3.20	3.60	3.20
Asheville	4.00	4.00	4.60	4.00
Chapel Hill	2.95	3.20	3.90	3.20
Charlotte	2.65	3.20	2.85	3.20
Clayton	2.48	2.86	3.63	2.80
Cherryville	3.85	3.60	3.40	3.63
Clinton	1.60	3.60	3.20	3.00
Creedmoor	3.00	3.00	3.80	3.00
Cunningham	3.00	2.40	4.00	2.40
Dallas	3.00	3.60	3.40	3.60
Davidson College	3.00	3.20	2.20	3.20
Dudley	1.70	3.00	3.20	3.00
Dunn	2.00	2.80	3.20	2.80
Durham	2.80	2.83	3.20	2.83
Elkin	3.60	3.20	3.60	3.20
Elm City	2.10	2.60	3.20	2.60
Fair Bluff	1.60	3.80	2.40	3.80
Fayetteville	1.80	3.00	3.00	3.00
Forestville	2.85	3.00	3.80	3.06
Gastonia	3.12	3.25	3.12	3.25
Gibson	2.10	3.50	2.10	3.50
Goldsboro	1.80	2.80	3.20	2.80
Greensboro	2.96	3.00	3.40	3.00
Hamlet	2.00	3.00	3.60	3.00
Henderson	3.00	2.83	3.55	2.83
Hickory	3.20	3.60	3.20	3.60
High Point	3.00	3.08	3.40	3.08
Hillsboro	2.88	2.88	2.68	2.88
Kernersville	3.00	3.00	3.40	3.00
Kinston	2.10	2.80	3.50	2.80
Laurel Hill	1.90	2.40	3.80	3.40
Laurinburg	1.90	3.40	3.80	3.40
Liberty	2.72	3.00	3.80	3.00
Louisburg	2.95	3.00	3.80	3.00
Lumberton	1.60	3.00	3.70	3.00
Macon	3.05	3.00	3.85	3.00
Madison	3.00	3.00	3.40	3.00
Matthews	2.60	3.20	3.20	3.20
Maxton	1.80	3.40	2.70	3.40
Milton	3.44	2.40	4.00	2.40
Mocksville	3.36	3.20	3.40	3.20
Morven	2.55	3.00	2.50	3.00
Mount Airy	3.20	3.40	3.80	3.40
Nashville	2.30	2.90	3.40	2.90
New Bern	1.25	1 75	3.95	1.75
Norwood	3.68	3.20	3.20	2.23
Oxford	3.04	2.83	3 55	2.83
Pineville	2 77	3.25	3.00	3.20
Pittsboro	2.00	3.30	4.10	3.30
Polkton	2.40	3.00	2.20	3.00
Raleigh	2.56	2.83	3.40	2.83
Reidsville	3.00	2.96	3.40	2.36
Rockingham	2.10	3.00	3.80	3.00
Rocky Mount	2.20	2.50	3.40	2.50
Ruffin	3.28	2.80	3.40	2.20
Rural Hall	3.28	3.20	3.60	3.20
Rutherfordton	3.05	3.65	3.05	3.65
Salisbury	3 25	3.20	3.20	3.20
Sanford	2.10	3.00	3 40	3.00
Selma	2.10	2.80	3.20	2.80
Shelby	2.90	3.60	3.90	3.60
Siler City	2.60	3.60	3.80	3.60
Smithfield	2 20	2.80	3.20	2.80
Statesville	3.50	3.20	3.60	3.20
Stem	2.95	2.83	3.80	2.83
Tarboro	2.30	2.40	3.00	2.40
Waco	2.90	3.00	3.40	3.60
Wadesboro	2.30	3.00	2.50	3.00
Walnut Cove	3.09	3.00	3.40	3.00
Warrenton	3.05	3.25	4.10	3.25
Warsaw	1 50	3.00	3.20	3.00
Washington	2.65	1.75	2.25	1.50
Weldon	2.95	1.90	3.85	1.90
Wilson	2.00	2.60	3.20	2.60
Winston-Salem	3.00	3.00	3.40	3.00

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per ton at Factory.
					Available Phosphoric Acid.	Water-Soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
			MIXED FERTILIZERS.								
	Brands claiming				**8.00**			**1.65**	**2.00**	**2.00**	**15.82**
6859	Armour Fertilizer Works, Wilmington, N. C.	General Fertilizer	Wilkesboro	R	8.68	.28	1.14	**1.42**	1.72	**1.91**	**15.45**
6902	Atlantic Chemical Co., Norfolk, Va.	Atlantic Co.'s Soluble Guano	Elkin	S	**7.92**	.86	.66	**1.52**	1.85	2.31	**15.80**
6828	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Crown Brand Ammoniated Guano.	Walnut Cove	R	**7.81**	.52	1.14	1.66	2.02	3.15	16.97
6836	do	Eli Ammoniated Fertilizer	Stoneville	S	8.68	.36	.68	**1.04**	1.26	2.42	**14.53**
6875	Columbia Guano Co., Norfolk, Va.	Columbia Soluble Guano	Roxboro	S	8.05	1.16	.76	1.92	2.33	2.33	17.29
6814	Listers' Agrl. Chemical Works, Newark, N. J.	Listers' Success Fertilizer	Mooresville	S	8.10	.80	.88	1.68	2.04	**1.93**	15.96
6894	Navassa Guano Co., Wilmington, N. C.	Navassa Grain Fertilizer	Forest City	S	**7.16**	1.14	.78	1.92	2.33	2.23	16.38
6872	Patapsco Guano Co., Baltimore, Md.	Sea Gull Ammoniated Guano	Roxboro	R	8.43	.78	1.10	1.88	2.28	2.08	17.21
6917	do	do	Mooresville	R	8.49	.78	1.06	1.84	2.23	2.19	17.22
6840	Powhatan Chemical Co., Richmond, Va.	Magic Tobacco Grower	Mt. Airy	S	8.35	.72	1.08	1.80	2.19	2.69	17.79
6885	Richmond Guano Co., Richmond, Va.	Premium Brand Fertilizer	Wilkesboro	S	8.76	.50	.78	**1.28**	1.55	2.38	**15.49**
6912	do	do	Dunn	R	8.50	.40	1.20	**1.60**	1.94	2.15	16.45
6903	Royster, F. S., Guano Co., Norfolk, Va.	Farmers' Bone Fertilizer	Wilson	S	**7.88**	1.10	.52	**1.62**	1.97	2.05	**15.66**
6873	do	do	Durham	S	8.02	1.00	.68	1.68	2.04	2.13	16.11
6916	do	do	Mt. Airy	R	**7.98**	1.00	.72	1.72	2.09	2.12	16.22
6816	Swift's Fertilizer Works, Atlanta, Ga.	Swift's Red Steer Guano	Mooresville	R	9.91	.64	.90	**1.54**	1.87	2.03	17.16
6847	Tuscarora Fertilizer Co., Wilmington, N. C.	Tuscarora Standard Fertilizer	Wilkesboro	R	**7.55**	.62	1.14	1.76	2.14	**1.66**	**15.48**
6818	Union Guano Co., Winston, N. C.	Old Honesty Guano	Mooresville	R	**7.37**	.30	1.26	**1.56**	1.89	3.00	16.02
6906	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Anchor Brand Fertilizer.	Whiteville	R	**7.59**	.62	1.00	**1.62**	1.97	**1.98**	**15.33**
6834	do	do	Stoneville	R	9.28	.24	.96	**1.20**	1.46	3.29	16.65
6876	do	Ajax C. S. M.	Oxford	D	**7.93**	.16	1.48	**1.64**	1.99	2.20	15.95
6905	do	Davie & Whittle's Owl Brand Guano.	Vineland	D	9.47	.70	.68	**1.38**	1.68	3.07	17.28
6849	do	Electric Standard Guano	Wilkesboro	R	9.25	.22	1.12	**1.34**	1.63	2.17	15.94
6866	do	Farmers' Favorite Fertilizer	Pilot Mt.	R	10.26	.36	1.08	**1.44**	1.75	2.16	19.22
6892	do	Genuine Slaughterhouse Bone Guano.	Elkin	R	**7.98**	.36	1.52	1.88	2.28	2.24	16.98

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per ton at Factory.
					Available Phosphoric Acid.	Water-Soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
			MIXED FERTILIZERS.								
6871	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Special Wheat Guano.	Winston	S	**7.77**	.84	.76	**1.60**	1.94	2.36	15.83
6848	....do	Owl Brand Guano	Wilkesboro	S	8.55	.36	1.50	1.86	2.26	2.36	17.74
6897	....do	Powers, Gibbs & Co.'s Eagle Island Ammoniated Guano.	Lincolnton	S	**7.93**	.50	1.66	2.16	2.62	**1.51**	17.28
6908	....do	Powers, Gibbs & Co.'s Soluble Ammoniated Guano.	Whiteville	R	8.15	.66	1.00	1.66	2.02	2.00	16.01
6900	....do	Stonewall Guano	Stoneville	R	9.37	.32	1.28	**1.60**	1.94	2.14	17.03
6823	....do	Travers & Co.'s Beef, Blood and Bone Fertilizer.	Statesville	R	**7.97**	.24	1.14	**1.38**	1.68	**1.88**	**14.62**
6879	....do	Travers & Co.'s National Fertilizer.	Durham	D	**7.79**	1.10	.82	1.92	2.33	3.20	18.02
	Brand claiming				**8.00**			**.82**	**1.00**	**3.00**	**13.70**
6829	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Comet Guano	Stoneville	S	9.66	.12	.64	.76	.92	**2.07**	13.93
	Brand claiming				**8.00**			**.82**	**1.00**	**4.00**	**14.80**
6857	Powhatan Chemical Co., Richmond, Va.	Magic Grain Special	Mt. Airy	D	9.07	.16	.82	.98	1.19	**3.87**	16.24
	Brands claiming				**8.00**			**2.06**	**2.50**	**2.00**	**17.43**
6910	Navassa Guano Co., Wilmington, N. C.	Ammoniated Soluble Navassa Guano.	Wallace	R	8.20	1.04	.72	**1.76**	2.14	2.31	**16.78**
6907	Va.-Car. Chemical Co., Richmond, Va.	Travers & Co.'s Capital Cotton Fertilizer.	Vineland	R	9.48	1.02	.40	**1.42**	1.72	3.08	17.46
	Brands claiming				**8.00**			**2.06**	**2.50**	**3.00**	**18.53**
6874	Royster, F. S., Guano Co., Norfolk, Va.	Orinoco Tobacco Guano	Durham	S	**7.95**	1.48	.76	2.24	2.72	3.50	19.74
6877	Va.-Car. Chemical Co., Richmond, Va.	Blue Star	....do	D	**7.95**	.70	1.38	2.08	2.53	3.75	**19.39**
	Brands claiming				**8.00**			**2.47**	**3.00**	**3.00**	**20.13**
6914	Swift Fertilizer Works, Atlanta, Ga.	Swift's Ruralist Guano	Burgaw	R	8.89	.80	1.80	2.60	3.16	3.11	21.56
6817	Union Guano Co., Winston, N. C.	Union Homestead Guano	Statesville	R	**6.35**	1.66	2.12	3.78	4.59	**2.41**	23.10
6899	....do	Victoria High Grade Tobacco Fertilizer.	Ararat	R	9.51	1.52	.90	**2.42**	2.94	**2.69**	20.95
6904	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Guano Co.'s Farmers' Friend Guano.	Selma	R	8.49	1.14	1.24	**2.38**	2.89	3.05	20.27

	Brand claiming			**8.00**			**3.29**	**4.00**	**4.00**	**24.47**
6913	Swift Fertilizer Works, Atlanta, Ga.	Swift's High Grade Monarch Vegetable Grower.	Chadbourn	R	8.59	.78	2.54	3.32	4.03	**3.73**	24.78
	Brand claiming			**9.00**			**.82**	**1.00**	**2.00**	**13.50**
6850	Va.-Car. Chemical Co., Richmond, Va.	Ford's Wheat and Corn Guano.	Wilkesboro	R	10.25	.30	.56	.86	1.04	2.45	15.27
	Brands claiming			**9.00**			**.82**		**3.00**	**14.80**
6862	Patapsco Guano Co., Baltimore, Md.	Coon Brand Guano	Wilkesboro	R	9.23	.46	.66	1.12	1.36	3.22	16.22
6890	Va.-Car. Chemical Co., Richmond, Va.	Bigelow's Crop Grower	Forest City	S	9.02	.48	.30	**.78**	.95	**2 60**	**14 02**
	Brand claiming			**9.00**			**1.85**	**2.00**	**1.00**	**15 64**
6878	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Star Brand Guano	Durham	R	**7.86**	.30	1.22	**1 62**	1 97	1.47	**15.00**
	Brands claiming			**9.00**			**2.06**	**2.50**	**2 00**	**18 33**
6815	Patapsco Guano Co., Baltimore, Md.	Patapsco Guano	Mooresville	R	9.35	.86	1.40	2.26	2.74	2 03	19.46
6832	Va.-Car. Chemical Co., Richmond, Va.	Owl Brand Special Tobacco Guano.	Stoneville	R	9.33	1.44	1.54	2.98	3.62	**1.52**	21.69
	Brand claiming			**11.00**			**2.47**	**3.00**	**4 00**	**23.93**
6895	Va.-Car. Chemical Co., Richmond, Va.	Charlotte Oil and Fertilizer Co.'s Perfect Wheat Grower.	Elkin	R	11.32	1.04	.98	2.62	3.18	**2.87**	**23.56**
	Brand claiming			**8 00**			**4.12**	**5.00**	**7.00**	**29.17**
6911	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano	Chadbourn	S	6.84	3.32	1.12	4.44	5.39	8.10	32.38
	Brand claiming			**7.00**			**8 24**	**10 00**	**2.00**	40.64
6909	American Fertilizer Co., Norfolk, Va.	Ten Per Cent Ammonia Guano	Wallace	S	7.70	6.02	1.32	**7.32**	8.89	2.62	**38 36**
	Brands claiming			**8 00**					**4.00**	**11.60**
6827	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Buncombe Wheat Grower	Walnut Cove	R	10.97					4.42	14.73
6825	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	----do	R	8.11					**3.11**	**10.72**
6831	Richmond Guano Co., Richmond, Va.	Winter Grain and Grass Grower	----do	R	**7.74**					**3.36**	**10.60**
6840	Union Guano Co., Winston, N. C.	Union Wheat Mixture	Mt. Airy	R	9.03					**1 97**	**10.29**
6843	Va.-Car. Chemical Co., Richmond, Va.	Carr's Special Wheat Grower	----do	R	8.82					**3.64**	11.94
6841	----do	Miller's Special Wheat Mixture.	Elkin	R	8.32					**3 98**	11.87
	Brands claiming			**10.00**					**2.08**	**11.20**
6858	Armour Fertilizer Works, Wilmington, N. C.	Armour's Superphosphate	Wilkesboro	D	10.13					2.18	11.51
6826	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Electric Bone and Potash Mixture.	Walnut Cove	R	10.64					3.64	13.58
6824	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	----do	R	**9.41**					**2.13**	**10.81**
6887	Richmond Guano Co., Richmond, Va.	Bone and Potash Mixture	Wilkesboro	R	10.05					2.00	11.24
6863	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Bone and Potash Mixture.	Winston	S	**9.92**					**1.98**	11.08
6839	Union Guano Co., Winston, N. C.	Union Bone and Potash	Mt. Airy	R	10.58					**1.47**	11.14
6844	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s McGavock's Special Potash Mixture.	----do	R	10.80					**1.80**	11.70
6855	----do	Mammoth Wheat and Corn Grower.	Wilkesboro	R	10.06					**1.77**	**11.00**
6867	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Co.'s Alkaline Bone and Potash.	Winston	R	10.21					**1.55**	**10.89**
6820	----do	V. C. C. Co.'s Blue Ridge Wheat Grower.	Statesville	R	10.34					**1.78**	11.24

ANALYSES OF COMMERCIAL FERTILIZERS—FALL SEASON, 1908.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per ton at Factory.
					Available Phosphoric Acid.	Water-Soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
					MIXED FERTILIZERS.						
6819	Va.-Car. Chemical Co., Richmond, Va.	V. C. C. Co.'s Standard Wheat Grower.	Statesville	R	10.00					1.39	10.53
	Brand claiming				**10.50**					**1.50**	**11.10**
6880	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s Great Wheat and Corn Grower.	Roxboro	R	10.87					1.41	11.33
	Brands claiming				**10.00**					**4.00**	**13.40**
6860	Armour Fertilizer Works, Wilmington, N. C.	Armour's Superphosphate and Potash Fertilizer.	Wilkesboro	R	**8.91**					4.63	**13.11**
6889	Richmond Guano Co., Richmond, Va.	Rex Bone and Potash Mixture	do	R	10.77					**3.50**	14.44
6842	Va.-Car. Chemical Co., Richmond, Va.	V. C. C. Co.'s Special Potash Mixture.	Elkin	D	11.03					**3.87**	14.18
6856	do	Winner Grain Mixture	Wilkesboro	R	**9.92**					4.22	13.57
	Brand claiming				**10.00**					**5.00**	**14.50**
6853	Tuscarora Fertilizer Co., Wilmington, N. C.	Tuscarora Alkaline	Wilkesboro	R	**9.60**					5.09	**14.24**
	Brand claiming									**12.00**	**12.00**
6883	Va.-Car. Chemical Co., Richmond, Va.	Genuine German Kainit	Oxford	S						13.12	13.12
	Brand claiming							**2.47**	**3.00**		**25.69**
6884	Armour Fertilizer Works, Baltimore, Md.	Armour's Bone Meal	Tobaccoville	D				**2.40**	2.91		**25.15**
	Brand claiming							**3.70**	4.49		**[1]28.37**
6886	Baugh & Sons Co., Norfolk, Va.	Baugh's Raw Bone Meal	Madison	D				3.84	4.66		[2]28.73
6833	Va.-Car. Chemical Co., Richmond, Va.	Pure Raw Bone Meal	Stoneville	D				4.24	5.15		[3]30.87
6898	do	do	Ararat	D				4.12	5.00		[4]29.09

1.—Total Phosphoric Acid found, 23.58, valued at 3½ cents per pound.
2.—Total Phosphoric Acid found, 21.30, valued at 3½ cents per pound.
3.—Total Phosphoric Acid found, 22.30, valued at 3½ cents per pound.
4.—Total Phosphoric Acid found, 23.38, valued at 3½ cents per pound.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per ton at Factory.
					Available Phosphoric Acid.	Water-Soluble Ammonia.	Organic Ammonia	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
RAW OR UNMIXED FERTILIZER MATERIALS.											
	Brands claiming				**12.00**						**9.60**
6885	Armour Fertilizer Works, Baltimore, Md.	Armour's Acid Phosphate	Tobaccoville	R	**10.12**						**8.10**
6870	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Royster Acid Phosphate.	Winston	R	15.11						12.08
	Brands claiming				**13.00**						**10.40**
6881	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s I X L Acid Phosphate	Durham	D	13.63						10.90
6896	do	Norfolk-Carolina Chemical Co.'s Best Acid Phosphate.	Elkin	D	**12.45**						**9.96**
6868	do	Old Dominion Bone Phosphate	Winston	R	14.79						11.83
6901	do	Va.-Car. Chemical Co.'s Clipper Brand Acid Phosphate.	Elkin	R	13.37						10.69
6851	do	Victor Acid Phosphate	Wilkesboro	D	16.92						13.54
	Brands claiming				**14.00**						**11.20**
6837	Baugh & Sons Co., Norfolk, Va.	Baugh's High Grade Acid Phosphate.	Winston	D	15.05						12.04
6852	Royster, F. S., Guano Co., Norfolk, Va.	Royster's 14 Per Cent Acid Phosphate.	do	R	**12.60**						**10.08**
6891	Va.-Car. Chemical Co., Richmond, Va.	Almont High Grade Acid Phosphate.	Lincolnton	R	15.07						12.05
6869	do	Old Dominion High Grade Acid Phosphate.	Winston	D	**13.66**						**10.92**
6835	do	S. W. Travers & Co.'s Dissolved Bone Phosphate.	Stoneville	R	14.29						11.43
6882	do	V. C. C. Co.'s 14 Per Cent Acid Phosphate.	Oxford	D	14.29						11.43
	Brands claiming				**16.00**						**12.80**
6861	Patapsco Guano Co., Baltimore, Md.	Florida Soluble Phosphate	Wilkesboro	R	**15.82**						**12.66**
6915	Richmond Guano Co., Richmond, Va.	Rex Dissolved Bone Phosphate	Dunn	R	16.27						13.02
6864	Royster, F. S., Guano Co., Norfolk, Va.	Royster's High Grade Acid Phosphate.	Winston	R	16.69						13.35
6865	Va.-Car. Chemical Co., Richmond, Va.	V. C. C. Co.'s 16 Per Cent Acid Phosphate.	do	R	16.16						12.93

N, D, R, S, B, P, Y, and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

II. REGISTRATION OF FERTILIZERS.

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
The Atlantic Chemical Corporation, Norfolk, Va.—			
Nitrate of Soda	----	15.22	----
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Atlantic High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Atlantic 14 Per Cent Acid Phosphate	14.00	----	----
Atlantic Dissolved Bone	13.00	----	----
Atlantic Acid Phosphate	12.00	----	----
Atlantic 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Atlantic Bone and Potash for Grain	10.00	----	3.00
Atlantic Bone and Potash Mixture	10.00	----	2.00
Atlantic 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Atlantic 7 Per Cent Truck Guano	7.00	5.77	7.00
Atlantic Potato Guano	7.00	4.12	5.00
Atlantic Special Truck Guano	8.00	3.30	4.00
Atlantic High Grade Tobacco Guano	8.00	2.47	3.00
Atlantic Tobacco Grower	8.00	2.06	3.00
Atlantic Tobacco Compound	8.00	2.06	2.00
Atlantic Special Guano	9.00	1.65	1.00
Atlantic Special Wheat Fertilizer	8.00	1.65	2.00
Atlantic Meal Compound	9.00	2.27	2.00
Atlantic High Grade Cotton Guano	8.00	2.47	3.00
Atlantic Soluble Guano	8.00	1.65	2.00
Apex Peanut Grower	8.00	1.02	4.00
Perfection Peanut Grower	7.00	----	5.00
Oriental High Grade Guano	8.00	3.30	4.00
Paloma Tobacco Guano	8.00	3.30	4.00
Pure Raw Bone Meal—Total	21.50	3.71	----
Corona Cotton Compound	9.00	1.65	3.00
Atlantic 10 and 5 Bone and Potash Mixture	10.00	----	5.00
Geo. L. Arps & Co., Norfolk, Va.—			
Arps' Potato Guano	6.00	5.76	5.00
Arps' Standard Truck Guano	7.00	4.12	5.00
Arps' Scuppernong Guano for Trucks	6.00	4.12	7.00
Geo. L. Arps & Co.'s Big Yield Guano	8.00	1.65	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Arps' Premium Guano for Cotton, Tobacco and All Spring Crops	8.00	1.65	2.00
Arps' Tobacco Guano	8.00	2.47	3.00
Acme Manufacturing Co., Wilmington, N. C.—			
Acme Acid Phosphate	12.00	----	----
Acme Bone and Potash	10.00	----	2.00
Acme Bone and Potash	10.00	----	3.00
Acme Bone and Potash	10.00	----	4.00
Acme Bone and Potash	8.00	----	4.00
Acme Bone and Potash	11.00	----	2.00
Acme High Grade Acid Phosphate	14.00	----	----
Acme Acid Phosphate	16.00	----	----
Acme Standard Guano	8.00	2.06	2.00
Acme High Grade Guano	6.00	4.95	8.00
Acme Strawberry Top Dresser	8.00	1.65	4.00
Acme Truck Grower	6.00	3.30	8.00
Acme Top Dresser	----	7.42	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Acme Cotton Grower	9.00	2.27	2.00
Acme Special Grain	8.00	1.65	2.00
Acme Fertilizer for Tobacco	8.00	2.47	2.50
Acme Fertilizer	8.00	2.47	2.50
Acme Acid Phosphate	13.00	----	----
Gibson's Melon Grower	10.00	3.30	5.00
Acme Corn Guano	6.00	2.47	3.00
Clark's Corn Guano	1.00	6.60	10.00
P. D. Special	8.00	2.47	3.00
Quickstep	8.00	3.30	4.00
Gem Fertilizer	8.00	1.65	2.00
Cotton Seed Meal Guano	8.00	1.65	2.00
Lattimer's Complete Fertilizer	8.00	2.06	2.00
Tiptop Crop Grower	8.00	2.06	3.00
Tiptop Tobacco Grower	8.00	2.06	3.00
Sulphate of Ammonia	----	20.62	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	48.00
Acme Bone and Potash	10.00	----	5.00
Ashepoo Fertilizer Co., Charleston, S. C.—			
High Grade Eutaw Acid Phosphate	14.00	----	----
High Grade Ashepoo Acid Phosphate	14.00	----	----
High Grade Ashepoo Dissolved Phosphate	16.00	----	----
High Grade Ashepoo Superpotash Acid Phosphate	10.00	----	4.00
High Grade Ashepoo Vegetable Guano	5.00	4.12	5.00
High Grade Ashepoo Truck Guano	7.00	4.12	5.00
High Grade Ashepoo Farmers' Special	8.00	2.06	3.00
High Grade Ashepoo Special Cotton Seed Meal Guano	8.00	2.46	2.00
High Grade Ashepoo Ammoniated Superphosphate	8.00	2.46	2.00
High Grade Ashepoo Bird and Fish Guano	8.00	2.46	3.00
High Grade Ashepoo Meal Mixture	8.00	2.46	3.00
High Grade Ashepoo X Tobacco Fertilizer	8.00	2.46	3.00
High Grade Ashepoo Golden Tobacco Producer	8.00	2.46	3.00
High Grade Ashepoo Guano	8.00	3.29	4.00
High Grade Ashepoo Perfection Guano	8.00	3 29	6.00
High Grade Ashepoo Fruit Grower	8.00	3.91	2.75
High Grade Ashepoo Watermelon Guano	10.00	3.29	5.00
High Grade Eutaw X Golden Fertilizer	8.00	2.46	4.00
High Grade Eutaw Special Cotton-seed Meal Guano	8.00	2.46	4.00
High Grade Carolina XXX Guano	8.00	2.46	3.00
High Grade Taylor's Circle Guano	9.00	1.65	4.00
Standard Eutaw XX Acid Phosphate	12.00	----	----
Standard Eutaw XXX Acid Phosphate	13.00	----	----
Standard Eutaw Potash Acid Phosphate	11.00	----	1.00
Standard Eutaw Acid Phosphate and Potash	12.00	----	1.00
Standard Eutaw Circle Guano	8.00	2.06	2.00
Standard Eutaw XX Guano	8.50	1.65	2.00
Standard Eutaw XXX Guano	9.00	1.65	2.00
Standard Eutaw Fertilizer	9.00	1.85	1.00
Standard Ashepoo Fertilizer	9.00	1.85	1.00
Standard Ashepoo Harrow Brand Raw Bone Superphosphate	9.00	1.65	2.00
Muriate of Potash	----	----	45.00
Nitrate of Soda	----	14.81	----
H. G. Ashepoo Bone and Potash	12.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
H. G. Eutaw Superpotash Acid Phosphate	10.00	----	4.00
Standard Ashepoo Wheat and Oats Special	9.50	1.65	1.00
Standard Ashepoo XXX Guano	8.65	1.65	2.00
Standard Ashepoo XX Guano	8.50	1.65	2.00
Standard Ashepoo Circle Guano	8.00	2.06	2.00
Standard Ashepoo Guano	8.50	2.06	1.00
Standard Ashepoo Special Fertilizer	8.00	1.65	2.00
Standard Ashepoo Acid Phosphate and Potash	12.00	----	1.00
Standard Ashepoo Potash and Acid Phosphate	11.00	----	1.00
Standard Ashepoo Potash Compound	10.00	----	3.00
Standard Ashepoo XXX Acid Phosphate	13.00	----	----
Standard Ashepoo Dissolved Bone	12.00	----	----
Standard Ashepoo XX Acid Phosphate	12.00	----	----
Standard Coomassie Acid Phosphate	12.00	----	----
Standard Coomassie Circle Fertilizer	8.00	1.65	2.00
Standard Carolina Guano	8.00	1.65	2.00
Standard Carolina Acid Phosphate	13.00	----	----
Standard Circle Bone	13.00	----	----
Standard Palmetto Potash Acid Phosphate	11.00	----	1.00
Standard Brownwood Acid Phosphate	8.00	----	4.00
Standard P. D. Fertilizer	8.00	1.65	2.00
German Kainit	----	----	12.00
Standard Enoree Acid Phosphate and Potash	10.00	----	2.00
High Grade Ashepoo XXXX Acid Phosphate	14.00	----	----
Taylor's XX Ammoniated Dissolved Fertilizer	10.00	.82	1.00
High Grade Ashepoo Nitrogenous Top Dressing	3.00	7.00	2.00
The Armour Fertilizer Works, Atlanta, Chicago and Wilmington—			
Top Dresser	5.00	8.24	2.00
10 Per Cent Trucker	5.00	8.25	3.00
Manure Substitute	6.00	3.30	4.00
7 Per Cent Trucker	6.00	5.78	5.00
General	8.00	1.65	2.00
Fruit and Root Crop Special	8.00	1.65	5.00
High Grade Potato	8.00	1.65	10.00
King Cotton No. 2	8.00	2.06	2.00
Champion	8.00	2.06	2.50
Gold Medal for Tobacco	8.00	2.06	3.00
Berry King	8.00	2.06	4.00
Cotton Special	8.00	2.47	3.00
Tobacco Special	8.00	2.47	3.00
Truck and Berry Special	8.00	2.47	10.00
All Soluble	8.00	2.88	4.00
Special Trucker	8.00	3.30	4.00
Bone, Blood and Potash	8.00	4.12	7.00
Bone and Dissolved Bone with Potash	9.00	1.65	3.00
African Cotton Grower	9.00	2.47	3.00
10 Per Cent Trucker	5.00	8.24	3.00
Dried Blood	----	13.18	----
Phosphoric Acid with Potash	10.00	----	5.00
Superphosphate and Potash	10.00	----	4.00
M H. White & Co.'s Special Corn Mixture	10.00	----	2.00
Phosphate and Potash No. 2	8.00	----	5.00
Phosphate and Potash No. 1	10.00	----	2.00
17 Per Cent Acid Phosphate	17.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
13 Per Cent Acid Phosphate	13.00	----	----
12 Per Cent Acid Phosphate	12.00	----	----
Star Phosphate	14.00	----	----
Nitrate of Soda	----	14.83	----
Harvey's Special	4.00	3.30	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
10 Per Cent Tankage	2.00	8.24	----
Manure Substitute	6.00	3.30	4.00
Carolina Cotton Grower	8.00	2.47	2.00
Carolina Cotton Special	8.00	1.65	3.00
Kainit	----	----	12.00
King Cotton	8.00	2.06	2.00
Ammoniated Dissolved Bone and Potash	10.00	1.65	2.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Van Lindley's Special	8.00	4.12	2.00
Standard Cotton Grower	8.50	1.65	2.00
Armour's Slaughterhouse Fertilizer	8.00	1.65	2.00
American Fertilizer Co., Norfolk, Va.—			
10 Per Cent Ammoniated Guano	7.00	8.24	2.50
Standard 7 Per Cent Ammonia Guano	7.00	5.76	5.00
American Irish Potato Grower	7.00	4.12	5.00
American 7-7-7 for Irish Potatoes	7.00	5.76	7.00
American Fish Scrap Guano	7.00	3.29	4.00
American Eagle Guano	8.00	2.47	3.00
American No. 1 Fertilizer	8.00	2.06	3.00
American No. 2 Fertilizer	8.00	1.65	2.00
American Cotton Compound	8.00	1.65	2.00
American Standard Cotton Grower	10.00	1.65	2.00
American Special Potash Mixture for Wheat	8.00	----	4.00
American High Grade Acid Phosphate	16.00	----	----
Special Formula Guano for Yellow Leaf Tobacco	9.00	2.88	5.00
Special Potato Guano	7.00	4.12	7.00
Special Potato Manure	6.00	4.12	7.00
Bone and Peruvian Guano	8.00	1.65	2.00
Bone and Peruvian Guano	8.75	1.65	2.00
A. L. Hanna's Special	8.00	1.65	2.00
Peruvian Mixture	8.50	1.65	1.50
Blood and Bone Compound	8.50	2 06	1.00
Bob White Fertilizer for Tobacco	8.00	2.06	2.50
J. G. Miller & Co.'s Yellow Leaf Fertilizer	8.00	2.47	3.00
Pitt County Special Fertilizer	9.00	2.88	5.00
N. C. and S. C. Cotton Grower	8.00	3.29	4.00
Peruvian Mixture Guano Especially Prepared for Sweet Potatoes	8.00	3.29	5.00
Kale, Spinach and Cabbage Guano	7.00	4.12	4.00
Stable Manure Substitute	7.00	2.47	4.00
Strawberry and Asparagus Guano	9.00	2.88	9.00
Ground Fish Scraps	----	8.24	----
Nitrate of Soda	----	14.83	----
Raw Bone Meal—Total	22.50	3.71	----
Muriate of Potash	----	----	49.00
Sulphate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Eagle Brand Acid Phosphate	13.00	----	----
High Grade Acid Phosphate	14.00	----	----
Dissolved Bone and Potash for Corn and Wheat	10.00	----	2.00
Double Dissolved Bone and Potash	10.00	----	4.00
Cooper's Genuine Eagle Island	8.00	1.65	2.00
Atlantic Fertilizer Co., Baltimore, Md.—			
Farmers' Alkaline Bone	10.00	----	2.00
Big 4, Blood, Bone, Fish and Potash for Early Truck	6.00	2.47	6.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
American Agricultural Chemical Co., New York—			
Holmes & Dawson Productive Cotton and Peanut Grower	9.00	2.26	2.00
Pure Ground Bone Total	20.60	3.70	----
Fine Ground Bone Total	22.80	2.47	----
Holmes & Dawson Triumph Soluble	8.00	1.65	2.00
Holmes & Dawson Gold Dust Guano	9.00	1.65	2.00
Savage Sons & Co. Purity Guano	8.00	1.65	2.00
Lazaretto Truckers' Favorite	6.00	5.76	5.00
Lazaretto Early Trucker	7.00	4.11	5.00
Lazaretto Challenge Fertilizer	8.00	2.47	3.00
Lazaretto Special for Tobacco and Potatoes	8.00	2.47	3.00
Lazaretto Climax Plant Food	8.00	2.06	3.00
Lazaretto Universal Compound	8.00	2.06	2.00
Lazaretto Crop Grower	8.00	1.65	2.00
Lazaretto High Grade Dissolved Bone and Potash,	12.00	----	5.00
Lazaretto Alkaline Bone Phosphate	12.00	----	3.00
Lazaretto Dissolved Bone and Potash	10.00	----	2.00
Lazaretto Acid Phosphate	14.00	----	----
Reese Pacific Guano	8.00	1.65	2.00
Reese Pacific Guano for Tobacco	8.50	2.47	2.50
Canton Chemical Truckers' Special 7 Per Cent	6.00	5.76	5.00
Canton Chemical Excelsior Trucker	7.00	4.11	5.00
Canton Chemical Baker's Tobacco Fertilizer	8.00	2.47	3.00
Canton Chemical Baker's Fish Guano	8.00	1.65	2.00
Canton Chemical Baker's Dissolved S. C. Bone	14.00	----	----
Canton Chemical Baker's Standard High Grade Guano	8.00	2.06	3.00
Canton Chemical Gem Phosphate	12.00	----	----
Canton Chemical Soluble Bone and Potash	10.00	----	2.00
Canton Chemical Soluble Alkaline Bone	12.00	----	3.00
Canton Chemical Game Guano	8.00	1.65	2.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Canton Chemical CCC Special Compound	8.00	2.06	6.00
Canton Chemical Superior High Grade Fertilizer	8.00	2.47	3.00
Detrick's Gold Basis	6.00	5.76	5.00
Detrick's Special Trucker	7.00	4.11	5.00
Detrick's Gold Eagle	6.00	2.47	6.00
Detrick's Quickstep Bone and Potash	8.00	2.47	4.00
Detrick's Special Tobacco Fertilizer	8.00	2.47	3.00
Detrick's Vegetator Ammoniated Superphosphate,	8.00	2.06	3.00
Detrick's Kangaroo Komplete Kompound	8.00	1.65	3.00
Detrick's Royal Crop Grower	8.00	1.65	2.00
Detrick's Fish Mixture	8.00	1.65	2.00
Detrick's Victory Alkaline Bone	12.00	----	5.00
Detrick's P. & B Special	12.00	----	3.00
Detrick's Soluble Bone Phosphate and Potash	10.00	----	2.00
Detrick's XXtra Acid Phosphate	14.00	----	----
Zell's 10 Per Cent Trucker	5.00	8.23	3.00
Zell's 7 Per Cent Potato and Vegetable Manure	6.00	5.76	5.00
Zell's Truck Grower	7.00	4.11	5.00
Zell's Special Compound for Potatoes and Vegetables	8.00	2.47	4.00
Zell's Tobacco Fertilizer	8.00	2.47	4.00
Zell's Bright Tobacco Grower	8.00	2.47	3.00
Zell's Royal High Grade Fertilizer	9.00	2.06	2.00
Zell's Special Compound for Tobacco	8.00	1.65	2.00
Zell's Calvert Guano	8.00	1.65	2.00
Zell's Ammonia Bone Superphosphate	8.00	1.65	2.00
Zell's High Grade Potash Fertilizer	10.00	----	4.00
Zell's Reliance High Grade Manure	8.00	2.47	3.00
Sulphate of Potash	----	----	48.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Zell's Fish Guano	8.00	1.65	2.00
Zell's Dissolved Bone Phosphate	14.00	----	----
Holmes & Dawson's Crop Worker	8.00	1.65	2.00
Fidelity Crop Grower	8.00	.82	3.00
16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	.12
Nitrate of Soda	----	15.00	----
Zell's Electric Phosphate	10.00	----	2.00
Bull Head Potato and Vegetable Manure	6.00	4.11	7.00
Enterprise Alkaline Phosphate	8.00	----	5.00
Royal Alkaline Bone	10.00	----	4.00
Palmetto Alkaline Phosphate	8.00	----	4.00
Slingluff's Bright Mixture	8.00	2.06	2.50
Pure Ground Bone—Total	45.00	3.29	----
Muriate of Potash	----	----	50.00
A. A. C. Co.'s 16 Per Cent Superphosphate	16.00	----	----
Detrick's Superior Animal Bone Fertilizer	9.00	1.85	4.00
Lazaretto Retriever Animal Bone Fertilizer	9.00	1.85	4.00
Zell's Victoria Animal Bone Compound	9.00	1.85	4.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Purity Guano—2-8-2—for S. S. & Co.	8.00	1.65	2.00
A. D. Adair & McCarty Bros., Atlanta, Ga.—			
Adair's Wheat and Grass Grower	10.00	----	4.00
Adair's Dissolved Bone	12.00	----	----
Adair's High Grade Dissolved Bone	14.00	----	----
Adair's High Grade Dissolved Bone, No. 16	16.00	----	----
Adair's Special Potash Mixture	8.00	----	4.00
Adair's Ammoniated Dissolved Bone	8.00	1.65	2.00
Adair's Soluble Pacific Guano	10.00	1.65	2.00
McCarty's Wheat Special	10.00	.82	3.00
McCarty's Corn Special	10.00	.82	3.00
McCarty's Soluble Bone	10.00	.82	1.00
McCarty's High Grade Corn Grower	10.00	1.65	2.00
McCarty's High Grade Cotton Grower	10.00	1.65	2.00
Planters' Soluble Fertilizer	8.00	1.65	2.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
High Grade Potash Compound	10.00	----	4.00
Golden Grain Compound	8.00	.82	3.00
A. & M. 13-4	13.00	----	4.00
David Harum High Grade Guano	10.00	3.30	4.00
Adair's H. G. Blood and Bone	10.00	2.47	3.00
Special Wheat Compound	10.00	1.65	4.00
Special Corn Compound	10.00	1.65	4.00
Special Vegetable Compound	10.00	1.65	4.00
Special Potato Compound	10.00	1.65	4.00
Special Tomato Compound	10.00	1.65	4.00
Old Time Fish Scrap Guano	10.00	1.65	2.00
Adair's Wheat and Grass Grower, No. 8	10.00	----	8.00
Adair's Wheat and Grass Grower, No. 6	10.00	----	6.00
Adair's Wheat and Grass Grower, No. 5	10.00	----	5.00
H. G. Potash Compound, No. 8	10.00	----	8.00
H. G. Potash Compound No. 6	10.00	----	6.00
H. G. Potash Compound No. 5	10.00	----	5.00
Adair's Special Potash Mixture No. 5	8.00	----	5.00
Adair's Special Potash Mixture No. 6	8.00	----	6.00
Adair's Special Potash Mixture No. 8	8.00	----	8.00
McCarty's Potash Formula	12.00	----	2.00
McCarty's Potash Formula No. 4	12.00	----	4.00
McCarty's Potash Formula No. 5	12.00	----	5.00
A & M. 13—2	13.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Asheville Packing Co., Asheville, N. C.—			
Asheville Packing Co.'s Extra H. G. Fruit and Potato Special	8.00	1.65	6.00
Asheville Packing Co.'s Special Tobacco and Vegetable Fertilizer	8.00	2.47	3.00
Asheville Packing Co.'s Extra H. G. Vegetable Special	8.00	4.12	5.00
Asheville Packing Co.'s H. G. Muriate of Potash	----	----	52.00
Asheville Packing Co.'s Standard Grade Acid Phosphate	12.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	13.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	14.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	15.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	16.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	17.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	18.00	----	----
Asheville Packing Co.'s Pure Bone Meal---Total	18.00	2.47	----
Asheville Packing Co.'s Standard Potato	9.00	.82	2.00
Asheville Packing Co.'s Extra H. G. Potash Mixture	13.00	----	4.00
Asheville Packing Co.'s Celebrated Tankage	10.00	4.12	----
Asheville Packing Co.'s Extra H. G. Fertilizer	10.00	3.30	4.00
Asheville Packing Co.'s Extra H. G. Blood and Bone	10.00	2.47	3.00
Asheville Packing Co.'s H. G. Wheat, Corn and Oat Special	10.00	1.65	2.00
Asheville Packing Co.'s Extra H. G. Cotton Special	10.00	1.65	2.00
Asheville Packing Co.'s Standard Bone and Potash	10.00	.82	1.00
Asheville Packing Co.'s H. G. Special Potash Mixture	10.00	----	4.00
Asheville Packing Co.'s Standard Wheat Grower	10.00	----	2.00
Asheville Packing Co.'s Complete Fertilizer	8.00	1.65	2.00
Asheville Packing Co.'s Corn and Wheat	8.00	.82	3.00
Asheville Packing Co.'s Bone and Potash	8.00	----	4.00
Baugh & Sons Co., Phila., Pa., and Norfolk, Va.—			
Baugh's 16 Per Cent Acid Phosphate	16.00	----	----
Baugh's 5-6-5 Guano	6.00	4.12	5.00
Baugh's New Process 10 Per Cent Guano	5.00	8.23	2.50
Baugh's Fish Mixture	8.00	1.65	2.00
Baugh's Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Fish. Bone and Potash	8.00	3.30	4.00
Baugh's Animal Bone and Potash Compound for All Crops	8.00	1.65	2.00
Baugh's Complete Animal Bone Fertilizer	8.00	1.65	5.00
Baugh's Peruvian Guano Substitute for Potatoes and All Vegetables	6.00	4.12	7.00
Baugh's Grand Rapids High Grade Truck Guano	8.00	2.47	3.00
Baugh's Special Tobacco Guano	8.00	2.47	5.00
Baugh's Fruit and Berry Guano	8.00	2.47	10.00
Baugh's 7 Per Cent Potato Guano	6.00	5.76	5.00
Baugh's Soluble Alkaline Superphosphate	10.00	----	2.00
Baugh's Special Manure for Melons	10.00	3.30	4.00
Baugh's Sweet Potato Guano for Sweet Potatoes, Peas and Melons	8.00	2.47	3.00
Baugh's Potato and Truck Special	7.00	2.88	7.00
Baugh's Special Potato Manure	5.00	1.65	10.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Baugh's Fine Ground Fish	6.87	8.23	----
Baugh's Raw Bone Meal, Warranted Pure, Total	21.50	3.70	----
Baugh's High Grade Acid Phosphate	14.00	----	----
Baugh's High Grade Tobacco Guano	8.00	2.47	3.00
Baugh's High Grade Potash Mixture	10.00	----	4.00
Baugh's High Grade Cotton and Truck Guano	10.00	1.65	2.00
Baugh's Pure Animal Bone and Muriate of Potash Mixture	15.00	2.47	5.00
Baugh's Pure Dissolved Animal Bones	13.00	2.06	----
Glover's Special Potato Guano	7.00	3.30	8.00
Fine Ground Blood	----	13.00	----
Genuine German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	48.00
High Grade Sulphate of Potash	----	----	48.00
Baugh's Excelsior Guano	8.00	1.00	3.00
Randolph's Bone and Potash Mixture for All Crops	10.00	----	3.00
Nitrate of Soda	----	15.28	----
Lobos Peruvian Guano Total	14.00	1.65	1.70
Baugh's Cabbage Guano	6.00	5.76	5.00
Baugh's Wheat Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Animal Bone and Potash Compound for all crops	8.00	1.65	2.00
Baugh's Special Guano	8.00	3.30	6.00
Hassell's Tobacco Guano	9.00	2.26	2.00
Benthall's Special Guano	8.00	1.65	2.00
J. A. Benton, Ruffin, N. C.—			
Benton's North Carolina Bright Fertilizer	9.00	1.65	2.00
Best & Thompson, Goldsboro, N. C.—			
Pure German Kainit	----	----	12.00
Baltimore Fertilizer Co., Baltimore, Md.			
Honest Ammoniated Bone	8.00	1.60	2.00
Honest Sweet Potato Grower	8.00	2.40	4.00
Honest Dixie Trucker	6.00	4.00	7.00
Honest Trucker	6.00	4.00	5.00
Honest Revenue	7.00	2.40	6.00
Honest Bone and Potash	10.00	----	2.00
Honest Acid Phosphate	14.00	----	----
Blackstone Guano Co., Inc., Blackstone, Va.—			
Special Mixture	----	9.88	----
Dissolved Bone	10.00	1.03	1.00
Red Letter for Tobacco	8.00	1.65	2.00
Jim Crow for Tobacco	8.00	2.47	3.00
Alliance for Tobacco	8.00	1.65	2.00
Alliance Guano	8.00	1.65	2.00
B. G. Co., Inc., Acid Phosphate	14.00	----	----
B. G. Co., Inc., Bone and Potash	10.00	----	2.00
Old Bellefonte	8.00	3.30	2.00
Blackstone Special for Tobacco	9.00	2.47	3.00
Bellefonte for Tobacco	8.00	2.47	2.00
Hard Cash for Tobacco	8.00	2.06	2.00
Carolina Special for Tobacco	8.00	1.65	4.00
Peanut Special	8.00	1.03	6.00
Pure Bone and Potash	8.00	----	6.00
B. G. Co., Inc., Bone and Potash	10.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
John L. Bailey Co., Elm City, N. C.—			
Fairmont Guano	8.00	2.47	3.00
Stag Brand Fertilizer	8.00	1.65	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.47	3.00
Bradley Fertilizer Co., Charleston, S. C.—			
High Grade Bradley's Dissolved Phosphate	16.00	----	----
Standard Bradley's Palmetto Acid Phosphate	12.00	----	----
Standard Bradley's XXX Acid Phosphate	13.00	----	----
Standard Bradley's Wheat Grower	10.00	----	2.00
Standard Bradley's Bone and Potash	10.00	----	2.00
Standard Bradley's Cereal Guano	8.00	1.65	2.00
Standard Bradley's X Guano	8.00	1.65	2.00
High Grade Bradley's Guano	8.00	2.46	3.00
High Grade Bradley's Circle Guano	8.00	3.29	4.00
High Grade Bradley's Acid Phosphate	14.00	----	----
Standard Bradley's Acid Phosphate	12.00	----	----
Standard Bradley's Ammoniated Dissolved Bone,	9.00	1.85	1.00
Standard Bradley's Patent Superphosphate	9.00	1.85	1.00
Standard B. D. Sea Fowl Guano	9.00	1.85	1.00
Standard Eagle Ammoniated Bone Superphosphate	9.00	1.85	1.00
German Kainit	----	----	12.00
High Grade Bradley's Potash and Phosphate	10.00	----	4.00
The Berkley Chemical Co., Norfolk, Va.—			
Royal Truck Grower	6.00	5 76	5.00
Mascot Truck Guano	7.00	4.12	5.00
Victory Special Crop Grower	7.00	3.30	4.00
Advance Crop Grower	8.00	2.47	3.00
Berkley Tobacco Guano	8.00	2.47	3.00
Monitor Animal Bone Fertilizer	9.00	1.85	4.00
Select Crop Grower	8.50	2.06	2.50
Brandon Superphosphate	8.00	1.65	2.00
Berkley Plant Food	10.00	----	4.00
Berkley Bone and Potash Mixture	11.00	----	2.00
Berkley Acid Phosphate	14.00	----	----
Superior Bone and Potash	8.00	----	4.00
Laurel Potash Mixture	10.00	----	2.00
Resolute Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Long Leaf Tobacco Grower	8.00	1.65	2.00
Berkley Peanut and Grain Grower	8.00	1.00	4.00
The Leader of the World	5.00	3.30	5.00
Bragaw Fertilizer Co., Washington, N. C.—			
Chocowinity Special Tobacco Guano	5.00	3.29	6.00
Tuckahoe Tobacco Guano	8.00	2.06	3.00
Beaufort County Guano	8.00	2.47	3.00
Old Reliable Premium Guano	8.00	1.65	2.00
Havana Tobacco Guano	8.00	2.47	3.00
Palmetto Acid Phosphate	14.00	----	----
Tar Heel Guano	8.00	1.65	2.00
Long Acre Bone Phosphate	14.00	----	----
Pamlico Trucker	7.00	4.12	8.00
Riverview Potato Grower	6.00	5.76	5.00
Genuine German Kainit	----	----	12.00
Farmers' Union Meal Mixture	9.00	2.26	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Columbia Guano Co., Norfolk, Va.—			
Pure Raw Bone Meal.....Total	21.50	3.71	----
Columbia High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Columbia 14 Per Cent Acid Phosphate	14.00	----	----
Columbia Dissolved Bone	13.00	----	--
Columbia Acid Phosphate	12.00	----	----
Columbia 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Columbia 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Columbia Bone and Potash for Grain	10.00	----	3.00
Columbia Bone and Potash Mixture	10.00	----	2.00
Columbia Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Columbia Special Truck Guano	8.00	3.30	4.00
Columbia Potato Guano	7.00	4.12	5.00
Columbia C. S. M. Special	9.00	2.27	2.00
Columbia Special 4-8-3	8.00	3.30	3.00
Columbia Special Wheat Fertilizer	8.00	1.65	2.00
Columbia Special Tobacco Guano	8.00	2.06	2.00
Olympia Cotton Guano	8.00	2.47	3.00
Columbia Soluble Guano	8.00	1.65	2.00
Crown Brand Peanut Guano	7.00	----	5.00
Our Best Meal Guano	8.00	2.47	3.00
Spinola Peanut Grower	8.00	1.02	4.00
Crew's Special	5.85	4.49	10.00
Hayes' Special	8.00	3.30	3.00
McRae's Special	9.00	4.12	7.00
McRae's High Grade Guano	8.00	3.30	7.00
Hyco Tobacco Guano	8.00	2.47	3.00
Carolina Soluble Guano	9.00	1.65	1.00
Pelican Ammoniated Guano	9.00	3.30	4.00
Sulphate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Nitrate of Soda	----	15.22	----
Trojan Tobacco Guano	8.00	3.30	4.00
Columbia 10-5 Bone and Potash Mixture	10.00	----	5.00
Columbia Top Dresser	----	7.42	3.00
Roanoke Ammoniated Guano	9.00	1.65	3.00
Cumberland Bone and Phosphate Co., Portland, Me., and Charleston, S. C.—			
Standard Cumberland Bone and Superphosphate of Lime	9.00	1.85	1.00
The Coe-Mortimer Co., Charleston, S. C —			
Thomas Phosphate (Big Slag) Ex. "Zeeburg"	14.75	----	----
Nitrate of Soda	----	14.76	----
Genuine Peruvian Guano Ex. S.S. Cela Chincha Island	9.00	5.53	2.25
Kainit	----	----	12.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Calder Bros., Wilmington, N. C.—			
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.80	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Craven Chemical Co., New Bern, N. C.—			
C. E. Foy High Grade Guano (Trade Mark)	8.00	2.47	3.00
Jewel Acid Phosphate	14.00	----	----
Neuse Truck Grower	6.00	4.94	6.00
Pantego Potato Guano	7.00	4.12	7.00
Hanover Standard Guano	8.00	3.29	4.00
Elite Cotton Guano	8.00	1.65	2.00
Marvel Great Truck Grower	8.00	2.06	3.00
Duplin Tobacco Guano	8.00	2.47	3.00
Gaston High Grade Fertilizer	8.00	2.47	3.00
Trent Bone and Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Craven Chemical Co.'s Truck Guano, 5-10-2½	5.00	8.24	2.50
William H. Camp, Petersburg, Va.—			
Lion and Monkey Bone and Potash	10.00	----	4.00
Camp's Red Head Chemicals	8.00	2.25	2.00
Camp's Green Head Chemicals, Irish Potato	7.00	6.15	10.00
Camp's Yellow Head Chemicals	8.00	2.87	7.50
Lion and Monkey for Tobacco	8.00	2.46	3.00
Clayton Oil Mill, Clayton, N. C.—			
Clayton Guano	8.00	2.47	3.00
Cotton Queen	8.00	1.65	2.00
Summer Queen	8.00	1.65	2.00
Clayton Special Tobacco Grower	8.00	2.46	3.00
Cowell, Swan & McCotter Co., Bayboro, N. C.—			
Cowell, Swan & McCotter Co.'s Cabbage Guano	5.00	8.25	2.50
Crop Guano	8.00	1.65	2.00
Rust Proof Cotton Guano	8.00	1.65	3.00
Standard Cotton Grower	8.00	3.30	3.00
Quick Grower Guano	8.00	2.06	3.00
Great Cabbage and Potato Guano	7.00	5.77	7.00
Aurora Trucker	7.00	4.12	7.00
Oriental Trucker	7.00	4.12	8.00
High Grade Truck Guano	7.00	4.12	5.00
Potato Favorite Guano	7.00	3.30	7.00
Champion Guano	8.00	2.47	3.00
Bone Phosphate	14.00	----	----
German Kainit	----	----	12.00
Cowell's Great Tobacco Grower	8.00	2.47	3.00
Chicamauga Fertilizer Works, Atlanta, Ga.—			
Chickamauga Complete Fertilizer	8.00	1.65	2.00
Chickamauga High Grade Fertilizer	10.00	1.65	2.00
Chickamauga High Grade Plant Food	10.00	1.65	2.00
Chickamauga Wheat Special	10.00	.82	3.00
Chickamauga Corn Special	10.00	.82	3.00
Chickamauga Standard Corn Grower	8.00	1.65	2.00
Chickamauga Dissolved Bone	12.00	----	----
Chickamauga High Grade Dissolved Bone	14.00	----	----
Chickamauga High Grade Dissolved Bone No. 16,	16.00	----	----
Chickamauga Bone and Potash	10.00	----	2.00
Chickamauga Alkaline Bone	10.00	----	4.00
Georgia Home Guano	8.00	1.65	2.00
Special Corn Compound	10.00	1.65	4.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
Old Glory Mixture	10.00	.82	1.00
Chickamauga Wheat and Corn Grower	10.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Cumbahee Fertilizer Co., Charleston, S. C.			
Melon Fertilizer	10.00	3.30	5.00
Canteloupe Fertilizer	10.00	2.46	10.00
Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.—			
Horne & Son's High Grade Bone and Potash	11.00	----	5.00
Buncombe Wheat Grower	8.00	----	4.00
Buncombe Corn Grower	8.00	----	4.00
Morris & Scarboro's Special Bone and Potash	10.00	----	3.00
Electric Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Climax Dissolved Bone	14.00	----	----
Sterling Acid Phosphate	13.00	----	----
Staple Acid Phosphate	12.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Bone Meal Total	20.00	3.91	----
Bone Meal Total	26.00	2.14	----
Crown Ammoniated Guano	8.00	1.65	2.00
Ely Ammoniated Fertilizer	8.00	1.65	2.00
Eclipse Ammoniated Guano	8.00	2.06	2.00
Planters' Pride	8.00	2.06	3.00
Caraleigh Special Tobacco Guano	8.00	2.06	3.00
Pacific Tobacco and Cotton Grower	9.00	2.26	2.00
Horne's Best	8.00	2.47	3.00
Caraleigh Top Dresser	3.00	8.24	4.00
Rhamkatte Special Tobacco	8.00	3.29	6.00
Special 8-4-4	8.00	3.29	4.00
Comet Guano	8.00	.82	3.00
W. B. Cooper, Wilmington, N. C.—			
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.00	----
Contentnea Guano Co., Wilson, N. C.—			
Contentnea 16 Per Cent Acid	16.00	----	----
Special Tobacco Formula	8.00	2.06	6.00
Special Formula for Cotton	7.00	2.47	3.25
Contentnea Corn Special	5.00	1.65	5.00
Davis' Best Fertilizer	8.00	3.29	6.00
Special Formula for Tobacco	8.00	2.88	5.00
Special Formula Fertilizer	9.00	2.06	5.00
Special Formula for Tobacco	8.00	3.28	7.00
High Grade 14 Per Cent Acid	14.00	----	----
Nitrate of Soda	----	14.81	----
Pick Leaf	8.00	2.47	3.00
Top Notch	8.00	2.47	3.00
Blood and Bone Cotton Compound	8.00	1.65	2.00
Contentnea Top Dresser	3.00	8.23	5.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone and Potash Mixture	10.00	----	4.00
8-4½-7 for Tobacco	8.00	3.70	7.00
8-4½-7 for Cotton	8.00	3.70	7.00
Contentnea Cotton Grower	8.00	2.47	2.50
German Kainit	----	----	12.00
Special Formula Fertilizer	8.00	3.29	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
C. P. Dey, Beaufort, N. C.—			
Ground Fish Scrap	----	8.24	----
Dixie Guano Co., Durham, N. C.—			
Niagara Soluble Bone	8.00	2.05	2.00
Old Plantation Superphosphate	8.00	1.65	2.00
Dixie Champion for Wheat and Corn	10.50	----	1.50
Dixie 16 Per Cent Acid Phosphate	16.00	----	----
Dixie 14 Per Cent Acid Phosphate	14.00	----	----
Dixie Star Ammoniated	9.00	1.65	1.00
Jeff Davis Special	9.00	2.26	2.00
Radium Brand Guano	8.00	3.28	5.00
Carolina Special Ammoniated	8.00	2.46	3.00
Sulky Plow Brand Guano	8.00	2.46	2.00
Battle's Blood and Bone Fertilizer	8.00	2.05	3.00
Etiwan Fertilizer Co., Charleston, S. C.—			
Plow Brand Ammoniated Fertilizer	8.00	1.65	2.00
Plow Brand Special Tobacco Fertilizer	8.00	3.30	4.00
Plow Brand Acid Phosphate with Potash	11.00	----	1.00
Etiwan Potash Bone	10.00	----	4.00
Etiwan Special Potash Mixture	8.00	----	4.00
Etiwan Soluble Bone with Potash	10.00	----	3.00
Etiwan Acid Phosphate with Potash	11.00	----	1.00
Etiwan Dissolved Bone	13.00	----	----
Etiwan High Grade Acid Phosphate	14.00	----	----
Etiwan Superior Cotton Fertilizer	8.00	3.30	6.00
Etiwan Special Cotton Fertilizer	8.00	3.30	4.00
Etiwan Cotton Compound	8.00	2.47	3.00
Etiwan Ammoniated Fertilizer	8.00	1.65	2.00
Etiwan High Grade Cotton Fertilizer	8.00	2.47	2.00
Diamond Soluble Bone	13.00	----	----
Diamond Soluble Bone with Potash	10.00	----	2.00
XX Acid Phosphate with Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Etiwan Blood and Bone Guano	9.00	2.06	1.00
Plow Brand Raw Bone Superphosphate	9.00	2.06	1.00
Farmers Guano Co., Raleigh, N. C.—			
Farmers' Formula	7.00	2.47	3.25
Special Bone and Potash Mixture	10.00	----	4.00
Century Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
14 Per Cent Acid Phosphate	14.00	----	----
Farmers' Acid Phosphate	13.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone Meal Total	20.00	3.91	----
Nitrate of Soda	----	15.65	----
Special Bone and Potash	8.00	----	4.00
State Standard Guano	8.00	1.64	2.00
Big Crop Guano	8.00	2.06	3.00
Toco Tobacco Guano	8.00	2.06	3.00
Golden Grade Guano	8.00	2.47	3.00
Farmers' Top Dresser	3.00	8.24	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Floradora Guano Co., Laurinburg, N. C.—			
Floradora	8.00	3.29	4.00
Ocelo	8.00	2.47	3.00
Rocky Ford	10.00	2.47	7.00
Scotland Special	6.40	2.13	3.00
Fremont Oil Mills, Fremont, N. C —			
Up-to-date	8.00	1.65	2.00
Nahunta Special	8.00	2.47	3.00
Fremont Prolific Fertilizer	9.00	2.26	2.00
Yelverton Bros ' Plant Food	8.00	2.47	3.00
Fremont Standard Fertilizer	8.00	2.47	3.00
Home Run Guano	8.00	1.65	2.00
Fremont Oil Mill Co.'s Special for Tobacco	8.00	2.47	5.00
Fomco	8.00	3.29	4.00
Nitrate of Soda	----	15.63	----
Kainit	----	----	12.00
Acid Phosphate	16.00	----	----
Barnes & Flower's Cotton Grower	8.00	1.65	2.00
Wayne County Standard	8.00	2.47	3.00
Farmers Cotton Oil Co., Wilson, N. C.—			
German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Contentnea Acid Phosphate	13.00	----	----
Bonum Acid Phosphate	14.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
Xtra Good Bone and Potash	10.00	----	2.00
Crop King Guano	8 00	1.65	2.00
Farmers' Special Guano	8.00	1.65	2.00
Planters' Friend Guano	8.00	2.06	3.00
Carolina Choice Tobacco Guano	8.00	2.06	3.00
Wilson High Grade Guano	8.00	2.27	2.00
J. D. Farrior's Special Guano	8.00	2.47	3.00
Graves' Cotton Grower Guano	8.00	2.47	3.00
Golden Gem Guano	8.00	2.47	3.00
Regal Tobacco Guano	8.00	2.88	5.00
Dean's Special Guano	8.00	3.70	7.00
Perfect Top Dresser	2.00	8.23	5.00
Wilson Top Dresser	2.00	9.05	4.00
Washington's Corn Mixture Guano	10.00	.82	5.00
W. R. Grace & Co., New York—			
Nitrate of Soda	----	14.85	----
James Garland & Co., Richmond, Va.—			
Bonebase Standard Fertilizer	9.00	1.65	2.00
Griffith & Boyd, Co. Baltimore, Md.—			
High Grade Acid Phosphate	14.00	----	----
Spring Crop Grower	6.50	1.65	4.50
Genuine German Kainit	----	----	12.00
Ammoniated Bone Phosphate	8.00	1.65	2.00
7 Per Cent Potash Guano	5.00	5.77	5.00
Early Trucker	7.00	4.12	8.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Home Fertilizer and Chemical Co., Baltimore, Md.—			
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
German Kainit	----	----	12.00
Home High Grade Acid Phosphate	14.00	----	----
Home Alkaline Bone	10.00	----	2.00
Home Cereal Fertilizer	8.00	1.65	2.00
Home Dissolved Animal Bone	12.00	1.65	2.00
Home Vegetable Fertilizer	6.00	4.12	6.00
Home Potato Grower	6.00	3.30	4.00
Home Bone and Potash	10.00	----	5.00
Phœnix Crop Grower	8.00	2.48	2.00
Matchless Guano	8.00	1.65	4.00
Home Fertilizer	----	5.77	7.00
Cerealite Top Dressing	----	7.68	3.00
Zancey's Formula for Yellow Leaf Tobacco	8.00	2.48	2.00
Hadley, Harriss & Co., Wilson, N. C.—			
Hadley Boss Guano	8.00	2.26	2.50
German Kainit	----	----	12.00
Daisy Fish Mixture	8.00	1.05	2.00
John Hadley Special High Grade Plant Food	8.00	1.64	2.00
Top Dressing	----	7.38	6.00
Golden Weed Tobacco Grower	8.00	2.47	3.00
S. B. Harrell, & Co. Norfolk, Va.—			
Harrell's Acid Phosphate	14.00	----	----
Harrell's Champion Cotton and Peanut Grower	8.00	1.65	2.00
Harrell's Truck Guano	6.00	5.76	5.00
Hampton Guano Co., Norfolk, Va,—			
Virginia Truck Grower	6.00	5.76	5.00
Reliance Truck Guano	7.00	4.12	5.00
Little's Favorite Crop Grower	7.00	3.30	4.00
P. P. P. (Princess Prolific Producer)	8.00	2.47	3.00
Hampton Tobacco Guano	8.00	2.47	3.00
Arlington Animal Bone Fertilizer	9.00	1.85	4.00
Alpha Crop Grower	8.50	2.06	2.50
Shirley's Superphosphate	8.00	1.65	2.00
Hampton Crop Grower	10.00	----	4.00
Hampton Bone and Potash Mixture	11.00	----	2.00
Dauntless Potash Mixture	10.00	----	2.00
Hampton Acid Phosphate	14.00	----	----
Supreme Acid Phosphate	16.00	----	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Genuine German Kainit	----	----	12.00
Excelsior Bone and Potash	8.00	----	4.00
Extra Tobacco Guano	8.00	1.65	2.00
Hampton Special Grain and Peanut Fertilizer	8.00	1.00	4.00
M. P. Hubbard & Co., Baltimore, Md.—			
Hubbard's Bermuda Guano	7.00	5.78	4.00
Hubbard's Special Cotton and Corn Fertilizer	7.00	5.78	4.00
Hubbard's Maryland Special	7.00	4.13	5.00
Hubbard's Gold Leaf Guano	8.00	2.48	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Hubbard Fertilizer Co., Baltimore, Md.—			
Hubbard's Special Potato	6.00	3.29	10.00
Hubbard's 7 Per Cent Royal Seal	6.00	5.76	5.00
Hubbard's 10 Per Cent Trucker Guano	4.00	8.23	4.00
Hubbard's 5 Per Cent Royal Seal	6.00	4.11	5.00
Hubbards' Blood, Bone and Potash	8.00	3.29	7.00
Hubbard's Jersey Trucker	8.00	1.65	10.00
Hubbard's Royal Ensign	8.00	2.47	4.00
Hubbard's Yellow Wrapper	8.00	2.47	3.00
Hubbard.s Fish Compound	8.00	1.65	3.00
Hubbard's Exchange Guano	8.00	1.65	2.00
Hubbard's Special Mixture	10.00	----	4.00
Hubbard's Bone and Potash	10.00	----	2.00
L. Harvey & Son Co., Kinston, N. C.—			
Nitrate of Soda	----	15.50	----
The Imperial Co., Norfolk, Va.—			
Imperial F. and B. Cotton Guano	8.00	2.06	3.00
Imperial Bright Tobacco Guano	8.00	2.06	3.00
Imperial 5-6-7 Potato Guano	6.00	4.11	7.00
Imperial Snowflake Cotton Grower	8.00	3.29	4.00
Imperial Peanut and Corn Guano	8.00	1.65	2.00
Imperial Champion Guano	8.00	1.65	2.00
Imperial X. L. O. Cotton Guano	8.00	2.47	3.00
Imperial Cisco Soluble Guano	8.00	1.65	2.00
Imperial Tobacco Guano	8.00	2.47	3.00
Imperial Laughinghouse Special Tobacco Guano	4.00	3.29	6.00
Imperial Standard Premium	8.00	1.65	2.00
Imperial Cubanola Tobacco Guano	4.00	2.47	5.00
Imperial Martin County Special Crop Grower	9.00	2.26	2.00
Imperial High Grade Acid Phosphate	14.00	----	----
Imperial Genuine German Kainit	----	----	12.00
Imperial Special 7 Per Cent for Potatoes	5.00	5.76	5.00
Imperial 10 Per Cent Guano	5.00	8.23	2.50
Imperial Sweet Potato Guano	6.00	1.65	6 00
Imperial Williams' Special Potato Guano	6.00	4.11	5.00
Imperial Fish and Bone	6.00	3.29	4.00
Imperial 7-7-7 Potash Guano	7.00	5.76	7.00
Imperial Bone and Potash	10.00	----	2.00
Imperial High Grade Irish Potato Guano	7.00	4.11	8.00
Imperial Tennessee Acid Phosphate	16.00	----	----
Imperial Muriate of Potash	----	----	50.00
Imperial Nitrate of Soda	----	15.63	----
Imperial Roanoke Crop Grower	7.00	2.47	2.00
Imperial 17 Per Cent Acid Phosphate	17.00	----	----
Imperial Asparagus Mixture	6.00	4.11	7.00
Imperial Yellow Bark Sweet Potato Guano	8.00	2.47	3.00
Dawson's Cotton Grower	7.00	2.67	2.75
Imperial Top Dresser for Cotton	2.00	8.32	----
Imperial 4-8-4 Tobacco Grower	8.00	3.29	4.00
Lister's Agricultural Chemical Works, Newark, N. J.—			
Lister's Ammoniated Dissolved Bone Phosphate	8.00	2.06	2.00
Lister's Success Fertilizer	8.00	1.65	2.00
Lister's Standard Pure Bone Superphosphate of Lime	9.00	1.65	2.00
American Agricultural Chemical Co.'s Buyers' Choice Acid Phosphate	14.00	----	----
Lister's Bone Meal Total	20.60	3.30	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
A. S. Lee & Sons Co. (Inc.), Richmond, Va.—			
Lee's Bone and Potash	9.00	----	4.00
Lee's Corn Fertilizer	10.00	----	2.00
Lee's Wheat Fertilizer	10.00	----	2.00
E. H. & J. A. Meadows Co., New Bern, N C.—			
Hookerton Cotton Guano	8.00	1.64	2.00
Meadows' Cotton Guano	8.00	1.64	2.00
Meadows' All Crop Guano	8.00	2.05	2.50
Meadows' Roanoke Guano	8.00	2.05	3.00
Meadows' Gold Leaf Tobacco Guano	8.00	2.47	3.00
Meadows' Lobos Guano	8.00	4.11	5.00
Meadows' Great Potato Guano	7.00	4.11	8.00
Meadows' Great Cabbage Guano	7.00	5.76	7.00
Meadows' 10 Per Cent Guano	6.00	8.23	2.50
Meadows' Sea Bird Guano	9.00	3.29	2.50
Meadows' Dissolved Bone and Potash Compound	10.00	----	2.00
Meadows' German Kainit	----	----	12.00
Meadows' Diamond Acid Phosphate	14.00	----	----
Dixon's High Grade Tobacco Guano	8.00	2.47	3.00
Parker's Special Tobacco Guano	8.00	2.47	4.00
Brooks' Special Tobacco Grower	8.00	2.47	5.00
Meadows' Ideal Tobacco Guano	8.00	3.29	4.00
The Miller Fertilizer Co., Baltimore, Md.—			
Special Tobacco Grower	8.00	1.65	4.00
Standard Phosphate	8.00	2.47	3.00
Ammoniated Dissolved Bone	8.00	1.65	2.00
High Grade Potato	6.00	4.12	7.00
Tobacco King	8.00	2.47	3.00
Profit	8.00	1.65	2.00
Standard Potato	8.00	2.47	3.00
Potato and Vegetable Guano	8.00	1.65	4.00
Trucker	8.00	4.12	5.00
Farmers' Profit	8.00	1.65	2.00
Harmony	8.00	2.06	3.00
Corn and Peanut Grower	10.50	----	2.25
No. 1 Potato and Vegetable Grower	9.00	3.71	7.00
Clinch	10.00	----	2.00
4 Per Cent Tobacco	8.00	3.29	4.00
Miller's 7 Per Cent	7.00	5.77	7.00
Miller's Irish Potato	8.00	3.29	4.00
Miller's 16 Per Cent Acid Phosphate	16.00	----	----
Kainit	----	----	12.00
Acid Phosphate	14.00	----	----
The Miller Fertilizer Co.'s 10 and 4 Per Cent	10.00	----	4.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.05	----
The Mapes Formula and Peruvian Guano Co., 143 Liberty Street, New York—			
Mapes' Economical Potato Manure	4.00	3.29	8.00
Mapes' Vegetable or Complete Manure for Light Soils	6.00	4.94	6.00
Mapes' Corn Manure	8.00	2.47	6.00
Mapes' Complete Manure, "A" Brand	10.00	2.47	2.50
John F. McNair, Laurinburg, N. C.—			
Nitrate of Soda	----	15.58	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
D. B. Martin Co., Richmond, Va.—			
Martin's 7 Per Cent Guano	6.00	5.74	5.00
Martin's Early Truck and Vegetable Grower	6.00	3.28	8.00
Martin's Claremount Vegetable Grower	7.00	2.46	5.00
Martin's Red Star Brand	8.00	3.28	4.00
Martin's Bull Head Fertilizer	8.00	2.46	3.00
Martin's Tobacco Special	8.00	2.46	3.00
Martin's Carolina Cotton Fertilizer	8.00	1.65	2.00
Martin's Old Virginia Favorite	8.00	1.65	2.00
Martin's Corn and Cereal Special	8.00	1.65	2.00
Martin's Gilt Edge Potato Manure	7.00	2.46	10.00
Martin's Animal Bone Potato Guano	6.00	4.10	7.00
Martin's Animal Bone Potato Compound	16.00	1.65	2.50
Martin's Pure Dissolved Animal Bone	12.00	1.65	2.00
Martin's Pure Ground Bone—Total	22.90	1.65	2.00
Martin's Raw Bone Meal—Total	21.00	3.69	----
Martin's Animal Tankage, Ground—Total	16.00	4.92	----
Martin's Acid Phosphate	16.00	----	----
Martin's Potash and Soluble Bone	12.00	----	5.00
Martin's High Grade Blood	----	13.94	----
Martin's Blood	----	12.30	----
Acid Phosphate	14.00	----	----
Potash and Soluble Bone	12.00	----	3.00
Potash and Soluble Bone	10.00	----	5.00
Potash and Soluble Bone	10.00	----	2.00
Nitrate of Soda	----	15.52	----
Sulphate of Ammonia	----	20.50	----
Blood	----	10.66	----
Blood	----	9.84	----
Blood	----	12.30	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Pure Ground Bone—Total	22.90	2.46	----
Martin's Carolina Special	8.00	1.65	2.00
Marietta Fertilizer Co., Atlanta, Ga.—			
Lion Power Guano	10.00	1.65	2.00
Royal Seal Guano	10.00	1.65	2.00
Cooper's High Grade Guano	10.00	1.65	2.00
Lion H. G. Guano	10.00	1.65	2.00
Marsh-Lee & Co., Marshville, N. C.—			
Marsh's High Grade Acid	14.00	----	----
Marsh's Cotton Fertilizer	8.00	1.65	2.00
Marsh's Guano for Corn	8.00	1.65	2.00
Marsh's Special	8.00	2.50	3.00
The MacMurphy Co., Charleston, S. C.—			
Special 8-3-3-Guano	8.00	2.47	3.00
Special 8-2-2 Cotton and Corn Guano	8.00	1.65	2.00
Cotton and Corn Guano, 9-2-2	9.00	1.65	2.00
Wilcox & Gibbs Co.'s Manipulated Guano	9.00	2.26	2.00
Cotton and Corn Guano, 9-3-3	9.00	2.47	3.00
High Grade Acid Phosphate, 14 Per Cent	14.00	----	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.82	----
Muriate of Potash	----	----	48.00
Acid Phosphate, 13 Per Cent	13.00	----	----
8-4-6 Guano	8.00	3.29	6.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
North Carolina Cotton Oil Co., Wilmington, N. C.—			
Wilmington Tobacco Grower	8.00	2.06	3.00
Wilmington High Grade	8.00	2.47	3.00
Wilmington Cotton Grower	8.00	1.65	2.00
Wilmington Standard	8.00	2.47	2.50
Wilmington Truck Grower	8.00	3.30	4.00
Wilmington Special	8.00	1.65	2.00
Carter's Lifter	8.00	2.47	3.00
Clark's Special	8.00	1.65	3.00
Wilmington Banner	8.00	1.65	3.00
John's Special	8.00	2.47	3.00
McEacheva's Special	7.00	5.77	7.00
North Carolina Cotton Oil Co., Raleigh, N. C.—			
Raleigh Standard Guano	8.00	2.26	2.00
North Carolina Cotton Oil Co., Charlotte, N. C.—			
Majestic	8.00	1.65	2.00
Dixie Standard	8.00	2.48	3.00
North Carolina Cotton Oil Co., Henderson, N. C.—			
Uneedit Cotton Grower	8.00	1.65	2.00
Uneedit Tobacco Fertilizer	9.00	2.47	3.00
Vance Cotton Grower	8.00	1.65	2.00
Pride of Vance	9.00	2.47	3.00
Henderson Cotton Grower	8.00	1.65	2.00
Henderson Tobacco Fertilizer	9.00	2.47	3.00
Franklin Cotton Grower	8.00	1.65	2.00
Franklin Tobacco Fertilizer	9.00	2.47	3.00
New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.—			
Oriole Tobacco Grower	8.00	3.30	4.00
Greene County Standard Fertilizer	8.00	1.65	2.00
Jones County Premium Crop Grower	8.00	2.06	3.00
Onslow Farmers' Reliance Guano	8.00	2.06	3.00
High Grade Fertilizer	8.00	2.47	3.00
Foy's High Grade Fertilizer	8.00	2.47	3.00
Pitt's Prolific Golden Tobacco Grower	8.00	2.47	3.00
Craven Cotton Guano	8.00	1.65	2.00
Lenoir Bright Leaf Tobacco Grower	8.00	2.47	3.00
Ives' Irish Potato Guano	7.00	4.13	7.00
Dunn's Standard Truck Grower	7.00	5.77	7.00
Pamlico Electric Top Dresser	5.00	8.25	2.50
Special Corn and Peanut Grower	11.00	----	2.00
Carteret Bone and Potash	10.00	----	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Bogue Fish Scrap	----	7.42	----
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
Favorite Cotton Grower C. S. M.	8.00	2.27	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Norfolk Fertilizer Co., Norfolk, Va.—			
Oriana Cotton Guano	8.00	1.65	2.00
Oriana C. S. M. Special	9.00	2.26	2.00
Oriana Tobacco Guano	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Oriana 3-8-3 for Cotton	8.00	2.47	3.00
Oriana Crop Grower	8.00	1.65	3.00
Oriana Bone and Potash	10.00	----	2.00
Oriana 14 Per Cent Acid Phosphate	14.00	----	----
Oriana 16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Iola Acid Phosphate	13.00	----	----
Oriana First Step Tobacco Guano	8.00	3.29	4.00
Oriana 4-4-6 High Grade Tobacco Guano	4.00	3.29	6.00
Pine Top Special Crop Grower	5.00	1.65	6.00
Nitrate of Soda Mixture for Top Dressing Cotton	2.00	8.23	----
Navassa Guano Co., Wilmington, N. C.—			
Ammoniated Soluble Navassa Guano	8.00	2.06	2.00
Clarendon Tobacco Guano	8.00	2.47	3.00
Occoneechee Tobacco Guano	8.00	1.65	2.00
Coree Tobacco Guano	8.00	3.29	4.00
Harvest King Guano	8.00	1.65	3.00
Mogul Guano	8.00	2.06	3.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda	----	14.82	----
Sulphate of Ammonia	----	20.59	----
Orton Guano	8.00	2.47	4.00
Navassa Universal Fertilizer	8.50	2.06	1.00
Navassa Wheat Mixture	10.00	----	2.25
Navassa Wheat and Grass Grower	10.00	----	4.00
Navassa Special Wheat Mixture	12.00	----	4.00
Navassa Gray Land Mixture	12.00	----	4.00
Navassa Dissolved Bone with Potash	10.00	----	2.00
Navassa Acid Phosphate	12.00	----	----
Navassa Dissolved Bone	13.00	----	----
Navassa 14 Per Cent Acid Phosphate	14.00	----	----
Navassa Acid Phosphate	16.00	----	----
Navassa Special Trucker	8.00	3.30	4.00
Navassa Strawberry Top Dressing	8.00	2.06	4.00
Navassa Blood and Meal Mixture	8.00	2.47	5.00
Navassa Creole Guano	6.00	4.12	7.00
Maxim Guano	10.00	2.47	2.00
Navassa Manipulated Guano	9.00	2.26	2.00
Osceola Guano	9.00	1.65	3.00
Corona Guano	10.00	1.65	2.00
Clark's Special Cotton Seed Meal Guano	8.00	1.65	3.00
Navassa Root Crop Fertilizer	7.00	4.12	7.00
Navassa Carib Guano	8.00	2.47	10.00
Navassa Guano for Tobacco	8.00	2.06	2.00
Navassa Grain Fertilizer	8.00	1.65	2.00
Navassa Fruit Growers' Fertilizer	8.00	1.65	6.00
Navassa Cotton Seed Meal Special 3 Per Cent Guano	8.00	2.47	2.00
Navassa Cotton Seed Meal Guano	8.00	1.65	2.00
Navassa Cotton Fertilizer	8.00	1.65	2.00
Navassa Complete Fertilizer	9.00	1.65	1.00
Navassa High Grade Guano	8.00	2.47	3.00
Navassa Dissolved Bone with Potash	8.00	----	4.00
Harvest Queen Fertilizer	9.00	1.65	2.00
Navassa High Grade Tobacco Guano	8.00	2.47	10.00
Navassa Fish Guano	9.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
The Nitrate Agencies Co., Savannah, Ga.—			
Nitrate of Soda	----	14.85	----
Ocean Fisheries Co., Wilmington, N. C.—			
Fish Scrap	3.47	5.30	----
G. Ober & Sons Co., Baltimore, Md.—			
Ober's Acid Phosphate with Potash	8.00	----	4.00
Ober's Stag Guano	8.00	.82	4.00
Ober's Complete Fertilizer	6.00	4.12	6.00
Special High Grade Fertilizer	9.00	2.47	3.00
Ober's Special Compound for Tobacco	8.00	2.47	3.00
Ober's Standard Tobacco Fertilizer	8.00	1.65	2.00
Ober's Special Ammoniated Dissolved Bone	9.00	1.65	2.00
Ober's Special Cotton Compound	8.00	1.65	2.00
Ober's Soluble Ammoniated Superphosphate of Lime	8.00	1.65	2.00
Ober's Farmers' Mixture	9.00	.82	2.00
Ober's Dissolved Bone, Phosphate and Potash	10.00	----	2.00
Ober's Acid Phosphate with Potash	8.00	----	2.00
Ober's Standard Potash Compound	12.00	----	5.00
Ober's High Grade Acid Phosphate	16.00	----	----
Ober's Dissolved Bone Phosphate	14.00	----	----
Nitrate of Soda	----	15.50	----
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Pure Raw Bone Meal Total	21.00	3.71	----
Ober's Dissolved Animal Bone	10.00	2.47	----
The Pocomoke Guano Co., Norfolk, Va.—			
Garrett's Grape Grower	8.00	3.29	10.00
Coast Line Truck Guano	5.00	8.23	3.00
Freeman's 7 Per Cent Irish Potato Grower	6.00	5.76	5.00
Seaboard Popular Trucker	6.00	5.76	5.00
Standard Truck Guano	7.00	4.12	5.00
Faultless Ammoniated Superphosphate	7.00	3.30	4.00
Harvest High Grade Monarch	8.00	2.47	3.00
Monarch Tobacco Grower	8.00	2.47	3.00
Monticello Animal Bone Fertilizer	9.00	1.85	4.00
Cinco Tobacco Guano	8.50	2.06	2.50
Crescent Complete Compound	8.00	1.65	3.00
Hornthal's Tobacco Guano	8.00	1.65	3.00
L. P. H. Premium	8.00	1.65	2.00
Electric Crop Grower	8.50	1.65	2.00
Pamlico Superphosphate	8.00	1.65	2.00
Pocomoke Superphosphate	8.50	1.65	2.00
Pocomoke Bone and Potash Mixture	10.00	----	4.00
Pure Ground Bone Total	20.00	3.70	----
10-2 Potash Mixture	10.00	----	2.00
Alkali Bone	11.00	----	2.00
Peerless Acid Phosphate	14.00	----	----
Pocomoke Wheat, Corn and Peanut Manure	8.00	1.00	4.00
Smith's Special Formula	4.00	3.30	6.00
Superb Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Pocomoke Defiance Bone and Potash	8.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Pamlico Chemical Co., Washington, N. C.—			
Pamlico Special Irish Potato Guano	7.00	4.12	7.00
Bull's Eye Tobacco Grower	8.00	3.30	4.00
Pamlico Ground Fish	----	7.42	----
Muriate of Potash	----	----	48.00
Pamlico Special Sweet Potato Guano	7.00	4.12	5.00
Pamlico Cereal Side Dresser	2.50	7.42	2.50
Pamlico Favorite Potato Guano	7.00	4.12	5.00
Pamlico Bone and Fish Guano	8.00	1.65	2.00
Pamlico Potato Guano	7.00	4.12	7.00
Pamlico Cotton Guano	8.00	1.65	2.00
Pamlico 7-7-7 Guano	7.00	5.77	7.00
Pamlico 16 Per Cent Acid Phosphate	16.00	----	----
Pamlico Bone Phosphate	14.00	----	----
Cowell's Great Potato Grower	8.00	4.12	7.00
Cowell's Great Cabbage Grower	5.00	8.25	2.50
Tobacco Growers' Friend	8.00	2.47	3.00
German Kainit	----	----	12.00
Farmers' Best Guano	8.00	2.06	3.00
Pamlico Success Guano	8.00	2.47	3.00
Staton, Taylor & Mayo's Special Cotton Grower	8.00	2.26	2.00
Prosperity Cotton Grower	9.00	2.26	2.00
Pamlico High Grade Tobacco Grower	8.00	2.47	5.00
Pamlico 8-4-4 Guano	8.00	3.30	4.00
Pamlico 6-3-6	6.00	2.47	6.00
Nitrate of Soda	----	14.85	----
Planters Fertilizer and Phosphate Co., Charleston, S. C.—			
Planters' Bright Tobacco Fertilizer	8.00	3.29	4.00
Planters' Fertilizer	8.00	2.06	2.00
Planters' Soluble Guano	8.00	2.47	3.00
Planters' Standard Fertilizer	8.75	1.65	2.00
Nitrate of Soda	----	14.83	----
Planters' High Grade Acid Phosphate	14.00	----	----
Planters' Standard Fertilizer	8.00	1.65	2.00
Planters' Soluble Bone	13.00	----	----
Sulphate of Potash	----	----	48.00
Planters' Kainit	----	----	12.00
Planters' Blood, Bone and Potash	8.00	2.06	2.00
Planters' H. G. Top Dresser	4.00	6.18	4.50
Planters H. G. Tobacco Fertilizer	8.00	2.47	3.00
Planters' Cotton and Truck Fertilizer	8.00	2.47	4.00
Planters' Special Cotton Fertilizer	8.00	3.29	4.00
Planters' Muriate of Potash	----	----	48.00
Planters' Acid and Potash	10.00	----	4.00
Planters' 16 Per Cent Acid Phosphate	16.00	----	----
Planters' Bone and Potash	10.00	----	2.00
Planters' Bone and Potash	12.00	----	1.00
Peruvian Guano Corporation, Charleston, S. C.—			
Peruvian Guano, Ex. S S. Celia, No. 1 ----Total	17.00	2.80	3.25
Peruvian Guano, Ex. S.S. Dalblair	10.00	2.15	2.25
Peruvian Guano, Ex. S.S Belle of Scotland, No. 1	9.50	2.40	1.50
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 2	9.00	2.56	2.25
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 3	9.00	2.69	2.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	15.50	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Sulphate of Ammonia	----	19.00	----
Dried Blood	----	14.00	----
Peruvian Guano, Ex. S.S. Celia ----Total	15.00	2.80	3.00
Peruvian Guano, S.S. Dalblair ----Total	15.50	2.13	2.00
Peruvian Guano, S.S. Chincha ----Total	10.00	4.13	2.00
Peruvian Guano, S.S. Belle of Scotland, No. 2, Total	14.50	2.47	2.00
Peruvian Guano, S.S. Belle of Scotland, No. 3, Total	14.00	2.56	2.00
Pearsall & Co., Wilmington, N. C.—			
Kainit	----	----	12.00
Pearsall's Uzit	8.00	2.46	3.00
Pearsall's H. G. F. F. F. G.	8.00	2.46	3.00
Pearsall's Fish and Potash Mixture	8.00	3.24	4.00
Pacific Guano Co., Charleston, S. C.—			
Standard Soluble Pacific Guano	8.50	1.65	2.00
Standard Pacific Acid Phosphate	12.00	----	----
High Grade Pacific Fertilizer	8.00	2.46	3.00
Powhatan Chemical Co., Richmond, Va.—			
Powhatan Trucker	7.00	4.94	5.00
Powhatan Bone and Potash Mixture	8.00	----	4.00
Powhatan Acid Phosphate	13.00	----	----
Magic Dissolved Bone Phosphate	16.00	----	----
Magic Peanut Grower	8.00	----	4.00
Magic Grain and Grass Grower	8.00	----	4.00
Magic Bone and Potash Mixture	10.00	----	4.00
Magic Mixture	9.00	1.65	1.00
Magic Cotton Grower	8.00	1.65	2.00
Magic Special Fertilizer	8.00	1.65	2.00
Magic Tobacco Grower	8.00	1.65	2.00
King Brand Fertilizer	8.00	2.06	3.00
White Leaf Tobacco Fertilizer	8.00	2.06	3.00
Economic Cotton Grower	9.00	2.26	2.00
North State Special	8.00	3.29	4.00
Guilford Special Tobacco Fertilizer	9.00	2.47	6.00
Pure Raw Bone Meal ----Total	20.00	3.29	----
Bone and Potash Mixture	10.00	----	2.00
Pure Animal Bone ----Total	25.00	2.47	----
Nitrate of Soda	----	15.63	----
Sulphate of Ammonia	----	19.75	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Pure German Kainit	----	----	12.00
Virginia Dissolved Bone	12.00	----	----
High Grade Acid Phosphate	14.00	----	----
P. C. Co.'s Hustle	8.00	2.47	3.00
Magic Corn Grower	10.00	.82	1.00
Magic Wheat Grower	9.00	.82	2.00
Johnson's Best Fertilizer	9.00	2.06	5.00
Holt's Magic Fertilizer	9.00	2.06	5.00
Magic Peanut Special	8.00	.82	4.00
Magic Crop Grower	10.00	.82	1.00
Pine Level Oil Mill Co., Pine Level, N. C.—			
Cotton Grower for All Crops	8.00	1.65	2.00
Pine Level High Grade	8.00	2.47	3.00
Hale's Special for Tobacco	8.00	2.47	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Patapsco Guano Co., Baltimore, Md.—			
Patapsco Plant Food for Tobacco, Potatoes and Truck	8.00	2.47	5.00
Patapsco Soluble Bone and Potash	10.00	----	2.00
Patapsco High Grade Bone and Potash	11.00	----	5.00
Patapsco 10 and 4 Potash Mixture	10.00	----	4.00
Patapsco 7-7-7 Truck Guano	7.00	5.76	7.00
Patapsco Potato Guano	6.00	4.11	7.00
Patapsco Crop Dresser	4.00	3.30	4.00
Patapsco Trucker for Early Vegetables	7.00	4.11	5.00
Patapsco Tobacco Fertilizer	9.00	2.47	3.00
Patapsco Guano for Tobacco	9.25	2.06	2.00
Patapsco Guano	9.25	2.06	2.00
Patapsco Special Tobacco Mixture	8.00	2.06	3.00
Patapsco Fine Ground Bone Total	20.61	3.29	----
Patapsco Pure Dissolved S. C. Phosphate	14.00	----	----
Coon Brand Guano	9.00	.82	3.00
Choctaw Guano	8.00	2.47	3.00
Planters' Favorite	8.00	1.65	2.00
Seagull Ammoniated Guano	8.00	1.65	2.00
Money Maker Guano	7.00	3.70	6.00
Unicorn Guano	8.00	2.06	3.00
Baltimore Soluble Phosphate	11.00	----	2.00
Florida Soluble Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Grange Mixture	8.00	1.65	2.00
Patapsco Crop Dresser	4.00	3.29	4.00
Nitrate of Soda	----	15.00	----
Muriate of Potash	----	----	49.00
Ground Fish	----	8.23	----
Swanson's Gold Leaf Special	8.00	2.06	2.00
Pocahontas Guano Co., Lynchburg, Va.—			
Imperial Dissolved S. C. Phosphate	14.00	----	----
Carrington's Superior Grain Compound	10.00	----	2.00
Wabash Wheat Mixture	10.00	----	4.00
Cherokee Grain Special	8.00	----	4.00
Farmers' Favorite Apex Brand	8.00	2.47	3.00
Spot Cash Tobacco Compound	8.00	2.06	3.00
Yellow Tobacco Special	9.00	1.65	2.00
High Grade 4 Per Cent Tobacco Compound, Mohawk King Brand	9.00	1.85	4.00
Standard Tobacco Guano, Old Chief Brand	9.00	1.66	2.00
Pocahontas Special Tobacco Fertilizer	9.00	2.47	3.00
A. A. Complete Champion Brand	8.00	1.03	3.00
Carrington's Special Truck Grower, Eagle Mount Brand	8.00	2.06	6.00
Pure Raw Bone Meal Total	20.60	3.69	----
Carrington's S. C. Phosphate, Waukesha Brand	16.00	----	----
Carrington's Banner Brand Guano	8.00	1.65	2.00
Indian Tobacco Grower	8.00	2.47	4.00
Bone Meal Total	22.80	2.46	----
Planters Cotton Seed Oil Co., Rocky Mount, N. C.—			
Tar River Special	8.00	2.47	3.00
Eagle Guano	8.00	1.65	2.00
Royal Cotton Grower	9.00	2.26	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Piedmont-Mt. Airy Guano Co., Baltimore, Md.—			
Piedmont Cultivator Brand	8.00	1.65	2.00
Piedmont Bone and Peruvian Mixture	8.00	1.65	2.00
Piedmont Special Truck	6.00	5.76	5.00
Piedmont Early Vegetable Manure	6.00	4.12	7.00
Piedmont Vegetable Compound	6.00	3.29	8.00
Piedmont Essential Tobacco Compound	9.00	1.65	2.00
Piedmont Guano for Tobacco	8.00	2.09	3.00
Piedmont High Grade Ammoniated Bone and Potash	8.00	2.47	3.00
Piedmont High Grade S. C. Bone Phosphate	14.00	----	----
Levering's Potashed Bone	10.00	----	4.00
Levering's Reliable Tobacco Guano	8.00	2.47	3.00
Piedmont Special Potato Guano	6.00	4.94	7.00
Piedmont Red Leaf Tobacco Guano	8.00	1.65	2.00
Piedmont Early Trucker	6.00	4.12	5.00
Piedmont Potato Producer	5.00	2.47	6.00
Piedmont Farmers' Standard	9.00	1.65	2.00
Piedmont Special for Cotton, Corn and Peanuts	8.00	1.65	2.00
Piedmont Special Farmers' Tobacco Guano	8.40	2.47	4.00
Piedmont Farmers' Bone and Potash	10.00	----	2.00
Piedmont High Grade Guano for Cotton	8.00	2.47	3.00
Haynes' Cultivator Guano	8.00	1.65	2.00
Piedmont Farmers' Favorite	8.00	.82	4.00
Piedmont Farmers' Cotton Grower	9.00	.82	3.00
Piedmont Star Bone and Potash	8.00	----	5.00
Piedmont Unexcelled Guano	8.00	3.29	4.00
Piedmont Bone Meal Total	21.00	3.29	----
Piedmont Special Potash Mixture	10.00	----	5.00
Boykin's Top Dresser	----	7.41	3.00
Levering's Ammoniated Bone	9.00	.82	3.00
Nitrate of Soda	----	15.23	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Sulphate of Ammonia	----	20.58	----
Piedmont 16 Per Cent Acid Phosphate	16.00	----	----
The Robertson Fertilizer Co., Norfolk, Va.—			
Robertson's X-Ray Tobacco Grower	8.00	2.06	2.00
Genuine German Kainit	----	----	12.00
Skyscraper Bone and Potash Compound	10.00	----	4.00
Double Dollar Soluble Guano	8.00	1.65	2.00
Double Dollar Soluble Cotton Grower	8.00	1.65	2.00
Double Dollar Soluble Tobacco Guano	8.00	1.65	2.00
Beaver Brand Soluble Guano	9.00	1.85	4.00
Beaver Brand Soluble Tobacco Guano	9.00	1.85	4.00
Beaver Brand Bright Tobacco Special	9.00	1.85	4.00
Big Cropper High Grade Guano	8.00	2.47	3.00
Robertson's Special Formula for Tobacco	8.00	3.30	4.00
Scepter Brand Acid Phosphate	14.00	----	----
High Peak Acid Phosphate	16.00	----	----
Level Run Dissolved Bone and Potash	10.00	----	2.00
Wood's Winner H. G. Guano	8.00	3.36	4.00
Dried Blood	----	13.20	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.85	----
The Quinnepiac Co., Charleston, S. C.—			
Standard Quinnepiac Pine Island Ammoniated Superphosphate	9.00	1.85	1.00
Standard Quinnepiac Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
F. S. Royster Guano Co., Norfolk, Va.—			
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Farmers' Bone Fertilizer	8.00	1.65	2.00
Bonanza Tobacco Guano	8.00	2.47	3.00
Orinoco Tobacco Guano	8.00	2.06	3.00
Special Tobacco Compound	8.00	2.06	2.00
Cobb's High Grade for Tobacco	8.00	3.30	5.00
Humphrey's Special for Tobacco	6.00	2.55	3.20
Eagle's Special Tobacco Guano	8.00	2.47	5.00
Royal Potato Guano	7.00	4.12	5.00
Royal Special Potato Guano	7.00	4.12	7.00
Ballentine's Potato Guano	6.00	5.77	7.00
Trucker's Delight	8.00	3.30	4.00
Special Compound	9.00	1.65	1.00
Tomlinson's Special	9.00	2.47	5.00
Williams' Special Guano	8.00	2.06	5.00
Magic Top Dresser	----	7.42	3.00
Royster's Special Sweet Potato Guano	8.00	2.47	3.00
Royster's Potato Guano	5.00	4.94	7.00
Royster's Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Royster's Early Truck Guano	7.00	4.12	8.00
Royster's Special 10 Per Cent Truck Guano	5.00	8.24	3.00
Royster's Special 4-8-3	8.00	3.30	3.00
Royster's 4-9-5 Special	9.00	3.30	5.00
Royster's Special 1-9-2 Guano	9.00	.82	2.00
Royster's 2-6-5 Special	6.00	1.65	5.00
Royster's Meal Mixture	9.00	2.26	2.00
Royster's Special Wheat Fertilizer	8.00	1.65	2.00
Royster's H. G. 16 Per Cent Acid Phosphate	16.00	----	----
Royster's 14 Per Cent Acid Phosphate	14.00	----	----
Royster's Dissolved Bone	13.00	----	----
Royster's XX Acid Phosphate	12.00	----	----
Royster's Bone and Potash Mixture	11.00	----	5.00
Royster's Bone and Potash Mixture	10.00	----	2.00
Royster's Bone and Potash for Grain	10.00	----	3.00
Royster's 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Royster's Peanut Special	7.00	----	5.00
Royster's Complete Guano	8.00	1.65	2.00
Royster's 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Jupiter High Grade Guano	8.00	3.30	4.00
Viking Ammoniated Guano	9.00	1.65	3.00
Royster's Best Guano	8.00	3.71	7.00
Harvey's Cabbage Guano	5.00	6.59	3.00
Marlborough High Grade Cotton Guano	8.00	2.47	3.00
Nitrate of Soda	----	15.22	----
Jumbo Peanut Grower	8.00	1.02	4.00
Watkins' Special	9.00	2.06	5.00
Haynes' Special	9.00	2.06	3.00
Pure Raw Bone Meal Total	21.50	3.71	----
Milo Tobacco Guano	8.00	3.30	4.00
Royster's Soluble Guano	10.00	1.65	2.00
McDowell's Cotton Grower	6.00	3.30	2.00
Royster's 4-6-4 Special	4.00	4.94	4.00
Webb's Korn King	8.00	1.65	2.00
Royster's 10-5 Bone and Potash Mixture	10.00	----	5.00
Corbett & Moore's Special	8.00	1.65	3.50
Oakley's Special Tobacco Guano	6.00	3.30	4.00
Royster's Irish Potato Guano	6.00	4.12	7.00
Royster's Cabbage Guano	5.00	8.23	2.50

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
J. H. Roberson & Co., Robersonville, N. C.—			
Roberson's Potato Guano	6.00	5.77	5.00
Roberson's Cotton Grower	9.00	2.26	2.00
Roberson's Special Potato Grower	7.00	5.77	7.00
Roberson's Special for Bright Tobacco	8.00	2.06	3.00
Richmond Guano Co., Richmond, Va.—			
10 Per Cent Cabbage Guano	6.00	8.23	2.00
Special High Grade for Truck	7.00	4.94	5.00
Southern Trucker	8.00	4.11	5.00
Perfection Special	8.00	3.29	4.00
Gilt Edge Fertilizer	8.00	2.47	3.00
Carolina Cotton Grower	9.00	2.26	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.26	2.50
Tip Top Fertilizer	8.00	2.06	3.00
Special Premium Brand for Tobacco	8.00	1.85	2.25
Special Premium Brand for Plants	8.00	1.85	2.25
Carolina Bright for Cotton	8.00	2.06	1.50
Benson's Special Fertilizer	8.00	1.65	6.00
Parker & Hunter's Special Fertilizer	8.00	1.65	2.00
Premium Tobacco Fertilizer	8.00	1.65	2.00
Premium Brand Fertilizer	8.00	1.65	2.00
Bone Mixture	9.00	1.65	1.00
Clark's Special Formula	7.00	4.94	6.00
Carter's Special for Tobacco	4.00	2.47	6.00
Saunders' Special Formula for Bright Tobacco	9.00	2.88	5.00
Burton's Special Tobacco Fertilizer	9.00	2.06	3.00
Hunter & Dunn's Special Ammoniated Fertilizer,	9.00	2.47	2.25
Hunter & Dunn's Ammoniated Fertilizer	8.00	1.65	2.00
Edgecombe Cotton Grower	8.00	1.65	2.00
Premium Bone and Potash Mixture	13.00	----	3.00
Rex Bone and Potash Mixture	10.00	----	4.00
Tip Top Bone and Potash Mixture	8.00	----	4.00
Winter Grain and Grass Grower	8.00	----	4.00
Premium Peanut Grower	8.00	----	4.00
Bone and Potash Mixture	10.00	----	2.00
Rex Dissolved Bone Phosphate	16.00	----	----
High Grade Acid Phosphate	14.00	----	----
High Grade Wheat and Grass Fertilizer	14.00	----	----
Premium Dissolved Bone	13.00	----	----
Bone Mixture	10.00	.82	1.00
Dissolved S. C. Phosphate	12.00	----	----
Hunter & Dunn's Dissolved Bone	12.00	----	----
Pure German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	19.75	----
Nitrate of Soda	----	15.63	----
Pure Raw Bone Meal Total	20.00	3.29	----
Pure Animal Bone Total	25.00	2.47	----
Premium Corn Grower	10.00	.82	1.00
Premium Wheat Grower	9.00	.82	2.00
Cracker Jack Fertilizer	9.00	1.65	2.00
Premium Peanut Special	8.00	.82	4.00
Premium Cotton Grower	9.00	.82	3.00
Old Homestead Dissolved Bone	12.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Read Phosphate Co., Charleston, S. C.—			
Genuine German Kainit	----	----	12.00
Read's High Grade Acid Phosphate	14.00	----	----
Read's Bone and Potash	10.00	----	4.00
Read's Alkaline Bone	10.00	----	2.00
Read's Special Potash Mixture	8.00	----	4.00
Read's High Grade Tobacco Leaf	8.00	2.47	3.00
Read's Blood and Bone Fertilizer No. 1	8.00	1.65	2.00
Read's Soluble Fish Guano	8.00	1.65	2.00
Read's High Grade Cotton Grower	8.00	2.47	3.00
Read's High Grade Dissolved Bone	16.00	----	----
Raisin-Monumental Co., Baltimore, Md.—			
Dixie Guano	9.00	1.65	2.00
Empire Guano	8.00	1.65	2.00
Raisin Gold Standard	8.00	2.47	3.00
Raisin Special Bone and Potash	10.00	----	5.00
Raisin Bone and Potash	10.00	----	2.00
Raisin 13 Per Cent Acid Phosphate	13.00	----	----
Raisin 16 Per Cent Acid Phosphate	16.00	----	----
Raisin 14 Per Cent Acid Phosphate	14.00	----	----
Baltimore Special Mixture	9.00	.82	2.00
Raisin's Indian Brand for Tobacco	8.00	2.47	3.00
Reidsville Fertilizer Co., Reidsville, N. C.—			
Banner Fertilizer	8.00	1.65	2.00
Champion Guano	8.00	1.65	2.00
Broad Leaf Tobacco Guano	8.00	1.85	2.50
Royal Fertilizer	8.00	2.47	3.00
Lion Brand Fertilizer	9.00	2.47	6.00
Bone and Potash	10.00	----	4.00
Reidsville Hustler	9.00	.82	2.00
Reidsville Acid Phosphate	14.00	----	----
Swift Fertilizer Works, Atlanta, Ga., and Wilmington, N. C.—			
High Grade Swift's Strawberry Grower	8.00	2.47	10.00
High Grade Swift's Special Trucker	6.00	5.76	5.00
High Grade Swift's Special 10 Per Cent Blood and Bone Trucker	5.00	8.23	3.00
High Grade Swift's Carolina 7 Per Cent Special Trucker	7.00	5.76	7.00
High Grade Swift's Favorite Truck Guano	6.00	4.94	6.00
High Grade Swift's Special Irish Potato Grower	7.00	4.12	8.00
High Grade Swift's Special Potato Grower	6.00	4.12	7.00
Swift's Carolina Tobacco Grower H. G. Guano	8.00	2.47	3.00
Swift's Cape Fear Truck Guano, H. G.	8.00	4.12	2.00
Swift's Red Steer Standard Grade Guano	8.00	1.65	2.00
Swift's Plow Boy Guano	10.00	.82	1.00
Swift's Cotton Plant Standard Grade Guano	9.00	1.65	1.00
Swift's Golden Harvest Standard Grade Guano	8.00	1.65	2.00
Swift's Farmers' Favorite High Grade	9.00	1.65	3.00
Swift's Pioneer High Grade Guano Tobacco Grower	8.00	1.65	4.00
High Grade Swift's Early Trucker	7.00	4.12	5.00
Swift's Blood, Bone and Potash High Grade Guano	9.50	3.29	7.00
Swift's Corn and Cotton Grower	10.00	2.47	3.00
Swift's Cotton King High Grade	9.00	2.47	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Swift's Ruralist High Grade Guano	8.00	2.47	3.00
Swift's Special High Grade Guano	9.50	4.12	3.00
Swift's Monarch H. G. Vegetable Grower	8.00	3.29	4.00
Swift's Special High Grade Phosphate and Potash	12.00	----	6.00
Swift's Plantation Standard Grade Phosphate and Potash	8.00	----	4.00
Swift's Farmers' Home High Grade Phosphate and Potash	10.00	----	4.00
Swift's Field and Farm Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Wheat Grower Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Harrow Standard Grade Acid Phosphate	13.00	----	----
High Grade Swift's No. 1 Ground Tankage	6.00	8.24	----
Swift's Pure Bone Meal Total	25.00	2.47	----
Swift's Cultivator High Grade Acid Phosphate	14.00	----	----
Swift's Special High Grade Acid Phosphate	16.00	----	----
Swift's Chattakoochee Standard Grade Acid Phosphate	12.00	----	----
Swift's Ground Dried Blood	----	13.18	----
Swift's Pure Nitrate of Soda	----	14.82	----
Swift's Pure Raw Bone Meal Total	23.00	3.71	----
Swift's Muriate of Potash	----	----	50.00
Swift's German Kainit	----	----	12.00
Swift's Eagle High Grade Guano	10.00	1.65	2.00
Swift's Atlanta High Grade Phosphate and Potash	12.00	----	4.00
Southern Chemical Co., Inc., Roanoke, Va.—			
Our Favorite	8.00	1.65	2.00
Farmers' Joy	8.00	1.65	4.00
Our Leader	9.00	.82	2.00
Harvest King	8.00	.82	3.00
Southern Queen	8.00	2.47	10.00
Valley Chief	8.50	1.65	2.00
Spartanburg Fertilizer Co., Spartanburg, S. C.—			
Corn Formula	10.50	1.65	5.00
Gosnell's Plant Food	10.50	2.46	2.00
West's Potash Acid	13.00	----	3.00
Bold Buster	9.00	1.65	2.00
Potato Guano	7.00	2.46	7.00
Tiger Brand Acidulated Phosphate	14.00	----	----
Dana's Best	10.00	----	4.00
Scotland Neck Guano Co., Scotland Neck, N. C.—			
Josey's Cotton Seed Meal Tobacco Guano	8.00	2.47	3.00
Josey's High Grade Acid Phosphate	16.00	----	----
Josey's Cotton Seed Meal Cotton Grower	8.00	1.65	2.00
Scotland Neck's Favorite Cotton Seed-meal Guano,	8.00	1.65	2.00
The Southern Exchange Co., Maxton, N. C.—			
Southern Exchange Co.'s Special Tobacco Fertilizer	8.00	1.65	3.00
Bright Tobacco Formula	8.00	2.47	4.00
Melon Grower	8.00	4.12	7.00
McKimmon's Special Truck Formula	8.00	4.12	7.00
Two Fours Guano	7.00	3.30	4.00
That Big Stick Guano	8.00	2.47	4.00
Bull of the Woods Fertilizer	8.00	2.47	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Jack's Best Fertilizer	8.00	2.47	3.00
Correct Cotton Compound	8.00	2.47	3.00
Juicy Fruit Fertilizer	9.00	1.85	4.00
The Walnut Fertilizer	8.50	2.06	2.50
The Racer Guano	8.00	1.65	3.00
The Coon Guano	8.00	1.65	2.00
R. M. C. Special Crop Grower	8.00	2.47	3.00
S. E. C. Bone and Potash Mixture	10.00	----	4.00
S. E. C. Bone and Potash Mixture	10.00	----	2.00
S. E. C. Acid Phosphate	16.00	----	----
S. E. C. Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Currie's Crop Lifter	8.00	1.65	3.00
The Southern Cotton Oil Co., Charlotte District, Concord, Charlotte, Davidson, Madison, Shelby, Gibson and Gastonia.—			
Dandy Top Dresser	4.00	9.07	2.50
Conqueror	8.00	3.30	4.00
Gloria	8.00	1.65	2.00
Peacock	8.00	2.47	3.00
Red Bull	8.00	2.06	2.00
Noon	8.00	2.47	3.00
King Bee	8.65	1.65	2.00
Gold Seal	14.00	----	----
Silver King	13.00	----	----
Genuine German Kainit	----	----	12.00
Magnolia Bone and Potash	10.00	----	2.00
Conqueror Bone and Potash	10.00	----	4.00
Cotton Seed Meal	2.30	6.18	1.50
Choice	8.00	3.30	6.00
Conqueror Bone and Potash	12.00	----	4.00
Southern Cotton Oil Co.'s 16 Per Cent Acid Phosphate	16.00	----	----
Razem	9.00	1.65	3.00
Nitrate of Soda, 19 Per Cent	----	15.65	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda, 16 Per Cent	----	13.20	----
Southern Cotton Oil Co., Goldsboro, Fayetteville, Rocky Mount and Wilson.—			
Goldsboro Cotton Grower	9.00	2.26	2.00
Rocky Mount Oil Mill Standard	8.00	1.65	2.00
Fayetteville Oil Mill Standard	8.00	1.65	2.00
Goldsboro Oil Mill Standard	8.00	1.65	2.00
Wilson Oil Mill Standard	8.00	1.65	2.00
The Southern Cotton Oil Company Standard	8.00	1.65	2.00
Fayetteville Oil Mill Special Cotton Grower	8.00	2.47	3.00
Wilson Oil Mill Special Cotton Grower	8.00	2.47	3.00
Rocky Mount Oil Mill Special Cotton Grower	8.00	2.47	3.00
Goldsboro Oil Mill Special Cotton Grower	8.00	2.47	3.00
Goldsboro Oil Mill High Grade	8.00	2.26	2.50
Rocky Mount Oil Mill High Grade	8.00	2.26	2.50
Fayetteville Oil Mill High Grade	8.00	2.26	2.50
Wilson Oil Mill High Grade	8.00	2.26	2.50
The Southern Cotton Oil Co. High Grade	8.00	2.26	2.50
Edgerton's Old Reliable	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Best & Thompson's Special	9.00	2.26	2.00
The Southern Cotton Oil Co.'s Special Tobacco Grower	8.00	2.47	3.00
Echo	8.00	2.06	3.00
Morning Glory	8.00	2.47	3.00
Southern Cotton Oil Co 's Special Mixture	8.00	3.30	4.00
Best & Thompson's High Grade Cotton and Tobacco Guano	8.00	2.47	3.00
Tuscarora Fertilizer Co., Atlanta, Ga., and Wilmington, N. C.—			
Acid Phosphate	14.00	----	----
Acid Phosphate	13.00	----	----
Tuscarora Alkaline Bone	10.00	----	5.00
Tuscarora Bone Potash	10.00	----	2.00
Champion	8.00	2.06	2.50
Manure Substitute	6.00	3.30	4.00
Tuscarora Trucker	8.00	4.12	7.00
Berry King	8.00	2.06	4.00
Tobacco Special	8.00	2.47	3.00
Tuscarora Fruit and Potato	8.00	1.65	10.00
Cotton Special	8.00	2.47	3.00
King Cotton	8.00	2.06	2.00
Big (4) Four	7.00	1.65	4.00
Tuscarora Standard	8.00	1.65	2.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Acid Phosphate	16.00	----	----
Tuscarora Bone and Potash	8.00	----	4.00
Tuscarora Bone and Potash	10.00	----	4.00
Union Guano Co., Winston-Salem, N. C.—			
Union 12-6 Bone and Potash	12.00	----	6.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Genuine German Kainit	----	----	12.00
Union 12 Per Cent Acid Phosphate	12.00	----	----
Union Dissolved Bone	13.00	----	----
Union High Grade Acid Phosphate	14.00	----	----
Union 16 Per Cent Acid Phosphate	16.00	----	----
Union 12-3 Bone and Potash	12.00	----	3.00
Union 10-6 Bone and Potash	10.00	----	6.00
Union 10-5 Bone and Potash	10.00	----	5.00
Union 10-4 Bone and Potash	10.00	----	4.00
Union 8-5 Bone and Potash	8.00	----	5.00
Union 12-4 Bone and Potash	12.00	----	4.00
Union 12-5 Bone and Potash	12.00	----	5.00
Union Wheat Mixture	8.00	----	4.00
Union Bone and Potash	10.00	----	2.00
Quakers' Grain Mixture	10.00	----	4.00
Giant Phosphate and Potash	10.00	----	3.00
Liberty Bell Crop Grower	10.50	----	1.50
Roseboro's Special Potash Mixture	12.00	----	6.00
Union Potato Mixture	8.00	1.65	10.00
Union Dissolved Animal Bone Total	13.00	2.06	----
Union Vegetable Compound	7.00	4.12	8.00
Union Truck Guano	7.00	3.29	5.00
Union Premium Guano	8.00	3.29	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Union Perfect Cotton Grower	9.00	2.26	2.00
Union Standard Tobacco Grower	8.00	2.06	2.00
Union Mule Brand Guano	10.00	1.65	2.00
Union Water Fowl Guano	8.00	2.06	3.00
Union Homestead Guano	8.00	2.47	3.00
Union Superlative Guano	8.00	.82	4.00
Union Special Formula for Cotton	10.00	2.47	3.00
Union Complete Cotton Mixture	9.00	1.65	3.00
Old Honesty Guano	8.00	1.65	2.00
Victoria High Grade Tobacco Guano	8.00	2.47	3.00
Sparger's Special Tobacco Grower	8.00	1.65	3.00
Old Honesty Tobacco Guano	8.00	1.65	2.00
Pure Animal Bone Meal—Total	22.50	3.71	----
Nitrate of Soda	----	14.82	----
Q and Q Quality and Quantity Guano	9.00	1.65	1.00
Pure Animal Bone Meal—Total	22.50	2.47	----
Sunrise Ammoniated Guano	8.00	.82	3.00
Union Approved Crop Grower	8.75	1.65	2.00
Fish Brand Ammoniated Guano	8.00	1.65	2.00
Farmers' Blood and Bone Guano	9.00	1.65	3.00
Union Prolific Cotton Compound	10.00	3.29	4.00
R. L. Upshur, Norfolk, Va.—			
Cotton Seed Meal Mixture	9.00	2.26	2.00
Nitrate of Soda	----	15.22	----
Muriate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00
Upshur's High Grade Acid Phosphate	14.00	----	----
Upshur's Peanut Guano	8.00	1.65	2.00
Upshur's G., G. & C. Guano	8.00	1.65	2.00
Upshur's Wheat Compound	12.00	----	5.00
Upshur's F. F. V. (Favorite Fertilizer of Virginia)	8.00	1.65	2.00
Upshur's Bone and Potash	10.00	----	2.00
Upshur's O. P. (Old Plantation)	9.00	1.65	2.00
Upshur's Norfolk Special 10 Per Cent	5.00	8.23	2.00
Upshur's 7 Per Cent Irish Potato	6.00	5.76	5.00
Upshur's F. C. (Farmers' Challenge)	6.00	5.76	6.00
Upshur's 7 Per Cent Special Potato Guano	5.00	5.76	5.00
Upshur's Special Truck	7.00	4.11	8.00
Upshur's F. F. (Farmers' Favorite)	7.00	4.11	6.00
Upshur's 5 Per Cent	5.00	4.11	5.00
Upshur's Fish, Bone and Potash	8.00	1.64	4.00
Upshur's 8-3-3 Cotton	8.00	2.47	3.00
Upshur's High Grade Tobacco Guano	8.00	2.47	3.00
Upshur's Premo Cotton Guano	8.00	1.65	2.00
Upshur's Special 2½-8-3	8.00	2.05	3.00
Upshur's 16 Per Cent Acid Phosphate	16.00	----	----
Upshur's 4-6-4	6.00	3.69	4.00
Venable Fertilizer Co., Richmond, Va.—			
Venable's 10 Per Cent Trucker	6.00	8.23	2.00
Venable's 6-6-6 Manure	6.00	4.94	6.00
Venable's 5 Per Cent Trucker	8.00	4.11	5.00
Venable's 4 Per Cent Trucker	8.00	3.29	5.00
Venable's Ideal Manure	8.00	1.65	5.00
Venable's Alliance Tobacco Manure No. 1	8.00	2.06	3.00
Venable's Alliance Tobacco Manure No. 2	8.00	1.65	2.00
Venable's B. B. P. Manure	9.00	1.65	1.00
Venable's Cotton Grower	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Venable's Roanoke Special	8.00	2.06	3.00
Venable's Alliance Bone and Potash Mixture	8.00	----	4.00
Venable's Peanut Grower	8.00	----	4.00
Venable's Best Acid Phosphate	16.00	----	----
Venable's Alliance Acid Phosphate	14.00	----	----
Venable's Dissolved Bone	13.00	----	----
Venable's Standard Acid Phosphate	12.00	----	----
Bone and Potash Mixture	10.00	----	2.00
High Grade Bone and Potash Mixture	10.00	----	4.00
Planters' Bone Fertilizer	8.00	1.65	2.00
Ballards' Choice Fertilizer	8.00	2.47	3.00
Roanoke Mixture	9.00	2.26	2.00
Roanoke Meal Mixture	9.00	2.26	2.00
Pure Animal Bone ---- Total	25.00	2.47	----
Pure Raw Bone ---- Total	20.00	3.29	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Sulphate of Potash	----	----	48.00
Pure German Kainit	----	----	12.00
Venable's Corn, Wheat and Grass Fertilizer	9.00	1.65	1.00
Venable's Peanut Special	8.00	.82	4.00
Virginia-Carolina Chemical Co., Richmond, Va.—			
V.-C. C. Co.'s Special High Grade Potash Mixture	12.00	----	6.00
V.-C. C. Co.'s 14 Per Cent Acid Phosphate	14.00	----	----
V.-C. C. Co.'s 16 Per Cent Acid Phosphate	16.00	----	----
V.-C. C. Co.'s Standard Bone and Potash	10.00	----	5.00
V.-C. C. Co.'s Special Crop Grower	12.00	----	3.00
V.-C C. Co.'s Formula 4-4	7.00	2.55	3.20
V.-C. C. Co.'s Special Truck Guano	6.00	4.12	7.00
V.-C. C. Co.'s Special	8.00	3.29	4.00
V.-C. C. Co.'s Special Potash Mixture	10.00	----	4.00
Genuine Peruvian Mixture Pelican	8.00	4.15	5.00
Jumbo Peruvian Guano Crop Grower	8.00	2.48	3.00
Yellow Leaf Tobacco Guano	8.00	2.47	3.00
Royal High Grade Fertilizer	8.00	2.47	3.00
V.-C. C. Co.'s Southern Cotton Grower	9.00	2.26	2.00
Burnhardt's Grain and Crop Guano	9.00	.82	3.00
Pure Animal Bone Meal ---- Total	22.50	2.47	----
McCormick's Wheat and Grain Guano	9.00	.82	3.00
Smith's Irish Potato Guano	8.00	1.65	10.00
Lion's High Grade Tobacco Fertilizer	8.00	2.47	4.00
Invincible High Grade Fertilizer	6.00	4.12	7.00
V.-C. C. Co.'s High Grade Tobacco Fertilizer	8.00	2.47	10.00
Great Texas Cotton Grower Soluble Guano	9.00	2.47	4.00
Cock's Soluble Guano High Grade Animal Bone	9.00	1.85	3.00
V.-C. C. Co.'s Truck Crop Fertilizer	7.00	4.12	7.00
Prolific Cotton Grower	9.00	2.26	2.00
Battles' Crop Grower	12.00	----	3.00
3 Per Cent Special C. S. M. Guano No. 3	8.00	2.47	2.00
Delta C. S. M.	8.00	2.26	2.50
Winston Special for Cotton C. S. M.	8.00	1.65	2.00
Diamond Dust C. S. M.	8.00	1.65	2 00
Admiral	8.00	2.47	2.50
Blue Star C. S. M.	8.00	2.06	3.00
Good Luck C. S. M.	8.00	2.47	2.50
North State Guano C. S. M.	9.00	1.65	1.00
Plant Food C. S. M.	8.00	1.65	2.00
Split Silk C S. M.	8.00	2.47	2.50
Superlative C. S. M. Guano	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand	Avail. Phos Acid.	Nitrogen.	Potash.
Farmers' Friend Favorite Fertilizer Special	8.50	1.65	2.00
White Stem C. S. M.	9.00	2.26	2.00
Special High Grade Tobacco Fertilizer C. S. M.	8.00	2.47	3.00
Wilson's Standard C. S. M.	8.00	1.65	2.00
Adams' Special	8.00	2.47	3.00
Ajax C. S. M. Guano	8.00	1.65	2.00
Royal Crown	8.00	2.26	2.00
Farmers' Favorite Fertilizer C. S. M.	8.00	1.65	2.00
Atlas Guano C. S. M.	8.00	2.47	2.50
Blake's Best	8.00	2.47	3.00
Orange Grove Guano	8.00	2.26	2.50
Carr's 8-4-4 Crop Grower	8.00	3.29	4.00
Ford's Wheat and Corn Guano	10.00	.82	2.50
Konqueror High Grade Truck Fertilizer	7.00	4.12	5.00
Goodman's Special Potash Mixture	12.00	----	5.00
Jones' Grain Special	8.00	----	4.00
V.-C. C. Co.'s Pure Raw Bone Meal Total	22.50	3.71	----
V.-C. C. Co.'s Dissolved Animal Bone	10.00	2.06	----
Sludge Acid Phosphate	14.00	----	----
Manure Salts	----	----	20.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	20.59	----
Fish Scrap	----	8.24	----
Nitrate of Soda	----	14.82	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	49.00
V.-C. C. Co.'s Grain Special	10.00	----	6.00
V.-C. C. Co.'s Dissolved Bone and Potash	10.00	----	2.00
Diamond Cotton Seed Meal Guano	8.00	2.47	3.00
Bold Buster Guano	10.00	1.65	2.00
Bigelow's Crop Guano	9.00	.82	3.00
V.-C. C. Co.'s 12-4 Grain Grower	12.00	----	4.00
Jeffreys' High Grade Guano	9.00	2.47	3.00
V.-C. C. Co.'s High Grade Top Dresser	4.00	6.18	2.50
Parker & Hunter's Special	8.00	1.65	2.00
Allison & Addison's Star Brand Vegetable Guano	8.00	3.71	4.00
Farmers' Success	8.00	2.46	4.00
Pace's Special 5 Per Cent Potato Guano	8.00	2.06	5.00
Virginia 11-5 Bone and Potash	11.00	----	5.00
Pasquotank Trucker	7.00	3.30	8.00
Myatt's Special High Grade	8.00	2.47	3.00
Allison & Addison's Star Special Tobacco Manure	9.00	2.26	2.00
Allison & Addison's Anchor Brand Tobacco Fertilizer	8.50	2.26	2.00
Allison & Addison's Anchor Brand Fertilizer	8.00	1.65	2.00
Allison & Addison's A. A. Guano	8.00	2.47	3.00
Allison & Addison's Old Hickory Guano	8.00	1.65	2.00
Allison & Addison's Star Brand Guano	9.00	1.65	1.00
Allison & Addison's B. P. Potash Mixture	10.00	----	2.00
Allison & Addison's McGavock's Special Potash Mixture	10.00	----	2.00
Allison & Addison's Fulton Acid Phosphate	14.00	----	----
Allison & Addison's I. X. L. Acid Phosphate	13.00	----	----
Allison & Addison's Standard Acid Phosphate	12.00	----	----
Aillson & Addison's Rocket Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Acid Phosphate	16.00	----	----
Atlantic and Virginia Fertilizer Co.'s Crenshaw Acid Phosphate	13.00	----	----
Atlantic and Virginia Fertilizer Co.'s Valley of Virginia Acid Phosphate	14.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Atlantic and Virginia Fertilizer Co.'s Our Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Bone and Potash Compound	10.00	----	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone Special for Tobacco	9.00	2.06	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone	8.00	1.65	3.00
Atlantic and Virginia Fertilizer Co.'s Carolina Truckers	7.00	5.76	7.00
Atlantic and Virginia Fertilizer Co.'s Virginia Truckers	8.00	4.12	5.00
Atlantic and Virginia Fertilizer Co.'s Orient Special for Tobacco	8.00	1.65	2.00
Atlantic and Virginia Fertilizer Co.'s Orient Complete Manure	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s King Cotton Grower	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s The Leader B. G.	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Groom's Special Tobacco Fertilizer	8.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Charlotte Dissolved Bone	12.00	----	----
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano B. G.	8.00	2.06	1.50
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano C. S. M.	8.00	2.06	1.50
Charlotte Oil and Fertilizer Co.'s Charlotte Acid Phosphate	13.00	----	----
Charlotte Oil and Fertilizer Co.'s Catawba Guano B. G	8.00	2.47	3.00
Charlotte Oil and Fertilizer Co.'s Catawba Acid Phosphate	14.00	----	----
Charlotte Oil and Fertilizer Co.'s Queen of the Harvest C. S. M.	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Oliver's Perfect Wheat Grower	11.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Dayvault's Special	12.00	----	6.00
Charlotte Oil and Fertilizer Co.'s 10-2 Bone and Potash	10.00	----	2.00
Charlotte Oil and Fertilizer Co.'s 15 Per Cent Acid Phosphate	15.00	----	----
Charlotte Oil and Fertilizer Co.'s McCrary's Diamond Bone and Potash	9.00	----	3.00
Charlotte Oil and Fertilizer Co.'s Special 3 Per Cent Guano C. S. M.	8.00	2.47	2.00
Charlotte Oil and Fertilizer Co.'s High Grade Special Tobacco Fertilizer	9.00	2.06	2.00
Davie & Whittle's Owl Brand Guano for Tobacco	8.00	2.47	3.00
Davie & Whittle's Owl Brand Special Tobacco Guano	9.00	2.06	2.00
Davie & Whittle's Owl Brand Truck Guano	8.00	4.94	5.00
Davie & Whittle's Owl Brand Guano	8.00	1.65	2.00
Davie & Whittle's Owl Brand Acid Phosphate with Potash	10.00	----	2.00
Davie & Whittle's Owl Brand High Grade Dissolved Bone	14.00	----	----
Davie & Whittle's Owl Brand Dissolved Bone	12.00	----	----
Davie & Whittle's Owl Brand High Grade Acid Phosphate	16.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Davie & Whittle's Owl Brand High Grade 3 Per Cent Soluble Guano	9.00	2.06	3.00
Davie & Whittle's Owl Brand Acid Phosphate	13.00	----	----
Davie & Whittle's Vinco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Dissolved Bone	13.00	----	----
Durham Fertilizer Co.'s Diamond Wheat Mixture	10.00	----	3.00
Durham Fertilizer Co.'s Standard Wheat and Corn Grower	10.00	----	2.00
Durham Fertilizer Co.'s Excelsior Dissolved Bone Phosphate	14.00	----	----
Durham Fertilizer Co.'s Double Bone Phosphate	13.00	----	----
Durham Fertilizer Co.'s Blue Ridge Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Carr's Special Wheat Grower	8.00	----	4.00
Durham Fertilizer Co.'s Standard Guano	9.00	1.65	2.00
Durham Fertilizer Co.'s Best Potato Manure	7.00	5.76	7 00
Durham Fertilizer Co.'s L. & N. Special	9.00	2.47	2.00
Durham Fertilizer Co.'s Special Plant and Truck Fertilizer	8.00	4.12	3.00
Durham Fertilizer Co.'s Gold Medal Brand Guano	8.00	2.47	3.00
Durham Fertilizer Co.'s Durham Bone and Potash Mixture	10.00	----	2.00
Durham Fertilizer Co.'s Genuine Bone and Peruvian Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Genuine Bone and Peruvian Tobacco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Raw Bone Superphosphate	8.00	2.06	1.50
Durham Fertilizer Co.'s Standard Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	
Durham Fertilizer Co.'s Superphosphate for Tobacco	8.00	2.06	2.00
Durham Fertilizer Co.'s N. C. Farmers' Alliance Official Guano	8.00	2.06	3.00
Durham Fertilizer Co.'s N C. Farmers' Alliance Official Acid Phosphate	13.00	----	----
Durham Fertilizer Co 's Standard High Grade Acid Phosphate	14.00	----	----
Durham Fertilizer Co.'s Great Wheat and Corn Grower	10.50	----	1.50
Durham Fertilizer Co.'s Progressive Farmer Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Durham Ammoniated Fertilizer	9.00	1.65	1.00
Durham Fertilizer Co.'s Durham Best Acid Phosphate	16.00	----	----
Durham Fertilizer Co.'s Durham Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s New Era	8.00	1.65	3.00
Lynchburg Guano Co.'s Ironside Acid Phosphate	16.00	----	----
Lynchburg Guano Co.'s Spartan Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s Arvonia Acid Phosphate	13.00	----	----
Lynchburg Guano Co.'s S. W. Special Bone and Potash Mixture	10.00	----	4.00
Lynchburg Guano Co.'s Alpine Mixture	10.00	----	5.00
Lynchburg Guano Co.'s Dissolved Bone and Potash	10.00	----	2.00
Lynchburg Guano Co.'s Independent Standard	8.60	1.65	2.00
Lynchburg Guano Co 's Solid Gold Tobacco	8.00	2.26	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Lynchburg Guano Co.'s Lynchburg High Grade Acid Phosphate	14.00	----	----
Lynchburg Guano Co.'s Lynchburg Soluble	8.00	1.65	2.00
Lynchburg Guano Co.'s Lynchburg Soluble for Tobacco	8.00	1.65	2.00
Lynchburg Guano Co.'s Bright Belt Guano	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Crescent Brand Ammoniated Fertilizer	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Cooper's Bright Tobacco	8.00	2.06	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Trucker and Tomato Grower	8.00	4.12	5.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughter House Bone	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughter House Bone, Made Especially for Tobacco	8.00	2.06	2.00
Norfolk and Carolina Chemical Co.'s Amazon High Grade Manure	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Bright Leaf Tobacco Grower	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Bone and Potash	10.00	----	2.00
Norfolk and Carolina Chemical Co.'s Norfolk Soluble Bone	12.00	----	----
Norfolk and Carolina Chemical Co.'s Norfolk Best Acid Phosphate	13.00	----	----
Norfolk and Carolina Chemical Co.'s Norfolk Reliable Acid Phosphate	14.00	----	----
Old Dominion Guano Co.'s Standard Raw Bone Soluble Guano	9.00	1.65	1.00
Old Dominion Guano Co.'s Farmers' Friend High Grade Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Farmers' Friend Fertilizer	8.00	1.65	2.00
Old Dominion Guano Co.'s Farmers' Friend Special Tobacco Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Old Dominion Special Wheat Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Special Sweet Potato Guano	6.00	1.65	6.00
Old Dominion Guano Co 's Old Dominion Soluble Tobacco Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Soluble Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Potato Manure	7.00	4.12	8.00
Old Dominion Guano Co.'s Old Dominion Raw Bone Soluble Guano	9.00	2.05	3.00
Old Dominion Guano Co.'s Old Dominion 6-7-5 Truck Guano	6.00	5.75	5.00
Old Dominion Guano Co.'s Old Dominion 7-7-7 Truck Guano	7.00	5.75	7.00
Old Dominion Guano Co.'s Old Dominion Alkaline Bone and Potash	10.00	----	2.00
Old Dominion Guano Co.'s Bullock's Cotton Grower	8.00	1.65	2.00
Old Dominion Guano Co.'s Osceola Tobacco Guano	8.00	2.06	3.00
Old Dominion Guano Co.'s Millers' Special Wheat Mixture	8.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Old Dominion Guano Co.'s Planters' Bone and Potash Mixture	10.00		3.00
Old Dominion Guano Co.'s Bone Phosphate	13.00		
Old Dominion Guano Co.'s Royster's Acid Phosphate	12.00		
Old Dominion Guano Co.'s High Grade Acid Phosphate	14.00		
Old Dominion Guano Co.'s Obelisk Brand Bone and Potash	10.00		4.00
Old Dominion Guano Co.'s Horne's Cotton Fertilizer	9.00	2.06	3.00
Powers, Gibb & Co.'s Almont Acid Phosphate	12.00		
Powers, Gibb & Co.'s Cotton Brand Best Acid Phosphate	13.00		
Powers, Gibb & Co.'s Almont High Grade Acid Phosphate	14.00		
Powers, Gibb & Co.'s Fulp's Acid Phosphate	13.00		
Powers, Gibb & Co.'s Cotton Brand Acid Phosphate	12.00		
Powers, Gibb & Co.'s Acid Phosphate and Potash	10.50		1.50
Powers, Gibb & Co.'s Almont Wheat Mixture	10.00		3.00
Powers, Gibb & Co.'s Dissolved Bone and Potash	10.00		2.00
Powers, Gibb & Co.'s Almont Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibb & Co.'s Carolina Golden Belt Ammoniated Guano for Tobacco	8.00	2.06	3.00
Powers, Gibb & Co.'s Truck Farmers' Special Ammoniated Guano	8.00	3.29	5.00
Powers, Gibb & Co.'s Old Kentucky High Grade Manure	8.00	2.47	3.00
Powers, Gibb & Co.'s Cotton-seed Meal Standard Guano	9.00	2.47	2.00
Powers, Gibb & Co.'s Cotton-seed Meal Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibb & Co.'s Cotton Belt Ammoniated Guano	8.00	2.47	2.00
Powers, Gibb & Co.'s Eagle Island Ammoniated	8.00	1.65	2.00
Powers, Gibb & Co.'s Cotton Brand Ammoniated Dissolved Bone	8.00	3.29	4.00
Powers, Gibb & Co.'s Gibb's Ammoniated Guano	8.00	2.06	1.50
Powers, Gibb & Co.'s Powers' Ammoniated Guano	8.00	2.06	2.00
Southern Chemical Co.'s Electric Tobacco Guano	8.00	1.65	2.00
Southern Chemical Co.'s Electric Standard Guano	8.00	1.65	2.00
Southern Chemical Co.'s Pilot Ammoniated Guano Special for Tobacco	8.00	2.06	3.00
Southern Chemical Co.'s George Washington Plant Bed Fertilizer for Tobacco	8.00	2.47	2.50
Southern Chemical Co.'s Sun Brand Guano	9.00	2.06	5.00
Southern Chemical Co.'s Yadkin Complete Fertilizer	8.00	1.65	2.00
Southern Chemical Co.'s Solid South	10.00		6.00
Southern Chemical Co.'s Chick's Special Wheat Compound	8.00		4.00
Southern Chemical Co.'s Mammoth Wheat and Grass Grower	10.00		2.00
Southern Chemical Co.'s Winston Bone and Potash Compound	10.00		2.00
Southern Chemical Co.'s Winner Grain Mixture	10.00		4.00
Southern Chemical Co.'s Mammoth Corn Grower	10.00		2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Southern Chemical Co.'s Farmers' Pride Bone and Potash	10.00	----	3.00
Southern Chemical Co.'s Reaper Grain Application	12.00	----	3.00
Southern Chemical Co.'s Quickstep Bone and Potash	11.00	----	5.00
Southern Chemical Co 's Tar Heel Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Red Cross 14 Per Cent Acid Phosphate	14.00	----	----
Southern Chemical Co.'s Comet 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chick's 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chatham Acid Phosphate	13.00	----	----
Southern Chemical Co.'s Horseshoe Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Victor Acid Phosphate	13.00	----	----
J. G. Tinsley & Co.'s Dissolved S. C. Bone	13.00	----	----
J. G. Tinsley & Co.'s Powhatan Acid Phosphate	14.00	----	----
J. G. Tinsley & Co.'s Richmond Brand Guano	8.00	2.47	3.00
J. G. Tinsley & Co.'s Lee Brand Guano	8.00	1.65	2.00
J. G. Tinsley & Co.'s Killickinick Tobacco Mixture	8.00	2.06	3.00
J. G. Tinsley & Co.'s Stonewall Brand Acid Phosphate	12.00	----	----
J. G. Tinsley & Co.'s Stonewall Brand Guano	8.00	1.65	2.00
J. G. Tinsley & Co.'s Stonewall Tobacco Guano	8.00	1.65	2.00
J. G. Tinsley & Co.'s Tinsley's Special Irish Potato Guano	6.00	5.76	6.00
J. G. Tinsley & Co.'s Tinsley's Bone and Potash Mixture	10.00	----	2.00
J. G. Tinsley & Co.'s Tinsley's Strawberry Grower	6.00	3.29	4.00
J. G. Tinsley & Co.'s Tinsley's 10 Per Cent Truck Guano	5.00	8.25	2.50
J. G. Tinsley & Co.'s Tinsley's Irish Potato Guano	6.00	4.94	6.00
J. G. Tinsley & Co.'s Tinsley's Tobacco Fertilizer	8.00	3.29	2.50
J. G. Tinsley & Co.'s Tinsley's 7 Per Cent Ammoniated Guano for Beans, Peas, Cabbage, Strawberries, etc.	6.00	5.76	6.00
S. W. Travers & Co.'s National Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s National Special Tobacco Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Beef, Blood and Bone Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Standard Dissolved S. C. Bone	13.00	----	----
S. W. Travers & Co.'s Travers' Dissolved Bone Phosphate	14.00	----	----
S. W. Travers & Co 's Capital Dissolved Bone	12.00	----	----
S. W. Travers & Co.'s Capital Cotton Fertilizer	8.00	2.06	2.00
S. W. Travers & Co.'s Capital Bone and Potash Compound	10.00	----	2.00
S. W. Travers & Co.'s Capital Truck Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Capital Tobacco Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Travers' Special Wheat Compound	8.00	----	4.00
S. W. Travers & Co.'s Travers 7 Per Cent Truck Fertilizer	6.00	5.76	5.00
S. W. Travers & Co.'s Champion Acid Phosphate	16.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Virginia State Fertilizer Co.'s Virginia State Dissolved Bone and Potash	10.00		2.00
Virginia State Fertilizer Co.'s Virginia State Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Virginia State High Grade Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Number One Soluble Guano	9.00	1.65	2.00
Virginia State Fertilizer Co.'s XX Potash Mixture	10.00		4.00
Virginia State Fertilizer Co.'s Mountain Top Bone and Potash	10.00		5.00
Virginia State Fertilizer Co.'s Peerless Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Battle Axe Tobacco Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Dunnington's Special Formula for Tobacco	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Austrian Tobacco Grower	8.00	2.06	2.00
Virginia State Fertilizer Co.'s Buffalo Guano	8.00	2.06	3.00
Virginia State Fertilizer Co.'s Gamecock Special for Tobacco	8.50	1.65	2.00
Virginia State Fertilizer Co.'s Gilt Edge Special Tobacco Guano	8.00	2.06	2.00
Virginia State Fertilizer Co.'s Bull Dog Soluble Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Clipper Brand Acid Phosphate	13.00		
Virginia State Fertilizer Co 's Highland King	9.00	1.65	1.00
Virginia State Fertilizer Co.'s Alps Brand Acid Phosphate	12.00		
Virginia State Fertilizer Co.'s Bull Run Acid Phosphate	16.00		
Virginia State Fertilizer Co.'s Lurich Acid Phosphate	12.00		
Virginia State Fertilizer Co.'s Gilt Edge Brand Acid Phosphate	14.00		
Virginia State Fertilizer Co.'s Gilt Edge Brand Dissolved Bone and Potash	8.00		4.00
Thomas Wakefield, Friendship, N. C.—			
Bone Meal Total	21.73	4.12	
Williams & Clark Fertilizer Co., Charleston, S. C.—			
Standard American Ammoniated Bone Superphosphate	9.00	1.85	1.00
Winborne Guano Co., Tyner, N. C.—			
King Taminy Guano	8.00	2.47	3.00
Farmers' Select Guano	8.00	2.06	3.00
Winborne's 7 Per Cent Guano	5.00	5.75	5.00
Winborne's Excelsior Guano	8.00	1.65	2.00
Winborne's Tobacco Guano	8.00	2.47	3.00
Winborne's Eureka Guano	8.00	1.65	2.00
Winborne's 3-8-4 Guano	8.00	2.47	4.00
Winborne's Triumph Guano	8.00	1.65	2.00
High Grade Acid Phosphate	14.00		
Standard 16 Per Cent Acid Phosphate	16.00		
Genuine German Kainit			12.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Soluble Bone and Potash	10.00	----	2.00
Nitrate of Soda	----	15.63	----
Muriate of Potash	----	----	50.00
T. W. Wood & Sons, Richmond, Va.—			
Standard Grain and Grass Fertilizer	8.00	1.65	2.00
Standard High Grade Trucker Fertilizer	8.00	4.94	6.00
Standard Vegetable Fertilizer	8.00	2.47	3.00
Standard High Grade Acid Phosphate	14.00	----	----
Standard Bone and Potash Mixture	10.00	----	2.00
Wood's Lawn Enricher	6.00	2.47	3.00
Nitrate of Soda	----	15.64	----
Acid Phosphate Fertilizer	16.00	----	----
Acid Phosphate Fertilizer	14.00	----	----
Standard H. G. Acid Phosphate	16.00	----	----

LEAF TOBACCO SALES FOR DECEMBER, 1908.

Pounds sold for producers, first hand	13,282,190
Pounds sold for dealers	734,694
Pounds resold for warehouse	767,962
Pounds resold for other warehouses	40,578
Total	14,825,424

THE BULLETIN

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RALEIGH.

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NINTH (PARTIAL[1]) REPORT OF THE WORK ON THE DEPARTMENT TEST FARMS FOR SEASON 1908.

INCLUDING

VARIETY AND DISTANCE TESTS OF CORN AND COTTON.

B. W. KILGORE, State Chemist, Field Crops.

BY

G. M. MacNider, Soil Work.

AND

J. L. Burgess, Agronomist,

AND

R. W. Scott, Jr., Superintendent Edgecombe Test Farm.
F. T. Meacham, Superintendent Iredell Test Farm,
R. W. Collett, Superintendent Buncombe and Transylvania Test Farms.

On the following pages are recorded the results of this year's work with the variety and distance tests of corn and cotton on the Department's test farms. The testing of these two factors in the production of cotton and corn is of the most fundamental importance, as is evidenced by the difference in yield of different varieties and of different distancing when grown side by side in the same field, on the same type of soil, with identical cultivation and fertilization. Its importance is further emphasized when it is considered that 64.7 per cent (17.5 per cent to cotton and 47.2 per cent to corn) of the cultivated lands of North Carolina are devoted to these two crops, with the small average annual yields of 215 pounds of lint cotton and 12.8 bushels shelled corn per acre. If by carefully conducted experiments through a number of years the most advantageous distancing and most prolific varieties of corn and cotton on the different types of soil for an average season can be ascertained, and farmers generally be induced to use the best varieties and distances in growing these crops, material assistance will have been rendered in increasing the total amounts per acre of these crops grown in the State. Increasing the average yield of corn one bushel and seed cotton fifty pounds per acre will, according to the census of 1900, increase the anuual profits of the farmers of North Carolina by about $3,650,000, allowing sixty cents per bushel for shelled corn and three and one-half cents per pound for seed cotton. This does not appear, with the hearty co-operation of farmers, such a far-distant possibility, in the light of results during the past seven years in our testing of varieties of corn and cotton. Take, for example, the results of our variety tests at the

[1]The main portion of the work for 1902, 1903, 1904, 1905, 1906 and 1907 is reserved for publication later, when the results of our tests, which have now been running some six or seven years, will be brought together, with the view of drawing such conclusions as may be warranted on the subjects covered by the experiments.

Edgecombe farm[1] during this time. In comparative variety tests of corn, with the number of varieties in the different tests varying from eight to thirty-six, we have found the differences between the one yielding the highest and the one the lowest amount of shelled corn per acre in the individual test to range from 6.2 to 26.6 bushels. With cotton the range of difference in the different tests has been all the way from 530 to 915 pounds of seed cotton per acre, when from seven to twenty-six varieties were used in the different tests. It must not be forgotten that the best distancing of any crop is principally dependent upon soil fertility, while yield of variety is governed largely by soil fertility and adaptability and by the rigidity with which selection of seed of desirable characteristics has been made.

LOCATION AND CHARACTER OF SOILS OF TEST FARMS.

Edgecombe Farm.—This farm is located in Edgecombe County, about midway between the towns of Tarboro and Rocky Mount, and about two miles from Kingsboro, a station on the Atlantic Coast Line Railway. The soil of this farm consists principally of sandy loam, with moderately fine sand, underlain by a rather tenacious sandy clay subsoil at a depth, generally, of from 8 to 12 inches. The subsoil is a moderately good sandy clay, such as is found under the larger portion of the lands of the eastern part of the State. This type of soil responds very rapidly in remunerative crops to proper fertilization and cultivation, and represents a large and important part of the coastal-plain formation, which comprises something like forty per cent of the total area of the State. The types of soil on this farm are designated by the Bureau of Soils of the United States Department of Agriculture as Norfolk sandy loam and Norfolk fine sandy loam.

Iredell Farm.—This farm, located in the Piedmont section of the State, lies about one and one-half miles northwest of the corporate limits of Statesville, and is bisected by the Statesville and Western Division of the Southern Railway. The soils consist of Cecil clay and Cecil sandy loam, which are the predominant types throughout the Piedmont plateau. The surface soil of the Cecil sandy loam is a grayish brown sandy loam, while that of the Cecil clay is a deep red tenacious clay. Both are underlaid by a heavy red clay subsoil. These soils are naturally strong and are susceptible of high productivity under judicious fertilization and proper cultural management. They are especially adapted to the growth of grains, grasses and clover.

Transylvania Farm.—This farm is located at Blantyre, on the west side of the French Broad River, twelve miles directly west of Hendersonville, and is situated on both sides of the Hendersonville and Lake Toxaway branch of the Asheville and Spartanburg Division of the Southern Railway. The farm embraces both valley and mountain-side soils. The valley soil consists of a dark, heavy loam, containing organic matter and a liberal supply of plant-food constituents; it is known as Toxaway loam. This soil, which is typical of large areas of soil in the French Broad Valley, is deep and fertile, and generally produces large yields when not subject to too great overflows during the growing season.

[1]The results at the Edgecombe farm are taken for these comparisons because, it being the oldest farm, we have data for a greater number of years.

The mountain-side soil consists of a grayish to dark red loam, underlain at from 6 to 12 inches by a stiff clay loam; it is known as Porter's loam. Both soil and subsoil contain some rock fragments. This is one of the typical soils of the mountains of western North Carolina. It washes badly if not covered by forest or carefully looked after when cultivated. This soil, when not too steep, is devoted to some extent to general farming and fruit growing.

Buncombe Farm.—This farm is located near Swannanoa, on the north side of the Swannanoa River, eleven miles east of Asheville, on the Asheville Division of the Southern Railway. The farm embraces both valley and upland soils which are characteristic of the mountain region. The valley soil is a dark gray to black, heavy, silty loam, containing a large amount of organic matter; it has been classified as Toxaway loam. This is one of the typical alluvial soils occurring in the larger valleys throughout the mountains; it is naturally very fertile, and with proper attention very large yields can be obtained. The upland soil occurs on the knolls and foothills of the mountains and is a grayish to reddish-brown loam or fine sandy loam, underlain at from 6 to 12 inches by a stiff red clay; it has been classified as Porter's loam. This is the typical soil of the foothills of the mountains. It is naturally fertile and when properly managed to prevent washing very good yields can be obtained.

I. Variety, Variety-distance and Distance Tests of Corn.

Preparation and Cultivation.—The plats were all broken alike with a two-horse turning plow 8 to 10 inches deep and harrowed. Soon after the rows were run 4 to 5 inches deep and 4 feet apart in variety tests and the several distances in the distance tests. The stalks in the variety tests were reduced to a stand of 2½ feet in the row.

The fertilizer materials were applied uniformly in these drills and covered, the application being at the following rate per acre in all tests:

Three hundred pounds of a mixture of acid phosphate, dried blood and manure salt,[1] which contained 7 per cent available phosphoric acid, 1½ per cent potash and 3 per cent nitrogen (equal to 3.64 per cent ammonia), costing $3.12, were used.

The slight ridges formed in covering the fertilizer were opened and the corn planted a little below the level, all tests of the same kind at the same farm being given the same treatment as to time of planting and otherwise. All cultivations were as nearly level as possible and rather deep early in the season, with the small hoes of the Planet Jr. Cultivator, but became shallower, using the large hoes as the season advanced and the roots extended towards the middle of the rows and nearer the surface. This system of cultivation afforded pretty thorough breaking of the land early in the season and prevented the disturbance of the root systems of the plants later. An effort was made to cultivate every ten or twelve days, as far as the weather would permit, and especially immediately after rains, in order to produce a fine dust mulch with the shallow-running plows, to retard the evaporation of the recently added moisture.

Results of variety tests of corn.

The results of these tests are contained in the following tables:

[1]Manure salt is a potash compound containing about 20 per cent potash, principally in the form of muriate.

TABLE I—RESULTS OF

EDGECOMBE

Rank in Productivity.		Varieties Tested.	Number Stalks per Plat.		Date of Tasseling.	Average Height in Inches at Maturity.		Number of Ears per Plat.	Average Number of Ears per Stalk.	Yield per Plat.	
Shelled Corn.	Stover.		For Perfect Stand.	By Actual Count.		Stalks.	Ears.			Large Ears—Pounds.	Nubbins—Pounds.
1	1	Hickory King	200	192	July 17	103.0	38.0	189	.98	57.57	22.75
2	26	Yellow Dent	200	197	" 16	98.0	35.0	161	.82	55.00	23.75
3	18	Southern Beauty	200	197	" 17	105.0	38.0	140	.72	59.50	16.75
4	12	Brake's	200	201	" 18	114.0	49.0	120	.59	58.50	15.75
5	17	Wilson's Success	200	199	" 16	111.0	41.0	164	.82	55.50	19.75
6	10	Wyatt's Improved	200	186	" 15	111.0	41.0	134	.73	57.50	16.75
7	11	Weekley's Improved	200	198	" 20	107.0	46.0	211	1.06	43.50	26.75
7	16	American Queen	200	231	" 16	102.0	41.0	210	.99	43.00	30.75
8	5	Sander's Improved	200	164	" 20	108.0	42.0	162	.98	47.50	19.75
9	22	Peele's	200	196	" 15	108.0	52.0	140	.71	49.50	12.75
10	13	Leaming Yellow	200	204	" 14	99.0	28.0	156	.76	44.50	19.75
11	19	Sharber's	200	198	" 20	100.0	37.0	136	.69	38.75	22.75
12	27	White Dent	200	198	" 12	98.0	39.0	123	.62	46.50	17.75
13	28	Jarvis' Improved	200	195	" 19	104.0	43.0	198	1.01	44.50	16.75
14	24	Hickory King	200	199	" 15	102.0	45.0	164	.81	40.50	21.25
14	14	Pool's	200	192	" 16	106.0	42.0	156	.82	44.50	15.75
15	6	Goodman's Prolific	200	204	" 19	109.0	40.0	115	.56	39.50	17.70
16	9	Bradbury's Improved	200	193	" 21	110.0	48.0	124	.64	42.50	14.50
17	23	Boone County Special	200	162	" 16	102.0	35.0	110	.67	39.50	14.75
18	21	Biggs' Seven Ear	200	212	" 20	103.0	41.0	127	.59	35.50	14.75
19	8	Hastings' Prolific	200	199	" 20	107.0	49.0	155	.77	36.50	14.75
20	7	Marlboro Prolific	200	214	" 20	104.0	44.0	135	.63	34.50	15.75
21	4	Cocke's Prolific	200	197	" 18	101.0	40.0	77	.39	33.00	10.25
22	30	Iowa Silver Mine	200	200	" 15	95.0	34.0	113	.56	27.00	16.25
23	1	Henry Grady	200	198	" 20	104.0	50.0	87	.43	32.50	12.75
24	15	Williams'	200	191	" 20	93.0	41.0	84	.46	32.50	9.75
25	20	Farmers' Favorite	200	183	" 16	104.0	37.0	87	.47	30.50	8 75
26	25	Riley's Favorite	200	157	" 16	98.0	36.0	91	.57	26.50	11.75
27	2	Holt's Strawberry	200	196	" 20	114.0	47.0	75	.38	30.50	8.75
28	3	Fry's Improved	200	203	" 20	101.0	50.0	62	.30	25.50	11.75
29	29	McMackin's Gourd Seed	200	89	" 20	104.0	42.0	55	.61	24.50	7.75

VARIETY TEST OF CORN.

FARM.

Yield per Acre.		Number Ears to Shell One Bushel.	Pounds Ears (Grain and Cob) to Shell One Bushel.	Ears.		Shelling Capacity.		Total Weight.		Stover per Acre—Pounds.	Weight in Pounds of Measured Bushel of Shelled Corn.	Source of Seed.
Ears—Pounds.	Shelled Corn—Bushels.			Average Length—Inches.	Average Circumference—Inches.	Grain—Per Cent.	Cob—Per Cent.	Ears—Per Cent.	Stover—Per Cent.			
1701.3	26.7	160	67.0	7.90	6.18	88.0	12.0	43.3	56.7	2221	59.00	Tennessee.
1669.5	25.7	128	68.0	8.66	7.18	86.4	13.6	65.7	34.3	1087	59.00	Virginia.
1617.5	24.8	128	65.0	8.25	6.80	86.1	13.9	54.4	45.6	1352	56.00	North Carolina.
1574.1	24.2	124	65.0	8.00	7.25	86.1	13.9	51.2	48.8	1501	56.00	North Carolina.
1595.3	23.7	136	72.0	8.66	6.50	83.3	16.7	46.3	53.7	1373	60.00	Virginia.
1574.1	23.0	104	73.0	8.50	7.00	82.1	17.9	49.4	50.6	1606	60.00	North Carolina.
1489.3	22.3	176	75.0	8.50	6.18	84.0	16.0	48.4	51.6	1585	63.00	Iredell Test Farm.
1563.5	22.3	180	75.0	7.12	6.00	80.0	20.0	52.6	47.4	1385	60.00	North Carolina.
1425.7	22.0	148	68.0	8.50	6.66	86.7	13.3	43.3	56.7	1849	59.00	Georgia.
1319.7	20.4	164	69.0	7.25	6.50	86.9	13.1	51.8	48.2	1224	60.00	North Carolina.
1362.1	20.0	144	68.0	8.75	6.75	82.3	17.7	47.5	52.5	1500	56.00	Ohio.
1303.8	19.9	144	70.0	7.88	6.66	85.7	14.3	49.2	50.8	1346	60.00	North Carolina.
1361.0	19.8	124	68.0	8.00	7.18	82.3	17.7	55.8	44.2	1076	56.00	Virginia.
1298.5	19.3	232	72.0	6.90	6.18	83.3	16.7	55.6	44.4	1024	60.00	North Carolina.
1309.1	19.1	164	72.0	8.50	6.50	81.9	18.1	53.6	46.4	1130	59.00	Virginia.
1277.3	19.1	184	73.0	7.50	6.18	84.9	15.1	46.3	53.7	1479	62.00	North Carolina.
1212.6	18.7	144	68.0	7.90	6.50	86.7	13.3	39.7	60.3	1834	59.00	North Carolina.
1208.4	18.3	160	69.0	8.00	7.00	85.0	15.0	42.2	57.8	1654	57.00	Georgia.
1150.1	17.1	132	66.0	8.75	6.88	83.3	16.7	49.3	50.7	1182	55.00	Illinois.
1065.3	16.7	168	67.0	7.90	6.33	88.0	12.0	45.6	54.4	1267	59.00	North Carolina.
1086.5	16.2	216	73.0	7.33	6.18	83.5	16.5	42.7	57.3	1670	61.00	Georgia.
1065.3	15.6	188	74.0	7.18	6.18	82.4	17.6	47.2	52.8	1797	61.00	South Carolina.
916.9	14.1	132	66.0	7.90	6.75	86.3	13.7	32.0	68.0	1945	57.00	Edgecombe Test Farm.
916.9	13.6	152	67.0	7.90	6.90	83.4	16.6	48.0	52.0	981	56.00	Illinois.
959.3	13.5	124	71.0	9.25	7.50	78.8	21.2	31.6	68.4	2221	56.00	Georgia.
895.7	12.7	120	74.0	8.50	7.00	79.7	20.3	38.4	61.6	1436	59.00	North Carolina.
822.1	12.0	128	72.0	8.50	6.90	81.9	18.1	39.2	60.8	1288	59.00	North Carolina.
810.9	11.9	180	68.0	7.66	6.66	82.3	17.7	42.5	57.5	1097	56.00	Indiana.
822.1	11.4	136	69.0	9.33	7.50	78.2	21.8	29.0	71.0	2030	54.00	Virginia.
789.7	11.3	128	71.0	8.18	6.90	80.2	19.8	28.6	71.4	1966	57.00	Georgia.
683.7	10.1	104	64.0	7.90	8.00	82.8	17.2	40.3	59.7	1012	53.00	Tennessee.

[Farm.

TABLE I—RESULTS OF VARIETY

IREDELL

Rank in Productivity.		Varieties Tested.	Number Stalks per Plat.		Date of Tasseling.	Average Height in Inches at Maturity.		Number of Ears per Plat.	Average Number of Ears per Stalk.	Yield per Plat.	
Shelled Corn.	Stover.		For Perfect Stand.	By Actual Count.		Stalks.	Ears.			Large Ears—Pounds.	Nubbins—Pounds.
1	5	Parker's Cocke's Prolific	174	196	July 19	108.0	46.0	200	1.0	120.00	8.00
2	2	American Queen	174	184	" 20	115.0	54.0	204	1.1	114.00	7.50
3	14	Weekley's Improved	174	171	" 22	111.0	52.0	275	1.6	106.50	9.00
4	4	Holt's Strawberry	174	148	" 23	122.0	60.0	227	1.5	106.00	8.00
5	11	Biggs' Seven Ear	174	148	" 19	108.0	48.0	144	.9	77.00	14.00
5	3	Williams'	174	187	" 20	108.0	48.0	188	1.0	120.00	7.00
6	16	Wilson's Success	174	149	" 22	124.0	54.0	276	1.8	103.00	7.00
7	12	Brake's	174	164	" 23	114.0	60.0	284	1.7	100.00	9.00
8	24	Jarvis' Improved	174	165	" 21	108.0	48.0	390	2.4	103.00	5.00
9	1	Pool's	174	162	" 13	103.0	49.0	307	1.9	100.00	7.00
9	7	Goodman's Prolific	174	166	" 20	108.0	48.0	255	1.5	100.00	7.00
10	8	Henry Grady	174	173	" 20	128.0	58.0	247	1.4	100.50	5.50
11	10	Peele's	174	160	" 13	110.0	49.0	168	1.0	99.00	6.00
11	17	Farmers' Favorite	174	162	" 20	120.0	60.0	167	1.0	99.00	6.00
12	9	Southern Beauty	174	185	" 13	124.0	54.0	295	1.6	95.00	3.00
12	18	Hickory King	174	156	" 20	120.0	54.0	253	1.6	96.00	2.00
13	13	Fry's Improved	174	172	" 20	144.0	72.0	195	1.1	93.00	3.00
13	15	Marlboro Prolific	174	172	" 20	114.0	51.0	304	1.8	90.00	6.00
14	27	Cocke's Prolific	174	174	" 20	107.0	48.0	252	1.4	93.00	1.00
15	6	Hickory King	174	209	" 15	122.0	56.0	259	1.2	87.00	6.00
15	21	Wyatt's Improved	174	188	" 22	108.0	48.0	283	1.5	90.00	3.00
16	23	Bradbury's Improved	174	157	" 23	127.0	66.0	158	1.0	88.00	4.00
17	25	Sharber's	174	174	" 20	106.0	68.0	186	1.0	80.00	3.00
18	19	Sanders' Improved	174	155	" 20	96.0	48.0	190	1.2	82.00	8.00
18	26	Boone County Special	174	181	" 15	111.0	50.0	191	1.0	79.00	8.00
19	26	Leaming Yellow	174	177	" 9	108.0	48.0	193	1.1	83.00	2.50
20	22	McMackin's Gourd Seed	174	189	" 20	110.0	60.0	199	1.0	75.00	10.00
21	30	Iowa Silver Mine	174	174	" 9	99.0	42.0	180	1.0	75.50	6.50
22	18	White Dent	174	167	" 13	121.0	48.0	176	1.0	76.00	3.00
23	28	Yellow Dent	174	158	" 15	108.0	48.0	161	1.0	67.00	7.00
24	20	Hastings' Prolific	174	171	" 23	97.0	48.0	263	1.5	57.00	11.50
25	29	Riley's Favorite	174	174	" 11	106.0	48.0	166	.9	45.00	4.00

TESTS OF CORN—CONTINUED.

FARM.

Yield per Acre.		Number Ears to Shell One Bushel.	Pounds Ears (Grain and Cob) to Shell One Bushel.	Ears.		Shelling Capacity.		Total Weight.		Stover per Acre—Pounds.	Weight in Pounds of Measured Bushel of Shelled Corn.	Source of Seed.
Ears—Pounds.	Shelled Corn—Bushels.			Average Length—Inches.	Average Circumference—Inches.	Grain—Per Cent.	Cob—Per Cent.	Ears—Per Cent.	Stover—Per Cent.			
3200.0	45.7	106	71.0	6.25	6.00	80.3	19.7	39.4	60.6	6350.0	57.0	North Carolina.
3037.5	43.4	146	70.0	7.00	6.00	82.9	17.1	30.4	69.6	8250.0	58.0	North Carolina.
2887.5	41.3	142	73.0	8.00	6.25	82.2	17.9	40.1	59.9	5300.0	60.0	Iredell Test Farm.
2850.0	40.7	90	65.0	7.50	7.75	81.5	18.5	35.0	65.0	6500.0	53.0	Virginia.
2275.0	39.6	220	70.0	7.00	6.25	82.9	17.1	30.3	69.7	5750.0	58.0	North Carolina.
3175.0	39.6	100	65.50	8.00	6.50	81.7	18.3	34.8	65.2	7487.5	53.5	North Carolina.
2750.0	39.3	124	71.50	8.00	6.00	82.5	17.5	40.0	60.0	5087.5	59.0	Virginia.
2725.0	38.9	108	66.50	7.50	8.50	81.8	18.2	37.6	62.4	5587.5	54.5	North Carolina.
2700.0	38.6	94	66.50	8.00	7.00	82.7	17.3	48.0	52.0	3962.5	55.0	North Carolina.
2675.0	38.2	150	71.00	7.00	5.50	84.5	15.5	23.5	76.5	9600.0	60.0	North Carolina.
2675.0	38.2	126	66.50	6.50	5.75	85.7	14.3	33.9	66.1	6212.5	57.0	North Carolina.
2650.0	37.8	96	68.00	7.00	7.00	79.4	20.6	34.1	65.9	6050.0	54.0	Georgia.
2625.0	37.5	158	67.00	6.75	6.50	90.2	9.8	35.0	65.0	5825.0	55.0	North Carolina.
2625.0	37.5	102	73.50	7.50	6.50	79.0	21.0	38.1	61.9	5037.5	58.0	North Carolina.
2450.0	35.0	100	63.50	7.00	7.00	85.0	15.0	32.6	67.4	5912.5	54.0	North Carolina.
2450.0	35.0	144	66.00	7.00	6.00	86.4	13.6	37.0	63.0	4975.0	57.0	Virginia.
2400.0	34.3	94	70.00	8.00	6.00	80.0	20.0	33.6	66.4	5375.0	56.0	Georgia.
2400.0	34.3	154	67.00	8.00	6.00	82.1	17.9	34.9	65.1	5200.0	55.0	South Carolina.
2350.0	33.6	146	73.00	6.50	6.00	82.2	17.8	47.0	53.0	3175.0	60.0	Edgecombe Test Farm.
2325.0	33.2	138	63.50	7.50	7.25	86.6	13.4	30.5	69.5	6037.5	55.0	Tennessee.
2325.0	33.2	108	74.00	7.50	7.00	81.1	18.9	37.2	62.8	4400.0	60.0	North Carolina.
2300.0	32.8	100	63.00	7.00	6.75	85.7	14.3	40.0	60.0	4175.0	54.0	Georgia.
2275.0	32.5	124	70.50	8.00	6.50	83.7	16.3	31.9	68.1	3662.5	59.0	North Carolina.
2250.0	31.1	124	64.00	6.00	6.50	82.8	17.2	36.0	64.0	4650.0	53.0	Georgia.
2175.0	31.1	104	66.50	8.00	6.50	82.0	18.0	43.5	56.5	3337.5	54.5	Illinois.
2137.5	30.5	114	66.50	8.00	6.00	84.2	15.8	42.7	57.3	3337.5	56.0	Ohio.
2125.0	30.4	100	65.50	7.00	7.00	82.5	17.5	36.1	63.9	4225.0	54.0	Tennessee.
2050.0	29.3	118	65.50	8.00	6.00	82.5	17.5	42.0	58.0	2337.5	54.0	Illinois.
1975.0	28.2	96	66.00	9.00	7.00	81.8	18.2	29.8	70.2	4975.0	54.0	Virginia.
1850.0	27.8	118	65.00	6.50	7.00	81.1	16.9	38.9	61.1	3125.0	54.0	Virginia.
1712.5	24.5	192	70.00	7.00	6.00	82.9	17.1	27.4	72.6	4500.0	58.0	Georgia.
1205.0	17.2	130	66.00	7.50	7.00	84.9	15.1	29.7	70.3	2475.0	56.0	Indiana.

TABLE I—RESULTS OF VARIETY

BUNCOMBE

Rank in Productivity.		Varieties Tested.	Number Stalks per Plat.		Date of Tasseling.	Average Height in Inches at Maturity.		Number of Ears per Plat.	Average Number of Ears per Stalk.	Yield per Plat.	
Shelled Corn.	Stover.		For Perfect Stand.	By Actual Count.		Stalks.	Ears.			Large Ears—Pounds.	Nubbins—Pounds.
1	22	Biggs' Seven Ear	292	292	Aug. 10	109.0	55.0	693	2.36	231.91	16.31
2	7	Marlboro Prolific	292	292	" 10	110.0	64.0	563	2.92	236.79	9.16
3	4	Williams'	292	292	" 10	123.0	64.0	325	1.11	233.35	17.55
4	3	Jarvis' Improved	292	292	" 10	115.0	60.0	323	1.10	214.41	17.43
5	11	Cocke's Prolific	292	292	" 10	109.0	55.0	470	1.61	231.77	9.59
6	18	American Queen	292	292	" 5	108.0	56.0	518	1.77	202.69	27.39
7	14	Pool's	292	292	" 5	113.0	54.0	454	1.55	216.17	7.48
8	13	Wilson's Success	292	292	" 10	113.0	60.0	433	1.47	217.42	11.10
9	23	Parker's Cocke's Prolific	292	292	" 10	100.0	51.0	466	1.59	224.54	4.80
10	8	Weekley's Improved	292	292	" 10	108.0	60.0	498	1.70	214.59	14.38
11	2	Fry's Improved	292	292	" 10	126.0	66.0	310	1.06	215.91	10.35
11	12	Wyatt's Improved	292	292	" 5	112.0	54.0	320	1.09	220.84	12.46
12	20	Southern Beauty	292	292	" 1	108.0	52.0	382	1.30	188.88	18.06
13	19	Peele's	292	292	" 5	108.0	52.0	402	1.38	185.75	12.58
14	16	Weekley's Improved (Cherokee)	292	292	" 10	116.0	53.0	477	1.63	199.61	10.05
15	1	Henry Grady	292	292	" 10	125.0	67.0	304	1.04	197.35	21.80
16	21	Hickory King	292	292	" 10	108.0	52.0	396	1.35	168.27	13.18
17	27	Yellow Dent	292	292	" 1	108.0	50.0	311	1.06	187.16	10.20
18	17	Farmer's Favorite	292	292	" 5	113.0	55.0	274	.93	203.35	5.06
19	26	Leaming Yellow	292	292	" 1	102.0	44.0	299	1.02	191.62	7.73
20	25	Boone County Special	292	292	" 5	105.0	58.0	294	1.00	193.56	3.13
21	9	Hickory King	292	292	" 5	112.0	55.0	412	1.41	167.00	14.88
22	10	Bradbury's Improved	292	292	" 10	109.0	56.0	376	1.28	153.23	36.25
23	24	Patton	292	292	" 5	102.0	49.0	289	.98	187.87	7.71
24	17	Sharber's	292	292	" 10	108.0	57.0	342	1.17	179.48	9.43
25	15	Goodman's Prolific	292	292	" 10	116.0	57.0	378	1.29	166.86	15.77
26	6	Holt's Strawberry	292	292	" 10	116.0	62.0	286	.97	178.23	21.49
27	5	Brake's	292	292	" 10	115.0	60.0	287	.97	170.03	20.32
28	28	Iowa Silver Mine	292	292	July 25	90.0	43.0	302	1.03	157.32	12.25

TESTS OF CORN—CONTINUED.

FARM.

Yield per Acre.		Number Ears to Shell One Bushel.	Pounds Ears (Grain and Cob) to Shell One Bushel.	Ears.		Shelling Capacity.		Total Weight.		Stover per Acre—Pounds.	Weight in Pounds of Measured Bushel of Shelled Corn.	Source of Seed.
Ears—Pounds.	Shelled Corn—Bushels.			Average Length—Inches.	Average Circumference—Inches.	Grain—Per Cent.	Cob—Per Cent.	Ears—Per Cent.	Stover—Per Cent.			
3723.3	56.1	168	64.5	6.99	------	84.4	15.6	53.2	46.8	3275	54.5	North Carolina.
3689.3	54.4	150	69.5	7.96	------	82.7	17.3	45.1	54.9	4490	57.5	South Carolina.
3763.5	53.5	92	69.0	8.54	------	79.7	20.3	43.7	56.3	4835	55.0	North Carolina.
3477.6	52.5	80	59.0	7.60	------	84.7	15.3	39.8	60.2	5255	50.0	North Carolina.
3620.4	52.4	126	69.0	8.85	------	81.1	18.9	47.2	52.8	4178	56.0	Edgecombe Test
3451.2	52.2	136	66.0	7.20	------	84.8	15.2	49.1	50.9	3575	56.0	North Carolina. [Farm.
3354.8	51.8	144	67.0	7.33	------	86.5	13.5	46.9	53.1	3785	58.0	North Carolina.
3427.8	50.9	108	66.0	8.57	------	83.3	16.7	46.2	53.8	3978	55.0	North Carolina.
3440.1	50.7	140	69.0	7.35	------	82.6	17.4	52.0	48.0	3172	57.0	North Carolina.
3334.6	49.5	138	65.5	7.75	------	83.2	16.8	43.9	56.1	4379	54.5	Iredell Test Farm.
3394.0	48.8	80	62.0	8.47	------	80.6	19.4	37.9	62.1	5561	50.0	Georgia.
3499.5	48.8	112	69.0	8.62	------	78.2	21.8	46.7	53.3	3994	54.0	North Carolina.
3104.1	47.5	118	63.0	7.08	------	85.7	14.3	47.4	52.6	3443	54.0	North Carolina.
2975.0	46.8	108	64.0	7.28	------	88.2	11.8	45.6	54.4	3509	56.5	North Carloina.
3144.9	46.7	150	68.5	7.86	------	83.2	16.8	45.7	54.3	3728	57.0	North Carolina.
3287.2	46.5	80	58.0	8.15	------	79.3	20.7	29.6	70.4	7806	46.0	Georgia.
2721.8	46.0	128	57.0	7.58	------	94.7	5.3	41.0	59.0	3414	54.0	Virginia.
2960.4	45.3	98	66.5	8.74	------	85.7	14.3	58.1	41.9	2134	57.0	Virginia.
3126.2	45.1	80	68.0	8.95	------	80.8	19.2	45.7	54.3	3710	55.0	North Carolina.
2990.3	44.9	82	63.0	8.43	------	84.1	15.9	57.5	42.5	2205	53.0	Ohio.
2950.3	44.6	88	62.5	8.76	------	84.8	15.2	52.2	47.8	2699	53.0	Illinois.
2728.2	44.1	126	59.5	7.29	------	90.7	9.3	38.5	61.5	4352	54.0	Tennessee.
2842.2	43.8	86	55.5	6.85	------	86.4	13.6	39.6	60.4	4318	48.0	Georgia.
2933.7	43.2	98	69.0	8.80	------	82.6	17.4	49.6	50.4	2973	57.0	North Carolina.
2833.7	42.9	112	66.0	8.07	------	84.8	15.2	44.0	56.0	3599	56.0	North Carolina.
2739.5	42.8	134	60.5	6.63	------	87.6	12.4	42.1	57.9	3752	53.0	North Carolina.
2995.8	42.2	84	62.0	9.25	------	79.0	21.0	39.4	60.6	4605	49.0	Virginia.
2855.3	42.0	108	63.0	7.23	------	82.5	17.5	37.6	62.4	4737	52.0	North Carolina.
2543.6	39.1	98	58.0	8.19	------	86.2	13.8	60.6	39.4	1653	50.0	Illinois.

TABLE II—COMPILED RESULTS OF VARIETY TESTS OF CORN.

EDGECOMBE FARM.

Varieties Tested.	1900. Yield in Bushels Shelled Corn per Acre.	1900. Rank in Productivity of Shelled Corn.	1901. Yield in Bushels Shelled Corn per Acre.	1901. Rank in Productivity of Shelled Corn.	1902. Yield in Bushels Shelled Corn per Acre.	1902. Rank in Productivity of Shelled Corn.	1903. Yield in Bushels Shelled Corn per Acre.	1903. Rank in Productivity of Shelled Corn.	1904. Yield in Bushels Shelled Corn per Acre.	1904. Rank in Productivity of Shelled Corn.	1905. Yield in Bushels Shelled Corn per Acre.	1905. Rank in Productivity of Shelled Corn.	1906. Yield in Bushels Shelled Corn per Acre.	1906. Rank in Productivity of Shelled Corn.	1907. Yield in Bushels Shelled Corn per Acre.	1907. Rank in Productivity of Shelled Corn.	1908. Yield in Bushels Shelled Corn per Acre.	1908. Rank in Productivity of Shelled Corn.	Averages. Yield in Bushels Shelled Corn per Acre.	Averages. Rank in Productivity of Shelled Corn.
Cocke's Prolific (Edgecombe)	20.0	2	28.1	2	35.2	1	24.4	1	30.3	5	35.9	1	59.3	1	22.4	11	14.1	21	29.9	1
Cocke's Prolific (Tenn.)	----	----	----	----	----	----	19.9	7	26.4	12	26.8	14	41.9	9	26.5	2	----	----	----	----
Weekley's Impv'd	19.4	3	29.5	1	33.5	2	19.5	10	25.5	13	35.5	2	53.1	2	26.2	3	22.3	7	29.3	2
Pool's	----	----	----	----	26.1	5	19.7	8	----	----	31.5	5	----	----	24.0	8	19.1	14	----	----
Craig's Prolific Strawberry.	----	----	----	----	29.1	3	16.1	16	27.8	8	----	----	----	----	----	----	----	----	----	----
Sander's Improved	17.8	4	27.0	3	27.1	4	15.3	17	31.0	3	31.8	4	44.2	4	19.8	18	22.0	8	26.2	3
Holt's Strawberry	22.4	1	25.7	6	24.9	6	16.2	15	18.6	25	30.6	7	42.7	6	19.0	22	11.4	27	23.3	4
Craig's Prolific White.	----	----	----	----	24.6	7	14.9	18	27.1	10	24.1	21	----	----	----	----	----	----	----	----
Champion White Pearl.	----	----	----	----	21.6	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cooley's Red Cob	17.2	6	----	----	20.6	10	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Improved Golden Dent.	----	----	22.5	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Champion Dent	----	----	22.2	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hickory King (Tenn.)	----	----	21.4	9	----	----	20.1	6	----	----	31.2	6	40.9	11	21.5	15	26.7	1	----	----
Mosby's Prolific	17.4	5	----	----	----	----	----	----	23.4	18	23.9	22	37.7	17	15.7	29	----	----	----	----
Tatum's Choice	17.0	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Shaw's Improved	16.2	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Tennessee Yellow	----	----	26.6	5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Killebrew's Native	----	----	26.9	4	21.4	9	22.4	2	----	----	----	----	----	----	----	----	----	----	----	----
Leaming Yellow	----	----	----	----	20.0	12	21.1	4	24.6	15	24.1	21	33.6	29	18.8	24	20.0	10	----	----
Brake's	----	----	----	----	20.5	11	13.7	19	28.5	7	26.9	13	40.4	13	19.1	21	24.2	4	----	----
Marlboro Prolific (B. P. I.)	----	----	----	----	----	----	17.6	13	32.3	2	27.9	11	42.1	8	19.8	18	----	----	----	----
Biggs' Seven-ear	----	----	----	----	----	----	21.4	3	32.4	1	----	----	52.2	3	24.8	6	16.7	18	----	----
Iowa Silver Mine	----	----	----	----	----	----	17.3	14	25.2	14	22.3	24	36.6	21	18.9	23	13.6	22	----	----
Reid's Yellow Dent	----	----	----	----	----	----	17.8	12	23.4	18	23.3	23	35.3	24	22.2	12	----	----	----	----
Riley's Favorite	----	----	----	----	----	----	19.6	9	22.8	20	24.6	18	35.2	25	22.0	13	11.9	26	----	----
Boone County White (Ind.)	----	----	----	----	----	----	19.4	11	26.8	11	23.3	23	37.6	18	22.9	10	----	----	----	----
Boone County White (Tenn.)	----	----	----	----	----	----	17.6	13	23.9	17	28.9	9	34.5	28	23.6	9	----	----	----	----
Number 167	----	----	----	----	----	----	16.2	15	----	----	----	----	----	----	----	----	----	----	----	----
Selection 77	----	----	----	----	----	----	20.2	5	24.5	16	29.5	8	37.0	20	19.0	22	----	----	----	----
Cocke's Prolific (Pou)	----	----	----	----	----	----	----	----	32.3	2	----	----	----	----	----	----	----	----	----	----
Williams'	----	----	----	----	----	----	----	----	30.5	4	24.1	21	40.7	12	21.8	14	12.7	24	----	----
Square Deal	----	----	----	----	----	----	----	----	29.6	6	25.0	17	----	----	----	----	----	----	----	----

TABLE II—COMPILED RESULTS OF VARIETY TESTS OF CORN—CON.

EDGECOMBE FARM.

Varieties Tested.	1900.		1901.		1902.		1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.
Boone County Special.	----	----	----	----	----	----	----	----	27.3	9	25.2	16	34.6	27	18.0	25	17.1	17	----	----
McMackin's Gourd Seed.	----	----	----	----	----	----	----	----	23.3	19	25.9	15	43.2	5	19.0	22	10.1	29	----	----
Horse-tooth	----	----	----	----	----	----	----	----	22.3	21	----	----	----	----	----	----	----	----	----	----
Currituck	----	----	----	----	----	----	----	----	21.4	22	23.3	23	40.9	11	----	----	----	----	----	----
Thomas' Improved	----	----	----	----	----	----	----	----	20.6	23	32.4	3	32.7	30	----	----	----	----	----	----
Chester County Mammoth.	----	----	----	----	----	----	----	----	20.3	24	----	----	----	----	----	----	----	----	----	----
Hickory King (Va.)	----	----	----	----	----	----	----	----	----	----	28.1	10	34.8	26	22.9	10	19.1	14	----	----
Eureka	----	----	----	----	----	----	----	----	----	----	27.7	12	42.5	7	----	----	----	----	----	----
Peele's Prolific	----	----	----	----	----	----	----	----	----	----	24.6	18	37.4	19	----	----	----	----	----	----
Shellem's Prolific	----	----	----	----	----	----	----	----	----	----	24.5	19	40.2	14	----	----	----	----	----	----
Native	----	----	----	----	----	----	----	----	----	----	24.2	20	----	----	----	----	----	----	----	----
American Queen	----	----	----	----	----	----	----	----	----	----	----	----	41.1	10	24.1	7	22.3	7	----	----
Hastings' Prolific	----	----	----	----	----	----	----	----	----	----	----	----	39.6	15	17.9	26	16.2	19	----	----
Southern Beauty	----	----	----	----	----	----	----	----	----	----	----	----	38.0	16	19.5	19	24.8	3	----	----
Farmer's Favorite	----	----	----	----	----	----	----	----	----	----	----	----	35.8	22	19.4	20	12.0	25	----	----
Wilson's Success	----	----	----	----	----	----	----	----	----	----	----	----	35.7	23	21.2	16	23.7	5	----	----
Battle's Prolific	----	----	----	----	----	----	----	----	----	----	----	----	35.2	25	----	----	----	----	----	----
Wyatt's Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	27.0	1	23.0	6	----	----
Jarvis' Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25.2	5	19.3	13	----	----
Six-ear Corn	----	----	----	----	----	----	----	----	----	----	----	----	----	----	23.6	9	----	----	----	----
Parker's Cocke's Prolific.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20.1	17	----	----	----	----
Sharber's	----	----	----	----	----	----	----	----	----	----	----	----	----	----	19.8	18	19.9	11	----	----
Fry's Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	19.4	20	11.3	28	----	----
Bradbury's Impv'd,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	17.4	27	18.3	16	----	----
Henry Grady	----	----	----	----	----	----	----	----	----	----	----	----	----	----	17.2	28	13.5	23	----	----
Yellow Dent	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	25.7	2	----	----
Peele's	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	20.4	9	----	----
White Dent	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	19.8	12	----	----
Goodman's Prolific	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	18.7	15	----	----
Marlboro Prolific (S. C.)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	15.6	20	----	----

TABLE II—COMPILED RESULTS OF VARIETY TESTS OF CORN—CON.

IREDELL FARM.

Varieties Tested.	1900.		1901.		1902.		1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.
Biggs' Seven-ear	----	----	----	----	----	----	29.7	1	31.8	2	----	----	38.6	9	46.9	1	----	----	----	----
Craig's Prolific Strawberry.	----	----	----	----	----	----	24.7	2	26.0	6	----	----	----	----	----	----	----	----	----	----
Marlboro Prolific (S. C.)	----	----	----	----	----	----	24.3	3	----	----	33.5	12	40.2	6	39.4	7	34.3	13	----	----
Craig's Prolific White.	----	----	----	----	----	----	23.9	4	28.8	3	31.8	18	----	----	----	----	----	----	----	----
Cocke's Prolific (Tenn.)	----	----	----	----	----	----	23.5	5	22.5	14	35.2	9	32.7	21	36.4	15	----	----	----	----
Weekley's Impv'd	----	----	----	----	----	----	23.3	6	23.4	10	40.3	2	42.0	1	36.4	15	41.3	3	34.4	1
Mosby's Prolific	----	----	----	----	----	----	22.6	7	21.9	18	27.5	31	30.4	26	30.1	30	----	----	----	----
Boone County White (Tenn.)	----	----	----	----	----	----	22.6	7	24.6	7	27.8	30	36.4	14	34.4	23	----	----	----	----
Holt's Strawberry	----	----	----	----	----	----	21.9	8	23.3	16	31.7	19	31.7	24	35.1	19	40.7	4	30.5	2
Riley's Favorite	----	----	----	----	----	----	21.9	8	20.4	22	28.7	27	36.7	12	21.3	34	17.2	25	24.3	6
Pool's	----	----	----	----	----	----	21.8	9	----	----	35.4	8	----	----	43.2	4	----	----	----	----
Sanders' Improved	----	----	----	----	----	----	21.7	10	23.5	9	33.4	13	35.7	15	36.0	16	31.1	18	30.2	3
Selection 77	----	----	----	----	----	----	21.2	11	22.9	12	29.7	25	35.3	16	38.9	8	----	----	----	----
Reid's Yellow Dent	----	----	----	----	----	----	20.8	12	21.5	19	31.3	20	32.4	22	27.9	33	----	----	----	----
Leaming Yellow	----	----	----	----	----	----	20.8	12	22.5	14	31.0	21	33.4	20	31.3	29	30.5	19	28.2	4
Hickory King (Tenn.)	----	----	----	----	----	----	20.7	13	----	----	38.1	6	39.6	8	36.7	14	33.2	15	----	----
Iowa Silver Mine	----	----	----	----	----	----	20.6	14	22.5	14	30.5	24	30.4	26	30.0	25	29.3	21	27.7	5
Boone County White (Ind.)	----	----	----	----	----	----	19.9	15	24.2	8	32.8	14	33.9	19	40.3	5	----	----	----	----
Number 167	----	----	----	----	----	----	17.1	16	----	----	----	----	----	----	----	----	----	----	----	----
Brake's	----	----	----	----	----	----	----	----	32.4	1	37.4	7	40.3	5	37.0	13	----	----	----	----
Cocke's Prolific (Edgecombe.)	----	----	----	----	----	----	----	----	26.3	4	41.0	1	39.9	7	39.6	6	33.6	14	----	----
Horse-tooth	----	----	----	----	----	----	----	----	26.1	5	----	----	----	----	----	----	----	----	----	----
Currituck	----	----	----	----	----	----	----	----	23.3	11	30.9	22	34.5	18	34.9	21	----	----	----	----
Native	----	----	----	----	----	----	----	----	22.7	13	28.0	29	----	----	----	----	----	----	----	----
Thomas' Improved	----	----	----	----	----	----	----	----	22.5	14	38.8	4	37.9	11	----	----	----	----	----	----
Williams'	----	----	----	----	----	----	----	----	22.4	15	38.7	5	40.4	4	32.7	26	39.6	5	----	----
Boone County Special.	----	----	----	----	----	----	----	----	22.3	16	32.5	15	28.7	27	37.0	13	31.1	18	----	----
Shellem's Prolific	----	----	----	----	----	----	----	----	22.2	17	33.9	10	37.6	12	----	----	----	----	----	----
Pride of Burke	----	----	----	----	----	----	----	----	21.5	19	----	----	----	----	----	----	----	----	----	----
McMackin's Gourd Seed.	----	----	----	----	----	----	----	----	21.1	20	28.5	28	31.3	25	35.2	18	30.4	20	----	----

TABLE II—COMPILED RESULTS OF VARIETY TESTS OF CORN—CON.

IREDELL FARM.

Varieties Tested.	1900.		1901.		1902.		1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.	Yield in Bushels Shelled Corn per Acre.	Rank in Productivity of Shelled Corn.
Parks' Large Yellow	----	----	----	----	----	----	----	----	21.1	20	----	----	----	----	----	----	----	----	----	----
Parks' White Beauty	----	----	----	----	----	----	----	----	20.3	23	----	----	----	----	----	----	----	----	----	----
Square Deal	----	----	----	----	----	----	----	----	20.8	20	30.6	23	----	----	----	----	----	----	----	----
Hickory King (Va.)	----	----	----	----	----	----	----	----	----	----	33.8	11	----	----	33.7	24	35.0	12	----	----
Goodman's Prolific	----	----	----	----	----	----	----	----	----	----	32.3	16	----	----	38.7	9	38.2	9	----	----
Peele's Prolific	----	----	----	----	----	----	----	----	----	----	32.0	17	34.8	17	----	----	----	----	----	----
American Queen	----	----	----	----	----	----	----	----	----	----	39.2	3	40.8	2	45.1	2	43.4	2	----	----
Eureka	----	----	----	----	----	----	----	----	----	----	29.5	26	32.0	23	----	----	----	----	----	----
Farmer's Favorite	----	----	----	----	----	----	----	----	----	----	----	----	40.5	3	32.0	7	37.5	11	----	----
Battle's Prolific	----	----	----	----	----	----	----	----	----	----	----	----	38.7	10	----	----	----	----	----	----
Southern Beauty	----	----	----	----	----	----	----	----	----	----	----	----	36.6	13	43.7	3	35.0	12	----	----
Hastings' Prolific	----	----	----	----	----	----	----	----	----	----	----	----	32.7	21	28.2	32	24.5	24	----	----
Jarvis' Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	32.2	10	38.6	8	----	----
Wilson's	----	----	----	----	----	----	----	----	----	----	----	----	----	----	32.2	10	----	----	----	----
Henry Grady	----	----	----	----	----	----	----	----	----	----	----	----	----	----	38.0	11	37.8	10	----	----
Parker's Cocke's Prolific.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	37.8	12	45.7	1	----	----
Fry's Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	35.5	17	34.3	13	----	----
Wyatt's Improved	----	----	----	----	----	----	----	----	----	----	----	----	----	----	35.0	20	33.2	15	----	----
Sharber's	----	----	----	----	----	----	----	----	----	----	----	----	----	----	34.7	22	32.5	17	----	----
Bradbury's Impv'd,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	31.7	28	32.8	16	----	----
Six-ear Corn	----	----	----	----	----	----	----	----	----	----	----	----	----	----	28.6	31	----	----	----	----
Wilson's Success	----	----	----	----	----	----	----	----	----	----	----	----	----	----	39.3	6	39.3	6	----	----
Peele's	----	----	----	----	----	----	----	----	----	----	----	----	----	----	37.5	11	37.5	11	----	----
White Dent	----	----	----	----	----	----	----	----	----	----	----	----	----	----	28.2	22	28.2	22	----	----
Yellow Dent	----	----	----	----	----	----	----	----	----	----	----	----	----	----	27.8	23	27.8	23	----	----

TABLE III—SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER OF VARIETIES OF CORN TESTED IN 1908.

EDGECOMBE FARM.

Varieties.	Rank According to the Following Characters.													
	Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover in Pounds per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Lbs. of Ear Corn Required to Shell Bushel of Corn.	Prolificacy of Ears per Stalk.	Earliness as Shown by Date of Silking.	Height of Stalks.	Height of Ears.	Weight of Bushel of Shelled Corn.
Hickory King (Tenn.)	1	1	1	1	23	10	18	12	4	4	4	10	13	5
Yellow Dent	2	2	26	4	20	4	1	29	5	5	5	15	16	5
Southern Beauty	3	3	18	6	18	4	4	26	2	10	5	8	13	7
Brake's	4	5	12	6	18	3	8	22	2	18	5	1	3	7
Wilson's Success	5	4	17	13	11	6	16	14	9	5	4	2	10	4
Wyatt's Improved	6	5	10	17	7	1	9	21	10	9	3	2	10	4
Weekley's Improved	7	7	11	10	14	13	12	18	12	1	8	6	5	1
American Queen	7	6	16	20	4	14	6	24	12	3	3	11	10	4
Sanders' Improved	8	8	5	3	21	8	18	12	5	4	6	5	9	5
Peele's	9	11	22	2	22	11	7	23	6	11	3	5	1	4
Leaming Yellow	10	9	13	16	8	7	14	16	5	8	2	14	18	7
Sharber's	11	13	19	7	17	7	11	19	7	12	6	13	14	4
White Dent	12	10	27	16	8	3	2	28	5	17	1	15	12	7
Jarvis' Improved	13	14	28	13	11	18	3	27	9	2	6	9	8	4
Hickory King (Va.)	14	12	24	18	6	11	5	25	9	6	3	11	6	5
Pool's	14	15	14	9	15	15	16	14	10	5	5	7	9	2
Goodman's Prolific	15	16	6	3	21	7	23	7	5	20	6	4	11	5
Bradbury's Improved	16	17	9	8	16	10	21	9	6	14	8	3	4	6
Boone County Special	17	18	23	13	11	5	10	20	3	13	3	11	16	8
Biggs' Seven-ear	18	20	21	1	23	12	17	13	4	17	7	10	10	5
Hastings' Prolific	19	19	8	11	13	17	20	11	10	7	7	6	3	3
Marlboro Prolific	20	20	7	15	9	16	15	15	11	15	4	9	7	3
Cocke's Prolific	21	22	4	5	19	5	26	4	3	24	4	12	11	6
Iowa Silver Mine	22	22	30	12	12	9	13	17	4	20	2	16	17	7
Henry Grady	23	21	1	22	2	3	27	3	8	23	7	9	2	7
Williams'	24	23	15	21	3	2	25	5	11	22	6	17	10	5
Farmer's Favorite	25	24	20	18	6	4	24	6	9	21	4	9	14	5
Riley's Favorite	26	25	25	16	8	14	19	10	5	19	3	15	15	7
Holt's Strawberry	27	24	2	23	1	6	28	2	6	25	8	1	4	9
Fry's Improved	28	26	3	19	5	4	29	1	8	26	8	12	2	6
McMackin's Gourd Seed	29	27	29	14	10	1	22	8	1	17	9	9	9	10

TABLE III—SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER OF VARIETIES OF CORN TESTED IN 1908—CON.

IREDELL FARM.

Varieties.	Rank According to the Following Characters.													
	Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover, in Pounds per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Lbs. of Ear Corn Required to Shell Bushel of Corn.	Prolificacy of Ears per Stalk.	Earliness as Shown by Date of Silking.	Height of Stalks.	Height of Ears.	Weight of Bushel of Shelled Corn.
Parker's Cocke's Prolific	1	1	5	21	4	8	8	23	12	10	5	12	13	4
American Queen	2	3	2	10	15	18	25	6	10	9	7	8	7	3
Weekley's Improved	3	4	14	14	10	16	6	25	14	5	8	10	8	1
Holt's Strawberry	4	5	4	19	6	1	16	15	4	6	9	5	4	10
Biggs' Seven Ear	5	17	11	10	15	23	26	5	10	11	6	12	12	3
Williams'	5	2	3	18	7	5	18	13	5	10	8	12	12	9
Wilson's Success	6	6	16	13	12	12	7	24	13	3	8	4	7	2
Brake's	7	7	12	17	8	9	11	20	7	4	8	9	4	7
Jarvis' Improved	8	8	24	12	13	2	1	30	7	1	6	12	12	6
Pool's	9	9	1	7	19	19	30	1	12	2	2	15	11	1
Goodman's Prolific	9	9	6	4	22	13	20	11	7	6	8	12	12	4
Henry Grady	10	10	7	23	2	3	19	12	9	7	8	2	5	8
Peele's	11	11	10	1	25	21	16	15	8	10	3	11	11	6
Farmer's Favorite	11	11	17	24	1	6	10	21	15	10	5	7	4	3
Southern Beauty	12	12	9	5	21	5	22	9	2	5	3	4	7	8
Hickory King (Va.)	12	12	18	3	23	17	13	18	6	5	4	7	7	4
Fry's Improved	13	13	13	22	3	2	21	10	10	9	7	1	1	5
Marlboro Prolific	13	13	15	15	10	20	17	14	8	3	5	9	9	6
Cocke's Prolific	14	14	27	14	11	18	2	29	14	7	5	13	12	1
Hickory King (Tenn.)	15	15	3	2	24	15	24	7	2	8	4	5	6	6
Wyatt's Improved	15	15	21	20	5	9	12	19	16	6	5	12	12	1
Bradbury's Improved	16	16	23	4	22	5	7	24	1	10	9	3	3	8
Sharber's	17	17	25	9	17	12	23	8	11	10	5	14	2	2
Sanders' Improved	18	18	19	11	14	12	15	16	3	8	7	18	12	10
Boone County Special	18	19	26	16	9	7	3	28	7	10	4	10	10	7
Leaming Yellow	19	20	26	8	18	10	4	27	7	9	1	12	12	5
McMackin's Gourd Seed	20	21	22	13	12	5	14	17	5	10	7	11	4	8

TABLE III—SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER OF VARIETIES OF CORN TESTED IN 1908—CON.

IREDELL FARM.

Varieties.	Rank According to the Following Characters.													
	Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover in Pounds Per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Lbs. of Ear Corn Required to Shell Bushel of Corn.	Prolificacy of Ears per Stalk.	Earliness as Shown by Date of Silking.	Height of Stalks.	Height of Ears.	Weight of Bushel of Shelled Corn.
Iowa Silver Mine	21	22	30	13	12	11	5	26	5	10	8	16	14	8
White Dent	22	23	18	17	8	3	27	4	6	10	2	6	12	8
Yellow Dent	23	24	28	20	16	11	9	22	4	10	4	12	12	8
Hastings' Prolific	24	25	20	10	15	22	29	2	10	6	9	17	12	3
Riley's Favorite	25	26	29	6	20	14	28	3	6	11	1	14	12	5

TABLE III—SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER OF VARIETIES OF CORN TESTED IN 1908—CON.

BUNCOMBE FARM.

Varieties.	Rank According to the Following Characters.													
	Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover in Pounds per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Lbs. of Ear Corn Required to Shell Bushel of Corn.	Prolificacy of Ears per Stalk.	Earliness as Shown by Date of Silking.	Height of Stalks.	Height of Ears.	Weight of Bushel of Shelled Corn.
Biggs' Seven Ear	1	2	22	11	14	19	4	24	11	2	4	9	9	7
Marlboro Prolific	2	3	7	15	10	18	17	12	19	1	4	8	3	2
Williams'	3	1	4	21	4	6	20	9	18	17	4	3	3	6
Jarvis' Improved	4	6	3	10	15	1	23	6	4	18	4	5	5	12
Cocke's Prolific	5	4	11	18	7	11	10	18	18	5	4	9	9	5
American Queen	6	7	18	9	16	14	8	20	13	3	3	10	8	5
Pool's	7	11	14	5	20	17	11	17	15	8	3	6	10	1
Wilson's Success	8	9	13	13	12	8	13	15	13	9	4	6	5	6
Parker's Cocke's Prolific	9	8	23	16	9	16	6	22	18	7	4	13	13	3
Weekley's Improved (Iredell)	10	12	8	14	11	15	19	10	12	4	4	10	5	8
Fry's Improved	11	10	2	20	5	1	27	2	7	20	4	1	2	12
Wyatt's Improved	11	5	12	24	1	9	12	16	18	19	3	7	10	9
Southern Beauty	12	16	20	8	17	10	9	19	9	13	2	10	12	9
Peele's	13	19	19	3	22	8	16	13	10	11	3	10	12	4
Weekley's Improved (Cherokee)	14	14	16	14	11	17	14	14	17	6	4	4	11	3
Henry Grady	15	13	1	22	3	1	29	1	3	21	4	2	1	15
Hickory King (Va.)	16	28	21	1	24	12	22	7	2	12	4	10	12	9
Yellow Dent	17	20	27	8	17	7	2	26	14	20	2	10	14	3
Farmer's Favorite	18	15	17	19	6	1	15	14	16	27	3	6	9	6
Leaming Yellow	19	18	26	12	13	2	3	25	9	23	2	12	16	10
Boone County Special	20	21	25	9	16	5	5	23	8	24	3	11	6	10
Hickory King (Tenn.)	21	27	9	2	23	11	26	3	5	10	3	7	9	9
Bradbury's Improved	22	24	10	6	19	4	24	5	1	15	4	9	8	14
Patton	23	22	24	16	9	7	7	21	18	26	3	12	15	3
Sharber's	24	25	17	9	16	9	18	11	13	16	4	10	7	5
Goodman's Prolific	25	26	15	4	21	13	21	8	6	14	4	4	7	10
Holt's Strawberry	26	17	6	23	2	3	25	4	7	25	4	4	4	13
Brake's	27	23	5	17	8	8	28	2	9	25	4	5	5	11
Iowa Silver Mine	28	29	28	7	18	7	1	27	3	22	1	14	17	12

TABLE IV—COMPILED RESULTS OF VARIETY TESTS OF CORN, SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER.

EDGECOMBE FARM.

Varieties.	Number of Years Tested.	Rank According to the Following Characters.													
		Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover in Pounds per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Pounds of Ear Corn Required to Shell Bushel Corn.	Prolificacy of Ears per Stalk.[1]	Earliness as Shown by Date of Silking.[1]	Height of Stalks.[2]	Height of Ears.[2]
Holt's Strawberry	6	8	5	4	9	1	2	8	1	6	7	8	2	2
Marlboro Prolific	6	6	9	6	8	2	7	7	9	9	3	4	1	6
Sanders' Improved	6	3	3	5	1	9	6	5	3	1	2	7	4	1
Cocke's Prolific (Edgecombe)	6	1	1	1	7	3	9	2	6	8	4	6	6	4
Brake's	6	4	4	3	2	8	1	6	2	4	6	5	3	3
Boone County White (Ind.)[3]	5	6	7	13	10	5	1	2	13	11	11	3	11	10
Cocke's Prolific (Tenn.)[3]	5	4	3	6	12	3	11	11	6	14	4	7	1	6
Weekley's Improved	6	2	2	2	5	5	8	3	5	7	1	7	5	5
Iowa Silver Mine	6	9	8	7	3	7	4	4	4	5	6	2	9	8
Leaming Yellow	6	5	6	8	4	6	3	8	8	3	4	1	8	7
Selection 77[3]	5	6	8	11	7	8	5	4	11	4	12	3	10	9
Boone County White (Tenn.)[3]	5	7	6	9	14	1	3	6	9	13	8	2	9	10
Reid's Yellow Dent[3]	5	10	12	14	6	9	6	3	12	6	7	4	12	11
Mosby's Prolific[3]	5	12	5	1	2	13	13	15	1	2	6	8	5	2
Riley's Favorite	6	7	7	9	6	4	5	1	7	2	5	3	7	9

[1]Results in these columns are from data of 1907 and 1908.

[2]Results in these columns are from data of 1905, 1906, 1907 and 1908.

[3]These varieties were not in the test in 1908; the results are the compiled results from the previous years.

TABLE IV—COMPILED RESULTS OF VARIETY TESTS OF CORN, SHOWING RELATIVE EARLINESS, YIELDS, SIZE OF EARS, HEIGHT OF STALKS AND EARS, AND PERCENTAGE OF GRAIN, COB, EARS AND STOVER—CON.

IREDELL FARM.

Varieties.	Number of Years Tested.	Rank According to the Following Characters.											
		Yield of Shelled Corn in Bushels per Acre.	Yield of Ear Corn in Pounds per Acre.	Yield of Stover in Pounds per Acre.	Percentage of Grain.	Percentage of Cob.	Largeness of Ears.	Percentage of Ears.	Percentage of Stover.	Smallness in Pounds of Ear Corn Required to Shell Bushel Corn.	Prolificacy of Ears per Stalk.	Earliness as Shown by Date of Silking.	Height of Stalks.	Height of Ears.[1]
Cocke's Prolific (Tenn.)[2]	5	3	2	4	10	2	11	9	4	11	3	6	2	4
Weekley's Improved	6	1	1	2	5	3	6	5	2	5	1	5	2	3
Mosby's Prolific[2]	5	10	12	3	3	10	9	11	2	3	4	8	5	2
Boone County White (Tenn.)[2]	5	5	4	6	9	4	4	6	7	7	9	4	8	5
Holt's Strawberry	6	2	2	1	6	1	1	6	1	4	4	5	1	1
Riley's Favorite	6	6	6	6	3	5	3	1	6	1	6	2	4	4
Sanders' Improved	6	3	3	3	1	6	5	4	3	1	2	4	3	2
Selection 77[2]	5	4	5	9	5	8	4	4	9	5	5	3	6	6
Reid's Yellow Dent[2]	5	9	11	8	2	11	3	7	6	2	6	3	9	9
Leaming Yellow	6	4	4	4	2	2	4	3	4	2	3	1	5	5
Iowa Silver Mine	6	5	5	5	4	4	2	2	5	3	5	3	6	6
Boone County White (Ind.)[2]	5	2	3	7	8	5	2	5	8	7	10	4	7	7

[1]The results in this column are from data of 1904, 1905, 1906, 1907 and 1908.

[2]These varieties were not in the test in 1908; the results are compiled from the previous years.

COMMENTS ON VARIETY TESTS OF CORN.

The variety tests were conducted this year at the Edgecombe, Iredell and Buncombe farms. The soil at the Edgecombe farm devoted to these tests was Norfolk sandy loam, at Iredell Cecil clay and at Buncombe Porter's loam. To eliminate all inequalities in the character of the land, if any, the designated varieties at the different farms were planted each in separate rows, arranged consecutively, and this plan was repeated from two to four times, varying with the length of the rows in order to give the desired acreage to each variety. The varieties are arranged in Table I in the order of their productivity of shelled corn per acre; also the rank of stover per acre is indicated in the second column. In Table II are brought together the results of varietal tests obtained at the Edgecombe farm during 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907 and 1908, and at Iredell during 1903, 1904, 1905, 1906, 1907 and 1908. Results from the testing of the varieties of corn were obtained at the Transylvania farm during 1906 only, and the Buncombe farm has been in operation only one year, 1908. The vigorousness in growth, prolificacy, largeness of ears, percentages of grain and stover, yields, etc., of all varieties tested at the different farms are shown in Tables I, II, III and IV.

By consulting Table II it will be seen that the differences in yield of shelled corn per acre on the different farms during the period covered by the tests between the variety yielding the highest and the one the lowest in the individual tests have ranged all the way from 6.2 to 26.6 bushels of shelled corn at the Edgecombe farm during the past nine years, with the number of varieties in the different tests varying from eight to thirty-six; from 12.1 to 13.5 bushels during six years at Iredell, where from nineteen to thirty-seven varieties were employed, and a difference of 24.8 bushels at Transylvania during 1906, where thirty-four varieties were planted, and a difference of 17 bushels at Buncombe in 1908 where twenty-nine varieties were planted.

Tables III and IV will be found to contain much valuable data, in plain, compact form, relative to the different characters of corn when grown under widely varying soil and climatic conditions. A careful study of these tables should be made by every corn-growing reader.

Table II also gives the average standing of all the varieties at each farm that have been tested continuously since the beginning of the work in the different localities. The varieties which have averaged the highest yields of shelled corn at the different farms are: At Edgecombe, Cocke's Prolific, Weekley's Improved, Sanders' Improved and Holt's Strawberry; at Iredell, Weekley's Improved, Sanders' Improved, Cocke's Prolific and Boone County White.

NOTES ON VARIETIES OF CORN TESTED IN 1908.

Cocke's Prolific, from Edgecombe-grown seed, ranked second in 1900, 1901 and 1904, first in 1902, 1903, 1905 and 1906, eleventh in 1907 and twenty-first in 1908 at the Edgecombe farm; at Iredell, from Edgecombe-grown seed, sixth in 1904, first in 1905, seventh in 1906, sixth in 1907 and fourteenth in 1908; second in 1906 at Transylvania, and fifth

in 1908 at Buncombe. The results of comparative varietal tests conducted during the past nine years on the test farms indicate this to be a most substantial and reliable variety; in fact, one of the best varieties thus far tested for growth on the sandy loam soils of the eastern portion of the State. One defect, however, with this variety is that the grains are too short.

Weekley's Improved is a very good variety, having ranked first and second at the Iredell and Edgecombe farms as an average of four and seven years' trials, respectively. It is fairly early in maturity, and can be grown with more safety than most of the other varieties when only a short growing season is afforded. At the Edgecombe farm it ranked third in 1900, first in 1901, second in 1902, 1905 and 1906, but in 1903 and 1904 it fell down to tenth and thirteenth places, respectively; in 1907 it ranked third and in 1908 seventh; in 1903 sixth, in 1904 tenth, in 1905 second, in 1906 first, in 1907 fifteenth and in 1908 third at Iredell; in 1906 fifth at Transylvania, and in 1908 tenth at Buncombe. This variety has a little smaller ear and cob than Cocke's Prolific.

Sanders' Improved, from Georgia-grown seed, ranked fourth in 1900, third in 1901, fourth in 1902 and 1906, seventeenth in 1903, third in 1904, fourth in 1905, eighteenth in 1907 and eighth in 1908 at Edgecombe; tenth in 1903, ninth in 1904, thirteenth in 1905, fifteenth in 1906, sixteenth in 1907 and eighteenth in 1908 at Iredell, and third in 1906 at Transylvania. This variety produces an ear about the size of Cocke's Prolific, but contains a smaller cob by about three to six per cent, and consequently requires about three to five pounds less of corn on the ear, as shown by an average of the results of the past eight years, to shell a bushel of corn.

Holt's Strawberry occupied first place in 1900, sixth in 1901, 1902 and 1906, fifteenth in 1903, twenty-fifth in 1904, seventh in 1905, twenty-second in 1907 and twenty-seventh in 1908 at Edgecombe; eighth in 1903, sixteenth in 1904, nineteenth in 1905 and 1907, twenty-fourth in 1906 and fourth in 1908 at Iredell; second in 1906 at Transylvania, and twenty-sixth in 1908 at Buncombe. It has a much larger ear than Cocke's Prolific and produces a larger percentage of stover.

Brake's, as the result of the tests in Edgecombe, the home of the variety, ranked eleventh in 1902, nineteenth in 1903, seventh in 1904, thirteenth in 1905 and 1906, twenty-first in 1907 and fourth in 1908. At Iredell it occupied first place in 1904, seventh in 1905, fifth in 1906, thirteenth in 1907, and seventh in 1908; twentieth in 1906 at Transylvania, and twenty-seventh in 1908 at Buncombe. This variety has a short, large ear.

Leaming Yellow ranked twelfth in 1902, fourth in 1903, fifteenth in 1904, twenty-first in 1905, twenty-ninth in 1906, twenty-fourth in 1907, and tenth in 1908 at Edgecombe; twelfth in 1903, fourteenth in 1904, twenty-first in 1905 and 1906, twenty-ninth in 1907 and nineteenth in 1908 at Iredell; thirty-second in 1906 at Transylvania, and nineteenth in 1908 at Buncombe. This is a yellow corn that has a strong tendency to produce only one large ear per stalk. It has yielded excellent results in Indiana, Iowa and Illinois in comparison with other varieties.

Selection 77, from Ohio-grown seed, ranked fifth, sixteenth, eighth, twentieth and twenty-second at Edgecombe, and eleventh, twelfth, twenty-fifth, sixteenth and eighth at Iredell in 1903, 1904, 1905, 1906 and 1907, respectively; and twenty-fifth in 1906 at Transylvania. This corn has a larger ear and a slightly greater percentage of shelling capacity than Cocke's Prolific.

Riley's Favorite, from Indiana-grown seed, ranked ninth, eighteenth, twenty-fifth, thirteenth and twenty-sixth at the Edgecombe farm; eighth, twenty-second, twenty-seventh, twelfth, thirty-fourth and twenty-fifth at Iredell in 1903, 1904, 1905, 1906, 1907 and 1908, respectively; twenty-ninth in 1906 at Transylvania. This is a yellow corn, with fairly small and narrow grains. It has a somewhat larger ear than Cocke's Prolific. It is an early maturing variety.

Boone County White, from Indiana-grown seed, stood in 1903, 1904, 1906 and 1907 eleventh, twenty-third, eighteenth and tenth at Edgecombe, and fifteenth in 1903, eighth in 1904, fourteenth in 1905, nineteenth in 1906 and fifth in 1907 at Iredell, and eighteenth in 1906 at Transylvania; while from Tennessee-grown seed it ranked thirteenth, seventeenth, ninth, twenty-eighth and ninth at Edgecombe in 1903, 1904, 1905, 1906 and 1907; seventh in 1904, thirteenth in 1905, fourteenth in 1906 and twenty-third in 1907 at Iredell; and twenty-third in 1906 at Transylvania. This is a large, white-eared variety.

Reid's Yellow Dent, from Illinois-grown seed, ranked twelfth in 1903, eighteenth in 1904, twenty-third in 1905, twenty-fourth in 1906 and twelfth in 1907 at Edgecombe; twelfth in 1903, nineteenth in 1904, twentieth in 1905, twenty-second in 1906 and thirty-third in 1907 at Iredell; and thirty-third in 1906 at Transylvania. This is a yellow variety that has done well in the Northwestern States, but has a strong tendency, when grown under Southern conditions, as indicated by our variety tests, to produce only one large ear per stalk and smaller yields per acre than the two-eared varieties. It is medium early in maturity.

Marlboro Prolific, from South Carolina-grown seed, from Bureau of Plant Industry, ranked thirteenth in 1903, second in 1904, eleventh in 1905, eighth in 1906, eighteenth in 1907 and twentieth in 1908 at Edgecombe; third in 1903, twelfth in 1905, sixth in 1906, seventh in 1907 and thirtieth in 1908 at Iredell; seventh in 1906 at Transylvania; and second in 1908 at Buncombe. From South Carolina-grown seed, from Excelsior Seed Farm, it ranked fourth in 1907 at Edgecombe. This variety has an ear a little larger in size than Cocke'sProlific and has a decidedly strong tendency to bear more than one ear to each stalk.

Iowa Silver Mine, from Illinois seed, ranked fourteenth at both Edgecombe and Iredell farms in 1903 and 1904, twenty-fourth at both in 1905, twenty-first in 1906, twenty-third in 1907 and twenty-second in 1908 at Edgecombe; twenty-sixth in 1906, twenty-fifth in 1907 and twenty-first in 1908 at Iredell; twenty-first in 1906 at Transylvania, and twenty-eighth in 1908 at Buncombe. This is a white, large-eared corn that has a smaller percentage of cob to grain than Cocke's Prolific. Its grains are well shaped, showing the effect of prolonged breeding and selection. This is one of the earliest varieties which the Department has tested.

Mosby's Prolific, from Mississippi-grown seed, ranked fifth in 1900, twelfth in 1903, eighteenth in 1904, twenty-second in 1905, seventeenth in 1906, and twenty-ninth in 1907 at Edgecombe; seventh in 1903, eighteenth in 1904, thirty-first in 1905, twenty-sixth in 1906 and thirteenth in 1907 at Iredell; and twenty-seventh in 1906 at Transylvania. It has a large proportion of stalk to ear.

Williams' ranked in 1904 fourth and fifteenth, in 1905 twenty-first and fifth, in 1906 twelfth and fourth, in 1907 fourteenth and twenty-sixth and in 1908 twenty-fourth and fifth at Edgecombe and Iredell, respectively; thirteenth in 1906 at Transylvania; and third in 1908 at Buncombe. This variety has a large, tall stalk and large ears that contain a medium high percentage of cob, especially when grown at Iredell. It seems better suited to bottom than upland soils.

Boone County Special stood ninth and sixteenth in 1904, sixteenth and fifteenth in 1905, twenty-seventh and twenty-seventh in 1906, twenty-fifth and thirteenth in 1907 and seventeenth and eighteenth in 1908 at Edgecombe and Iredell, respectively; thirteenth in 1906 at Transylvania; and twentieth in 1908 at Buncombe. The ears are rather below the medium in size.

McMackin's Gourd Seed ranked nineteenth, fifteenth, fifth, twenty-second and twenty-ninth at Edgecombe; twentieth, twenty-eighth, twenty-fifth, eighteenth and twentieth at Iredell in 1904, 1905, 1906, 1907 and 1908, respectively; and eighth in 1906 at Transylvania. Medium in date of maturity.

Currituck, which is grown rather extensively in some sections of the Piedmont plateau of North Carolina, ranked twenty-second in 1904, eleventh in 1905, and twenty-second in 1906 at Edgecombe; twenty-third in 1904, eleventh in 1905, eighteenth in 1906 and twenty-first in 1907 at Iredell and seventeenth in 1906 at Transylvania. Its ears are large and contain a medium high percentage of cob to grain.

Shellem's Prolific ranked at Iredell seventeenth in 1904, tenth in 1905 and twelfth in 1906; at Edgecombe, nineteenth in 1905 and fourteenth in 1906; and fifteenth at Transylvania in 1906. It has a small ear and is early when grown in western North Carolina.

Eureka ranked twelfth in 1905 and seventh in 1906 at Edgecombe; twenty-sixth in 1905 and twenty-third in 1906 at Iredell; and fourth in 1906 at Transylvania. This variety has a white ear, with a comparatively high percentage of cob to grain.

Hickory King, from Tennessee-grown seed, ninth in 1901, sixth in 1903 and 1905, eleventh in 1906, fifteenth in 1907 and first in 1908 at Edgecombe; thirteenth in 1903, sixth in 1905, eighth in 1906, fourteenth in 1907 and fifteenth in 1908 at Iredell; first in 1906 at Transylvania; and twenty-first in 1908 at Buncombe. From Virginia-grown seed, it stood tenth in 1905, twenty-sixth in 1906, tenth in 1907 and fourteenth in 1908 at Edgecombe; eleventh in 1905, twenty-fourth in 1907 and twelfth in 1908 at Iredell; twenty-first in 1906 at Transylvania; and sixteenth in 1908 at Buncombe. This is a prolific variety, with small ears and broad and shallow grains.

Thomas' Improved ranked fourteenth in 1904, fourth in 1905 and eleventh in 1906, third in 1905 and thirteenth in 1906 at Edgecombe;

and fourteenth in 1906 at Transylvania. This is a vigorous, rank-growing variety that matures rather late.

Peele's Prolific stood eighteenth in 1905 and nineteenth in 1906 at Edgecombe; seventeenth in 1905 and 1906 at Iredell; and ninth in 1906 at Transylvania.

American Queen occupied third place in 1905, second in 1906, second in 1907 and second in 1908 at Iredell; tenth in 1906, seventh in 1907 and seventh in 1908 at Edgecombe; twelfth in 1906 at Transylvania; and sixth in 1908 at Buncombe.

Square Deal, in 1904 and 1905, ranked sixth and seventh at Edgecombe, and twenty-first and twenty-third at Iredell.

Hastings' Prolific ranked fifteenth in 1906, twenty-sixth in 1907 and nineteenth in 1908 at Edgecombe; twenty-first in 1906, thirty-second in 1907 and twenty-fourth in 1908 at Iredell; twenty-second in 1906 at Transylvania.

Southern Beauty ranked sixteenth in 1906, nineteenth in 1907 and third in 1908 at Edgecombe; thirteenth in 1906, third in 1907 and twelfth in 1908 at Iredell; sixth in 1906 at Transylvania; and twelfth in 1908 at Buncombe.

Farmer's Favorite ranked twenty-second in 1906, twentieth in 1907 and twenty-fifth in 1908 at Edgecombe; third in 1906, twenty-seventh in 1907 and eleventh in 1908 at Iredell; sixteenth in 1906 at Transylvania; and eighteenth in 1908 at Buncombe.

Biggs' Seven Ear ranked third in 1903, first in 1904, third in 1906, sixth in 1907 and eighteenth in 1908 at Edgecombe; first in 1903, second in 1904, ninth in 1906, first in 1907 and fifth in 1908 at Iredell; sixteenth in 1906 at Transylvania; and first in 1908 at Buncombe.

Wilson's Success ranked twenty-third in 1906, sixteenth in 1907 and fifth in 1908 at Edgecombe; tenth in 1907 and sixth in 1908 at Iredell; and eighth in 1908 at Buncombe.

Battle's Prolific stood twenty-fifth in 1906 at Edgecombe; tenth in 1906 at Iredell, and eleventh in 1906 at Transylvania.

Hamilton (native) ranked twenty-sixth in 1906 at Transylvania.

Merrill (native) ranked nineteenth in 1906 at Transylvania.

Jarvis' Improved ranked fifth in 1907 and thirteenth in 1908 at Edgecombe; tenth in 1907 and eighth in 1908 at Iredell; and fourth in 1908 at Buncombe.

Wyatt's Improved ranked first in 1907, sixth in 1908 at Edgecombe; twentieth in 1907 and fifteenth in 1908 at Iredell; and eleventh in 1908 at Buncombe.

Pool's, from Georgia-grown seed, ranked eighth in 1907 and fourteenth in 1908 at Edgecombe; fourth in 1907 and ninth in 1908 at Iredell; and seventh in 1908 at Buncombe.

Six-Ear Corn ranked ninth in 1907 at Edgecombe and thirty-first in 1907 at Iredell.

Parker's Cocke's Prolific ranked seventeenth in 1907 at Edgecombe; twelfth in 1907 and first in 1908 at Iredell; and ninth in 1908 at Buncombe.

Sharber's ranked eighteenth in 1907 and eleventh in 1908 at Edgecombe; twenty-second in 1907 and seventeenth in 1908 at Iredell; and twenty-fourth in 1908 at Buncombe.

Fry's Improved ranked twentieth in 1907 and twenty-eighth in 1908 at Edgecombe; seventeenth in 1907 and thirteenth in 1908 at Iredell; and eleventh in 1908 at Buncombe.

Bradbury's Improved ranked twenty-seventh in 1907 and sixteenth in 1908 at Edgecombe; twenty-eighth in 1907 and sixteenth in 1908 at Iredell; and twenty-second in 1908 at Buncombe.

Henry Grady ranked twenty-eighth in 1907 and twenty-third in 1908 at Edgecombe; eleventh in 1907 and tenth in 1908 at Iredell and fifteenth in 1908 at Buncombe.

Goodman's Prolific ranked fifteenth in 1908 at Edgecombe; ninth in 1907 and ninth in 1908 at Iredell; and twenty-fifth in 1908 at Buncombe.

White Dent ranked twelfth in 1908 at Edgecombe and twenty-second in 1908 at Iredell.

Yellow Dent ranked second in 1908 at Edgecombe; twenty-third in 1908 at Iredell, and seventeenth in 1908 at Buncombe.

Peele's ranked ninth in 1908 at Edgecombe; eleventh in 1908 at Iredell, and thirteenth in 1908 at Buncombe.

Weekley's Improved (Cherokee) ranked fourteenth in 1908 at Buncombe.

Patton ranked twenty-third in 1908 at Buncombe.

STUDY OF COMPILED RESULTS OF VARIETY TESTS OF CORN.

During the past nine years on the test farms of the Department something over fifty varieties of corn have been studied in comparative field tests. The number of varieties in the different tests has ranged all the way from eight in 1900 to thirty-seven in 1907. The different tests of varieties at the several farms were grown as nearly under the same conditions of soil, fertilization and cultivation as it was possible to provide. To eliminate all inequalities in the character of the land, if any, the varieties at the different farms were planted each in separate rows, arranged consecutively, and this plan was repeated from three to four times, varying with the length of the rows, in order to give the desired acreage to each variety. By taking these precautions the results obtained should be reliable and highly valuable.

WHAT IS A VARIETY?

A variety is supposed to represent in a general way a class of plants with one or more distinguishing characteristics, but with a cereal like corn, which crosses so readily, variety does not signify much unless proper precautions have been exercised in its growth.

Take some variety of corn, say Cocke's Prolific, that has been bred carefully and intelligently through a number of years for high yield of shelled corn per stalk, and grow it continuously in or adjacent to a field of inferior corn, and in a very short time, especially if proper seed selection is not practiced, it will give much smaller yields, when grown under the same conditions, than the original pure-bred corn; this being due to the fact that you no longer have pure Cocke's Prolific, but a mixture of "scrub" and Cocke's Prolific corn. This fact emphasizes the importance of securing seed from reliable parties.

EARLY MATURING VARIETIES.

Iowa Silver Mine, Riley's Favorite, Leaming Yellow, Reid's Yellow Dent, Boone County Special and Boone County White are six of the earliest varieties in maturing that have thus far been tested on the farms of the Department. These were all originated in the northern-central States, where they have been accustomed to a comparatively short growing season, which accounts largely for their inherent tendency to early maturity when grown under North Carolina conditions. Earliness, however, we do not consider an important requisite with corn for this climate, except, possibly, where corn is grown in the mountainous section of the State, or where corn, of necessity, has to be planted late, after the maturity of some crop like Irish potatoes or other truck crop. Under these circumstances it may be well to use one of the varieties mentioned above, especially if experience has taught the farmer that local varieties do not thoroughly mature before frost.

MEDIUM MATURING VARIETIES.

Biggs' Prolific, Craig's Prolific White, Cocke's Prolific and Craig's Prolific Strawberry mature at a medium date in the fall, and some of these are our most prolific varieties. All these will mature on the different types of soil of the State if planted before July 1.

LATE MATURING VARIETIES.

It has been found that Holt's Strawberry, Marlboro Prolific, Sanders' Improved, Weekley's Improved and Mosby's Prolific are the latest maturing varieties tested during the past five years. These varieties generally produce a large and tall stalk when grown under conditions as represented by the Iredell farm, *i. e.*, the results of the past five years' tests at that place indicate as much.

VARIETIES ADAPTED TO THE EAST SECTION.

A study of the results of the variety tests conducted at the Edgecombe farm during the past seven years indicates that the varieties of corn best suited to the fine loamy soils of the eastern and southwestern parts of the State are Cocke's Prolific, Biggs' Seven Ear, Weekley's Improved, Marlboro Prolific, Craig's Prolific Strawberry, Sanders' Improved and Holt's Strawberry, in about the order in which they are arranged. Cocke's Polific and Biggs' Seven Ear have proven exceedingly promising varieties. All these varieties, except Holt's Strawberry and Craig's Prolific Strawberry, are white and prolific, and produce medium to small ears.

VARIETIES ADAPTED TO PIEDMONT AND MOUNTAIN SECTIONS.

It has been found from a testing of thirty-eight varieties during the past five years at the Iredell farm, located in the Piedmont section, that Weekley's Improved, Biggs' Seven Ear, Craig's Prolific White, Cocke's Prolific, Sanders' Improved, Hickory King, Holt's Strawberry, Boone County White, Leaming Yellow and Reid's Yellow Dent are the larg-

est yielders of shelled corn per acre of all the varieties thus far tested. These, too, are all white varieties and are medium to medium late in maturity. The best of the varieties tested at the western farm are almost the same as for the east, but the order of prolificacy is somewhat different.

CORRELATION OF CHARACTERS OF VARIETIES OF CORN.

One of the purposes of our detailed study of varieties of corn, exhibited in Tables I, II, III and IV, is to ascertain what characters, being mutually helpful and hence conducive of greater yields, may be expected to be found combined in the same variety, and what ones, being generally antagonistic, seldom or never occur in the same plant or group of plants. This knowledge is of the most fundamental importance in the proper production of not only corn, but all other agricultural crops, as one being familiar with these facts will be better enabled to originate, improve or select varieties best adapted to different localities, soils and purposes. It is also felt that a more correct interpretation can be placed on the results obtained in variety tests.

In Table IV are brought together the average results of the work of six years (1903-'04-'05-'06-'07-'08) at the Edgecombe and Iredell farms, separately. From a detailed study of this table, supplemented by field observation, the following tentative inductions are made with reference to varieties of corn studied when they are grown under conditions of soil and climate as represented by these two farms:

Antagonistic Characters.—(1) Earliness in maturity, other things being equal, is not generally conducive to large yields of grain and stover. (2) Large-eared varieties usually have a low percentage of grain to cob, and are as a rule less productive of shelled corn per acre. (3) Ears with very small cob have poorly shaped kernels, and give a small amount of shelled corn per ear, and *vice versa*. (4) Kernels of low vitality do not tend to the growth of plants of maximum yields.

Associated Characters.—(1) Earliness, other things being equal, usually tends to high percentage of ear to stover, and *vice versa*, although this ratio is more or less modified by season, soil, fertilization and breeding. (2) Varieties producing two ears per stalk are generally more productive of shelled corn per acre than those bearing only one ear, although it may be a large one. (3) Medium maturity, other things being equal, tends to increase yields per acre of grain. (4) Small kernels usually possess low vitality. (5) Kernels with small germs (chits) contain a small percentage of oil or fat. (6) Varieties with good root and leaf development are usually the most resistant ones to drought and disease and insect ravages.

SELECTING SEED FOR IMPROVEMENT.

In the improvement of corn by seed selection an endeavor should be made to start with the best variety as ascertained by actual tests in the field through a sufficient number of years to eliminate weather conditions. It must be borne in mind that in all plant improvement the same principles and practices that have been employed with such striking results in the improvement of the different breeds of animals must be followed.

For corn there are three general methods of improvement: First, by importation of seed from some reputable breeder or grower; second, by the careful selection of seed corn from one's own field or from a neighbor's; third, by careful selection and growing of seed corn in a field isolated something like four or five hundred yards from any other corn field.

The characters that should be taken into account in the improvement of corn by selection are:

(1) Selection of ears from stalk bearing two or more ears, as it has been demonstrated time and again that a variety that bears two medium-sized ears per stalk will generally give higher yields of shelled corn per acre than a variety bearing one large ear to the stalk.

(2) The stalk should be large at the base and tapering gradually towards the tassel, for two reasons—first, because it will be better enabled to withstand drought, and, second, because it will stand up better in windstorms.

(3) The ears should by all means be of a cylindrical form, with both butts and tips filled out, as this is the form that gives the highest percentage of yield of shelled corn per ear, other things being equal.

(4) The best-shaped kernel is a medium wedge, as this fills out the space on the cob most completely. Also, the distance between the rows of grains should be small, while the number of rows should be large and run parallel the full length of the cob, with little or no diminution in size, either at the butts or tips. The percentage of grains should be from 80 to 90 and should be held rigidly by the cob. It should also possess a high (90 to 95 per cent) germinating power, and great resisting power to disease and insect ravages.

It should be kept clearly in mind that, with varieties of corn, selection should be made particularly with reference to total yield of shelled corn and the characters which tend to give this and an improved quality of grain. If it is to be used in feeding growing animals, or to be ground into meal for human consumption, it should be high in flesh and muscle-forming material (protein); if for fattening stock, high in fat, and if to manufacture whiskey, alcohol or starch, high in starch, sugar, etc. (carbohydrates).

SOURCES OF VARIETIES OF CORN TESTED.

The seed used in the variety tests of corn at the Edgecombe, Iredell and Buncombe farms this year were obtained from the following sources:

American Queen.....R. P. Dalton, Winston, N. C.
Boone County Special (Illinois)..Bureau of Plant Industry, Washington, D. C.
Brake's.....J. L. Brake, Rocky Mount, N. C.
Bradbury's Improved.....J. E. Bradbury, Jr., Athens, Ga.
Biggs' Seven Ear.....Noah Biggs, Scotland Neck, N. C.
Cocke's Prolific.....Edgecombe Farm.
Farmers' Favorite.....A. Cannon, Horse Shoe, N. C.
Fry's Improved.....H. C. Fry, Clarksville, Ga.
Goodman's Prolific.....J. K. Goodman, Mount Ulla, N. C.
Hastings' Prolific.....H. G. Hastings & Co., Atlanta, Ga.
Hickory King (Virginia).....A. O. Lee, Bartee, Va.
Hickory King (Tennessee).....Bureau of Plant Industry, Washington, D. C.
Holt's Strawberry.....T. W. Wood & Sons, Richmond, Va.

Henry Grady.....W. G. Headden, Austell, Ga.
Iowa Silver Mine (Illinois).....Bureau of Plant Industry, Washington, D. C.
Jarvis' Improved.....T. L. Jarvis, Moyock, N. C.
Leaming Yellow (Ohio).....Bureau of Plant Industry, Washington, D. C.
Marlboro Prolific (S. Carolina)..Bureau of Plant Industry, Washington, D. C.
Parker's Cocke's Prolific.....T. B. Parker, Raleigh, N. C.
McMackin's Gourd Seed (Tenn.) Bureau of Plant Industry, Washington, D. C.
Patton.....R. S. Patton, Swannanoa, N. C.
Peele's.....T. G. Peele, Rich Square, N. C.
Pool's.....J. C. Pool, Marion, N. C.
Riley's Favorite (Indiana).....Bureau of Plant Industry, Washington, D. C.
Sanders' Improved (Georgia)....Bureau of Plant Industry, Washington, D. C.
Sharber's.....M. D. Dozier, Camden, N. C.
Southern Beauty.....L. A. Strupe, Tobaccoville, N. C.
Weekley's Improved.....Iredell Farm.
Weekley's Improved (Cherokee).....R. W. Collett, Andrews, N. C.
White Dent (Virginia).....Bureau of Plant Industry, Washington, D. C.
Williams'.....C. S. Williams, Franklinton, N. C.
Wilson's Success.....F. D. Wilson, Chase City, Va.
Wyatt's Improved.....Job P. Wyatt, Raleigh, N. C.
Yellow Dent (Virginia).....Bureau of Plant Industry, Washington, D. C.

RESULTS OF VARIETY-DISTANCE TESTS OF CORN.

The results of these tests are included in the following tables:

TABLE V—RESULTS OF TESTS OF THREE LEADING VARIETIES OF CORN AT DIFFERENT SPACING IN THE ROWS IN 1908.

EDGECOMBE FARM.

Varieties.	Yield, Height of Stalks and Ears at Different Spacing of Stalks in Four-foot Rows.														
	20 Inches.			24 Inches.			30 Inches.			36 Inches.			40 Inches.		
	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.
Cocke's Prolific	108.0	----	25.4	110.0	----	12.1	109.0	----	12.0	109.0	----	11.2	107.0	----	11.6
Holt's Strawberry	109.0	----	7.9	106.0	----	2.7	108.0	----	6.0	108.0	----	4.6	106.0	----	4.6
Weekley's Improved	107.0	----	13.8	105.0	----	12.1	103.0	----	12.4	106.0	----	9.7	108.0	----	11.2

IREDELL FARM.

Cocke's Prolific	122.0	56.0	41.1	132.0	60.0	45.5	136.0	60.0	46.9	124.0	60.0	52.1	132.0	60.0	40.2
Holt's Strawberry	264.0	82.0	41.1	138.0	72.0	39.6	135.0	70.0	39.6	128.0	61.0	42.5	128.0	60.0	30.5
Weekley's Improved	124.0	60.0	38.8	120.0	64.0	54.6	122.0	66.0	51.0	128.0	64.0	45.8	124.0	70.0	38.1

TABLE VI—COMPILED RESULTS OF THREE YEARS' TESTS OF THREE LEADING VARIETIES OF CORN AT DIFFERENT SPACING IN THE ROWS.[1]

EDGECOMBE FARM.

Varieties.	Yield, Height of Stalks and Ears at Different Spacing of Stalks in Four-foot Rows.														
	20 Inches.			24 Inches.			30 Inches.			36 Inches.			40 Inches.		
	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.	Height of Stalks in Inches at Maturity.	Height of Ears in Inches at Maturity.	Yield in Bushels of Shelled Corn per Acre.
Cocke's Prolific	113.0	55.1	25.6	110.6	56.0	25.5	113.3	55.9	23.1	111.9	53.9	18.3	110.4	33.5	19.4
Holt's Strawberry	115.8	58.4	16.5	115.4	58.0	14.4	117.0	59.9	15.2	115.5	56.9	14.3	114.0	58.0	14.5
Weekley's Improved	107.2	52.0	21.4	108.9	52.5	19.8	109.9	55.9	27.0	110.6	55.2	22.4	110.6	51.5	22.9

IREDELL FARM.

Cocke's Prolific	116.0	56.0	39.6	121.0	57.0	36.7	120.0	41.0	40.2	117.0	56.0	40.7	120.0	54.0	36.4
Holt's Strawberry	156.0	68.0	31.9	123.0	66.0	32.1	121.0	63.0	34.2	112.0	61.0	33.6	122.0	62.0	30.3
Weekley's Improved	122.5	62.2	33.2	119.7	61.7	36.2	125.2	62.0	41.3	97.0	58.7	37.9	122.0	64.0	32.5

[1]The results in this table for the Edgecombe farm were obtained from data of 1905, 1907 and 1908.

These tests were conducted at both the Edgecombe and Iredell farms this year. The land devoted to this test at the Edgecombe farm was Norfolk sandy loam, while at the Iredell farm it was Cecil clay. The tests were planned and put out in 1905, and continued this year to ascertain if the claim made by some that if distance is given the large, one-eared varieties they will produce larger yields of shelled corn per acre than those producing or tending to produce two small or medium-sized ears per stalk. For the test, as seen above, two well-known prolific varieties—Cocke's Prolific and Weekley's Improved—are being compared with Holt's Strawberry, one of the best one-eared varieties. It will be noted that both Cocke's Prolific and Weekley's Improved have, each, as an average of four years' results at Iredell and three years' results at Edgecombe, made larger yields than Holt's Strawberry at both farms and at all the different distancing of the hills in the rows that were tried.

At the Edgecombe farm, as an average of the results of 1905, 1907 and 1908, Cocke's Prolific produced the following increase of bushels of shelled corn over Holt's Strawberry: at 20 inches, 9.1; at 24 inches,

11.1; at 30 inches, 7.9; at 36 inches, 4.0; at 40 inches, 4.9 bushels; while at Iredell the increased yields of Cocke's Prolific over Holt's Strawberry, as an average of the results for 1905, 1906, 1907 and 1908, were: at 20 inches, 7.7; at 24 inches, 4.6; at 30 inches, 6.0; at 36 inches, 7.1; at 40 inches, 6.1 bushels.

Weekley's Improved increased yields over Holt's Strawberry, as an average for 1905, 1907 and 1908 at the Edgecombe farm, were: at 20 inches, 4.9; at 24 inches, 5.4; at 30 inches, 1.8; at 36 inches, 8.1; at 40 inches, 8.4 bushels; while at the Iredell farm, as an average of four years' tests, 1905, 1906, 1907 and 1908, the increases of Weekley's Improved over Holt's Strawberry were: at 20 inches, 1.3; at 24 inches, 4.1; at 30 inches, 7.1; at 36 inches, 4.3; at 40 inches, 2.2 bushels.

In the light of these results, coupled with six years' variety tests, it is evident that the largest yields of shelled corn per acre on any type of soil are going to result generally from the use of more prolific varieties, because they will produce more shelled corn per stalk, and, as the stalks are generally smaller and can be planted closer in the row, will contain more stalks per acre.

When the corn is planted wide apart in the row, and in wide-apart rows—matters not if the best one-eared varieties are used—the land will not "turn out" the maximum yield which it is capable of producing, for the reason that there are not enough stalks per acre.

In 1905 Cocke's Prolific and Weekley's Improved, at both the Edgecombe and Iredell farms, produced their largest yields in these tests at the distancing centering about 30 to 36 inches, while Holt's Strawberry did best at the greatest distancing. At the most favorable distancing (40 inches) Holt's Strawberry at the Edgecombe and Iredell farms yielded less by 12.6 and 4.2 bushels of shelled corn per acre, respectively, than Cocke's Prolific at the distancing best suited to it, which was 30 and 36 inches, respectively. Weekley's Improved, with its best distancing at Edgecombe, yielded 13 bushels more than Holt's Strawberry at 40-inch distancing; while at Iredell Weekley's Improved, with the stalks 36 inches in the row, produced 4.2 bushels more per acre than Holt's Strawberry at its optimum distancing (40 inches) in the row.

In 1906, being a year in which excessive amounts of rain fell during the growing period, all three varieties produced largest yields at a distancing of 20 inches in the row; while the next best yields for all were at 30 inches in the row. This year seemed to be especially favorable to the production of maximum yields of all the large one-eared varieties, and at the Iredell farm Holt's Strawberry outyielded Weekley's Improved at both 20 and 30 inches between the hills in four-foot rows.

In 1907, at the Edgecombe farm, all three varieties attained their highest yields at a distancing of 20 inches in the row. At this distancing Cocke's Prolific slightly exceeded Holt's Strawberry, and Holt's Strawberry exceeded Weekley's Improved by 1.8 bushels shelled corn per acre. At the Iredell farm all three varieties made the best yields at a distancing of 36 inches in the row. At this distancing Cocke's Prolific exceeded Holt's Strawberry by 4.7, and Weekley's Improved exceeded Holt's Strawberry by 3.1 bushels shelled corn per acre.

In 1908, at the Edgecombe farm, all three varieties attained their highest yields at a distancing of 20 inches in the row. At this distancing Cocke's Prolific exceeded Holt's Strawberry by 17.5 bushels, and Weekley's Improved exceeded Holt's Strawberry by 5.9 bushels. At the Iredell farm Cocke's Prolific made it's best yield at a distancing of 36 inches in the row, exceeding Holt's Strawberry, which also made its best yield at this distancing by 9.6 bushels. Weekley's Improved made its best yield at a distancing of 24 inches in the row, exceeding Holt's Strawberry at this distancing by 15.0 bushels.

DISTANCE TESTS OF CORN.

The results of the distance tests of corn are brought together in Tables VII and VIII, which follow:

TABLE VII—RESULTS OF DISTANCE TESTS OF CORN.

EDGECOMBE FARM.

Rank According to Yield of Shelled Corn per Acre.	Distance Between Stalks.	Distance Between Stalks in Row.	No. Stalks per Plat.		Number of Ears per Plat.	Average Height of Stalks in Inches at Maturity.	Yield per Plat in Pounds.				Total Bushels Shelled Corn per Acre.	Pounds Shelled Corn per Stalk.	Stover per Acre—Pounds.
			For Perfect Stand.	By Actual Count.			Large Ears.	Nubbins.	Total Corn on Cob.	Stover.			
2	Three and one-half feet.	Four feet	----	----	270	107.0	50.00	35.50	85.50	169.50	16.1	----	2101
11	Three and one-half feet.	Three feet	----	----	166	109.0	35.75	18.50	54.25	118.75	10.3	----	1472
10	Three and one-half feet.	Two and one-half feet.	----	----	184	103.0	35.50	25.50	61.00	84.00	11.6	----	1041
6	Three and one-half feet.	Two feet	----	----	234	106.0	39.75	29.00	68.75	109.25	12.9	----	1354
7	Four feet	Four feet	----	----	227	105.0	46.50	27.50	74.00	86.00	12.2	----	928
4	Four feet	Three feet	----	----	271	108.0	68.00	25.25	93.25	126.75	15.3	----	1369
5	Four feet	Two and one-half feet.	----	----	147	109.0	47.50	31.50	79.00	169.00	13.1	----	1825
6	Four feet	Two feet	----	----	268	107.0	37.50	40.00	77.50	147.50	12.9	----	1593
8	Four feet	One and one-half feet.	----	----	173	109.0	35.50	36.50	72.00	126.00	11.9	----	1360
3	Five feet	Four feet	----	----	385	106.0	95.75	36.50	132.25	162.75	15.9	----	1416
1	Five feet	Three feet	----	----	355	105.0	108.00	27.50	135.50	152.50	18.1	----	1327
9	Five feet	Two feet	----	----	310	107.0	56.25	27.50	83.75	161.25	11.2	----	1403
9	Five feet	One and one-half feet.	----	----	297	110.0	48.05	36.00	84.05	138.95	11.2	----	1199

TABLE VII—RESULTS OF DISTANCE TESTS OF CORN—CON.

IREDELL FARM.

Rank According to Yield of Shelled Corn per Acre.	Distance Between Stalks.	Distance Between Stalks in Row.	No. Stalks per Plat.		Number Ears per Plat.	Average Height of Stalks in Inches at Maturity.	Yield per Plat in Pounds.				Total Bushels Shelled Corn per Acre.	Pounds Shelled Corn per Stalk.	Stover per Acre—Pounds.
			For Perfect Stand.	By Actual Count.			Large Ears.	Nubbins.	Total Corn on Cob.	Stover.			
8	Three and one-half feet.	Four feet	67	72	130	126.0	57.50	5.00	62.50	112.50	42.2	.71	5175
4	Three and one-half feet.	Three feet	84	76	137	126.0	68.00	4.00	72.00	118.00	48.4	.77	5428
2	Three and one-half feet.	Two and one-half feet.	107	77	125	126.0	73.00	6.50	79.50	130.50	53.6	.84	6003
5	Three and one-half feet.	Two feet	135	88	146	118.0	63.00	7.00	70.00	135.00	47.2	.65	6210
7	Four feet	Four feet	67	81	150	119.0	68.00	5.00	73.00	127.00	42.8	.73	5080
11	Four feet	Three feet	84	94	158	122.0	56.50	5.00	61.50	128.50	35.9	.53	5140
9	Four feet	Two and one-half feet.	107	96	167	118.0	65.00	5.00	70.00	115.00	41.1	.59	4600
6	Four feet	Two feet	135	96	182	117.0	69.50	5.00	74.50	125.50	43.7	.63	5020
3	Four feet	One and one-half feet.	175	99	194	122.0	80.00	4.50	84.50	135.50	49.6	.70	5420
13	Five feet	Four feet	67	95	172	120.0	62.00	7.00	69.00	116.00	32.4	.59	3712
12	Five feet	Three feet	84	86	155	121.0	70.00	5.00	75.00	125.00	35.2	.71	4000
10	Five feet	Two feet	135	83	145	122.0	79.00	6.00	85.00	210.00	39.9	.84	6720
1	Five feet	One and one-half feet.	175	84	155	120.0	118.00	9.00	128.00	253.00	59.6	1.48	8096

BUNCOMBE FARM.

9	Three and one-half feet.	Four feet	312	282	----	------	246.50	13.00	259.50	227.50	38.5	.76	2275
5	Three and one-half feet.	Three feet	415	376	----	------	285.00	14.00	299.00	162.00	44.4	.66	1620
8	Three and one-half feet.	Two and one-half feet.	496	447	----	------	257.00	12.00	269.00	342.00	39.9	.50	3420
10	Three and one-half feet.	Two feet	622	532	----	------	245.50	12.50	258.00	364.00	38.3	.40	3640
12	Four feet	Four feet	272	281	----	------	209.50	11.50	221.00	231.00	32.8	.65	2310
4	Four feet	Three feet	362	347	----	------	309.00	8.50	317.50	295.00	46.6	.75	2950
3	Four feet	Two and one-half feet.	435	395	----	------	324.00	11.00	335.00	341.00	49.7	.70	3410
2	Four feet	Two feet	544	451	----	------	358.00	13.00	371.00	395.00	55.1	.68	3950
1	Four feet	One and one-half feet.	725	605	----	------	371.00	16.00	387.00	442.00	57.4	.53	4420
11	Five feet	Four feet	212	236	----	------	229.00	8.50	237.50	201.50	35.2	.83	2015
6	Five feet	Three feet	282	267	----	------	269.50	9.00	278.50	264.50	41.3	.71	2645
7	Five feet	Two feet	422	326	----	------	271.50	5.50	277.00	252.00	41.1	.76	2520

TABLE VIII—COMPILED RESULTS OF DISTANCE TESTS OF CORN.

EDGECOMBE FARM.

Year.	Yield of Shelled Corn in Bushels per Acre at Different Distancing.																	
	3½ feet by 2 feet.		3½ feet by 2½ feet.		3½ feet by 3 feet.		3½ feet by 3½ feet.		3½ feet by 4 feet.		4 feet by 1½ feet.		4 feet by 2 feet.		4 feet by 2½ feet.		4 feet by 3 feet.	
1901	----		----		----		----		----		----		28.6		----		28.4	
1902	----		----		18.8		16.1		14.6		----		----		17.6		16.1	
1903	22.0		----		----		26.8		23.7		----		----		27.4		23.0	
1904	36.8		35.8		37.4		----		37.4		35 8		33.7		35.8		40.1	
1905	16.1		12.7		22.7		----		29.6		12.7		18.1		18.3		15.8	
1906	----		----		----		----		----		----		----		----		----	
1907	30.8		22.3		26.1		----		19.6		----		19.3		20.8		25.7	
1908	12.9		11.6		10.3		----		16.1		11.9		12.9		13.1		15.3	
Averages	----		----		----		----		----		----		----		----		----	

Year.	4 feet by 3½ feet.		4 feet by 4 feet.		5 feet by 1¼ feet.		5 feet by 2 feet.		5 feet by 3 feet.		5 feet by 4 feet.	
1901	----		24.4		----		22.5		24.3		23.0	
1902	----		16.2		----		----		13.0		13.6	
1903	----		25.0		----		24.6		19.5		18.7	
1904	----		30.2		----		32.7		32.8		31.9	
1905	----		17.6		----		26.1		20.4		20.6	
1906	----		----		----		----		----		----	
1907	24.7		15.0		17.7		15.4		18.2			
1908	12.2		11.2		11.2		18.1		15.9			
Averages	----		----		----		----		----			

IREDELL FARM.

1903	15.8		----		21.9		----		18.0		22.9		14.5		16.4		17.1	
1904	42.4		----		39.3		----		40.6		36.4		35.1		39.3		35.4	
1905	31.4		----		38.0		----		39.1		37.0		34.1		37.2		34.5	
1906	27.8		26.9		27.2		----		24.3		----		20.5		28.8		25.9	
1907	30.7		29.8		31.2		----		29.1		31.1		26.9		26.3		28.7	
1908	47.2		53.6		48.4		----		42.2		49.6		43.7		41.1		35.9	
Averages	32.5		----		34.3		----		32.2		----		29.1		31.5		29.5	

1903	----		14.5		----		19.8		20.5		19.8	
1904	----		41.0		----		46.9		37.2		31.0	
1905	----		34.8		----		46.9		35.0		33.9	
1906	----		24.3		28.8		23.8		17.5		18.4	
1907	----		24.8		31.5		28.6		24.8		23.7	
1908	----		42.8		59.6		39.9		35.2		32.4	
Averages	----		30.3		----		34.3		28.3		26.5	

COMMENTS ON DISTANCE TESTS.

These tests were conducted this year at the Iredell, Edgecombe and Buncombe farms, seed of Cocke's Prolific having been used at Edgecombe, and Weekley's Improved at Iredell and Buncombe for planting the different tests during all the years. The distance best suited to the soil at the Edgecombe farm in its present state of fertility, as indicated by an average of seven years' results, is 4 feet by 3 feet; at Iredell as an average of six years' results, 5 feet by 2 feet. It will require a number of repetitions of this test to arrive at a fair idea of the best width of rows and distance in rows for planting corn on the types of soil used in the experiments. This will no doubt vary with the different kinds of corn, soil and season.

In Table VIII is presented in concise form the results of all distance tests with corn that have been conducted at the Edgecombe farm during seven years and the Iredell farm during six years.

II. VARIETY AND DISTANCE TESTS OF COTTON.

Preparation and Cultivation.—All plats devoted to these tests were broken 8 to 10 inches deep during March with a two-horse turning plow, followed by a thorough disking during the middle of April. Just before laying off the rows, which was during the last of April, the ground was gone over with a smoothing harrow. The rows were run 5 to 7 inches deep, 3⅓ feet apart, with an 8-inch shovel, and the fertilizer materials applied in the drill, at the following rate per acre in all tests:

Four hundred pounds of a mixture of acid phosphate, manure salt and dried blood, which contained 7 per cent available phosphoric acid, 2½ per cent potash and 2½ per cent nitrogen (equal to 3.04 per cent ammonia), costing $3.95, were used.

The cultivation was level, with cultivators, being moderately deep at the beginning of the season and shallower as the root zone increased. The cultivator was never run more than twice to the row at a time, as this more than covered the middle, and an effort was made to work over the plats as quickly as possible immediately after rains to break the crust formed by the showers and leave a dust mulch to check evaporation. The cultivator was run about 1½ to 2 inches deep toward the close of the season. It was attempted to cultivate every ten days, which had to be changed, of course, to suit the season. The cotton was reduced to a stand of 15 inches at Edgecombe and 16 inches at Iredell between the hills in the rows with the variety tests.

RESULTS OF VARIETY TESTS OF COTTON.

The results of these tests are included in the following tables:

TABLE IX—RESULTS OF

EDGECOMBE

Rank According to Selling Price of Total Products (Lint and Seed).	Varieties Tested.	Number of Stalks per Plat.		Average Height of Stalks in Inches at Maturity.	Yield of Seed Cotton in Pounds per Plat at the Several Pickings.				
		For Perfect Stand.	By Actual Count.		First Picking—October 30.	Second Picking—November 11.	Third Picking.	Fourth Picking.	Total Pickings.
1	Morgan's Climax	556	461	38.0	38.00	44.25			82.25
2	Hodge	556	464	39.0	37.50	39.50			77.00
3	Thigpen's Prolific	556	311	40.0	32.25	42.00			74.25
3	Cleveland Big Boll	556	493	36.0	35.50	34.00			69.50
4	Alexander Moneymaker	556	472	33.0	26.50	40.50			67.00
5	Culpepper's Reimproved	556	376	41.0	24.75	42.50			67.25
6	Russell's Big Boll Prolific	556	520	31.0	26.00	47.00			73.00
7	Cook's Improved	556	457	42.0	29.00	33.50			62.50
8	Culpepper's Improved	556	473	41.0	24.00	42.00			66.00
9	King's Improved	556	439	32.0	42.50	24.75			67.25
10	Brown's No. 1	556	499	47.0	26.25	36.25			62.50
11	Webb	556	487	33.0	36.00	32.50			68.50
12	Excelsior Prolific	556	493	39.0	26.50	31.00			57.50
13	Bigham's Improved	556	287	39.0	38.25	29.25			67.50
14	Williams'	556	490	28.0	43.00	13.75			56.75
15	Shine's Cluster	556	436	42.0	28.00	39.50			67.50
16	Simpkin's Prolific	556	481	32.0	40.50	16.50			57.00
17	Moss' Improved	556	415	43.0	14.75	37.25			52.00
18	Braswell's Cluster	556	428	46.0	33.25	32.25			65.50
19	Shine's Extra Early Prolific	556	462	45.0	32.50	35.00			67.50
20	Sugar Loaf	556	479	38.0	41.25	18.00			59.25
21	Triumph	556	464	48.0	23.75	38.25			62.00
22	Carolina	556	402	44.0	21.00	38.50			59.50
23	Mortgage Lifter	556	436	40.0	20.50	37.25			57.75
24	Dozier's Reimproved	556	450	39.0	47.00	12.75			59.75
25	King's Improved (Native)	556	516	31.0	32.50	22.50			55.00
26	Peterkin's Improved	556	456	35.0	16.00	33.75			49.75
27	Edgeworth	556	460	35.0	23.50	32.00			55.50
28	Russell's Big Boll	556	389	47.0	19.00	42.25			61.75
29	Columbia Long Staple	556	411	51.0	23.00	39.00			52.00
30	Morgan's Ten Lock	556	463	43.0	20.00	26.50			46.50

VARIETY TESTS OF COTTON.

FARM.

Total Pounds Seed Cotton per Acre.	Number of Bolls Required to Yield One Pound of Seed Cotton.	Number of Seed in One Pound of Seed Cotton.	Pounds of Lint in 100 Pounds of Seed Cotton.	Pounds of Seed in 100 Pounds of Seed Cotton	Pounds of Lint per Acre.	Pounds of Seed per Acre.	Value of Lint per Acre at 11 Cents per Pound.	Value of Seed per Acre at $1.00 per 100 Pounds or 30 Cents per Bushel.	Total Value of Lint and Seed per Acre.	Source of Seed.
1538.07	71	2721	33.20	66.80	510.63	1027.44	$56.16	$10.27	$66.43	South Carolina.
1439.90	87	3556	35.80	64.20	515.48	924.42	56.70	9.24	65.94	North Carolina.
1388.47	66	2494	35.50	64.50	492.90	895.57	54.21	8.95	63.16	North Carolina.
1299.65	66	2222	36.30	63.70	501.77	797.88	55.19	7.97	63.16	Mississippi.
1252.90	84	3084	39.40	60.60	493.64	759.26	43.03	7.59	61.89	Georgia.
1257.57	63	2449	34.80	65.20	437.63	819.94	52.09	8.19	60.28	Georgia.
1415.10	68	2494	32.40	67.60	458.49	956.61	50.43	9.56	59.99	Georgia.
1168.75	68	2540	40.20	59.80	469.83	698.92	51.68	6.98	58.66	Georgia.
1234.20	80	2630	36.60	63.40	451.71	782.49	49.68	7.82	57.50	North Carolina.
1257.57	93	3220	35.70	64.30	448.95	808.62	49.38	8.08	57.46	Iredell Test Farm.
1168.75	56	2222	37.40	62.60	437.11	831.64	48.08	8.31	56.39	Georgia.
1280.95	86	3447	33.90	66.10	434.24	846.61	47.76	8.46	56.22	North Carolina.
1075.25	89	3175	41.20	58.80	443.00	632.25	48.73	6.32	55.05	South Carolina.
1262.25	73	2857	33.60	66.40	424.11	838.14	46.25	8.38	55.03	North Carolina.
1061.22	114	3220	41.70	58.30	442.52	618.70	48.67	6.18	54.85	North Carolina.
1252.25	79	2948	32.80	67.20	410.73	841.52	45.18	8.41	53.59	North Carolina.
1085.90	81	3175	39.30	60.70	426.75	659.15	46.94	6.59	53.53	North Carolina.
972.74	81	3129	44.40	55.60	431.74	540.66	47.49	5.40	52.89	South Carolina.
1224.85	91	2676	33.00	67.00	404.20	820.65	44.46	8.20	52.66	North Carolina.
1262.25	93	3311	31.00	69.00	391.39	870.86	43.05	8.70	51.75	North Carolina.
1107.97	97	3129	36.70	63.30	406.62	701.35	44.72	7.01	51.73	North Carolina.
1159.40	70	2540	32.90	67.10	381.44	777.96	41.95	7.77	49.72	Georgia.
1112.65	74	2676	33.60	66.40	373.85	738.80	41.12	7.38	48.50	South Carolina.
1079.92	58	2358	34.50	65.50	372.57	707.35	40.98	7.07	48.05	Georgia.
1117.32	87	2993	32.90	67.10	367.59	749.73	40.43	7.49	47.89	North Carolina.
1028.50	94	3220	36.40	63.60	374.37	654.13	41.18	6.54	47.72	North Carolina.
930.32	84	3220	37.50	62.50	348.87	581.45	38.37	5.81	44.18	South Carolina.
1037.85	77	2630	34.40	65.60	357.02	680.83	39.27	6.80	46.07	Georgia.
1154.72	53	2086	24.90	75.10	287.52	867.20	31.62	8.67	40.29	Edgecombe Test Farm.
972.40	61	2358	28.60	71.40	278.10	694.30	30.59	6.94	37.53	South Carolina.
879.55	66	2449	29.90	70.10	262.98	616.57	28.92	6.16	35.08	South Carolina.

TABLE IX—RESULTS OF VARIETY

IREDELL

Rank According to Selling Price of Total Products (Lint and Seed).	Varieties Tested.	Number of Stalks per Plat.		Average Height of Stalks in Inches at Maturity.	Yield of Seed Cotton in Pounds per Plat at the Several Pickings.				
		For Perfect Stand.	By Actual Count.		First Picking—October 2.	Second Picking—November 7	Third Picking—December 10.	Fourth Picking.	Total Pickings.
1	Russell's Big Boll Prolific	334	329	37.0	4.00	21.25	29.00	.....	54.25
2	King's Improved	334	389	36.0	16.50	27.00	6.25	.....	49.75
3	Cleveland's Big Boll	334	352	36.0	9.25	23.00	18.00	.....	50.25
4	Simpkin's Prolific	334	392	36.0	19.25	22.00	6.50	.....	47.25
5	Culpepper's Improved	334	386	40.0	10.75	26.00	14.00	.....	50.75
6	King's Improved (Native)	334	364	36.0	13.50	23.00	10.00	.....	46.50
7	Excelsior Prolific	334	346	36.0	12.50	19.50	13.00	.....	45.00
8	Alexander Moneymaker	334	667	29.0	6.50	20.00	17.25	.....	43.75
9	Sugar Loaf	334	335	36.0	17.00	21.00	6.00	.....	44.00
10	Shine's Extra Early Prolific	334	350	40.0	13.00	22.00	12.25	.....	47.25
11	Brown's No. 1	334	368	30.0	10.50	19.50	14.00	.....	44.00
12	Shine's Cluster	334	396	38.0	8.00	20.50	15.00	.....	43.50
13	Edgeworth	334	342	34.0	8.50	22.00	15.00	.....	45.50
14	Bigham's Improved	334	390	32.0	18.50	20.00	7.00	.....	45.50
15	Thigpen's Prolific	334	369	44.0	7.50	20.00	16.50	.....	44.00
16	Mortgage Lifter	334	381	31.0	5.50	21.50	17.00	.....	44.00
17	Dozier's Reimproved	334	368	27.0	23.00	16.00	4.00	.....	43.00
18	Culpepper's Reimproved	334	351	30.0	6.00	18.00	19.00	.....	43.00
19	Hodge	334	377	35.0	15.00	19.00	7.00	.....	41.00
20	Williams'	334	403	35.0	19.00	22.50	9.00	.....	40.50
21	Russell's Big Boll	334	364	26.0	6.00	16.50	20.00	.....	42.50
22	Braswell's Cluster	334	360	33.0	14.00	19.50	7.00	.....	40.50
23	Cook's Improved	334	349	40.0	8.00	15.25	14.25	.....	37.50
24	Triumph	334	323	32.0	10.00	20.00	9.50	.....	39.50
24	Morgan's Climax	334	358	30.0	12.00	19.00	9.75	.....	40.75
25	Webb	334	382	29.0	8.00	15.00	4.00	.....	37.00
26	Carolina	334	342	26.0	6.00	19.00	12.75	.....	37.75
27	Columbia Long Staple	334	340	26.0	6.50	17.00	15.25	.....	38.75
28	Moss' Improved	334	324	28.0	5.00	15.00	13.25	.....	33.25
29	Peterkin's Improved	334	321	38.0	2.50	10.00	19.50	.....	32.00

TESTS OF COTTON—CONTINUED

FARM.

Total Pounds Seed Cotton per Acre.	Number of Bolls Required to Yield One Pound of Seed Cotton.	Number of Seed in One Pound of Seed Cotton.	Pounds of Lint in 100 Pounds of Seed Cotton.	Pounds of Seed in 100 Pounds of Seed Cotton.	Pounds of Lint per Acre.	Pounds of Seed per Acre.	Value of Lint per Acre at 11 Cents per Pound.	Value of Seed per Acre at $1.00 per 100 Pounds or 30 Cents per Bushel.	Total Value of Lint and Seed per Acre.	Source of Seed.
1085.0	55	2009	33.80	66.20	366.73	718.27	$40.37	$ 7.18	$47.55	Alabama.
995.0	80	3016	37.50	62.50	373.12	621.88	41.04	6.21	47.25	Iredell Test Farm.
1005.0	62	2177	36.30	63.70	364.81	640.19	40.12	6.40	46.52	Mississippi.
955.0	88	3197	37.70	62.30	360.03	594.97	39.60	5.94	45.54	North Carolina.
1015.0	69	2322	34.60	65.40	351.19	663.81	38.63	6.63	45.26	North Carolina.
930.0	92	2707	37.10	62.90	345.03	584.97	37.95	5.84	43.79	North Carolina.
900.0	83	2930	38.00	62.00	342.00	558.00	37.62	5.58	43.20	South Carolina.
875.0	94	3111	39.20	60.80	343.00	532.00	37.73	5.32	43.05	Georgia.
880.0	91	2296	38.50	61.50	338.80	541.20	37.26	5.41	42.67	North Carolina.
945.0	81	2803	34.50	65.50	326.02	618.98	35.86	6.18	42.06	North Carolina.
880.0	54	2390	37 40	62.60	329.12	550.88	36.20	5.50	41.70	Georgia.
870.0	66	2881	37.90	62.10	329.73	540.27	36.26	5.40	41.66	North Carolina.
910.0	63	2322	35.20	64 80	320.32	589.68	35.23	5.89	41.12	Georgia.
910.0	76	2798	34.90	65.10	317.59	592.41	34.93	5.92	40.85	North Carolina.
880.0	75	2163	36.30	63.70	319.44	570.56	35.13	5.70	40.83	North Carolina.
880.0	56	2113	36.10	63.90	317.68	562.32	34.94	5.62	40.56	Georgia.
860.0	87	3043	37.10	62.90	319.06	340.94	35.09	5.40	40.49	North Carolina.
860.0	52	2150	35.95	64.05	305.17	550.83	34.00	5.50	39.56	Georgia.
820.0	87	2835	37.00	63.00	303.40	516.60	33.37	5.16	38.53	North Carolina.
810.0	91	3016	38.50	61.50	298.70	511.30	32.85	5.11	37.96	North Carolina.
850.0	63	2770	34.10	65.90	289.85	560.15	31.88	5.60	37.48	Edgecombe Test Farm.
810.0	83	2835	35.70	64.30	289.17	520.83	31.80	5.20	37.00	North Carolina.
750.0	62	2376	38.90	61.10	291.75	458.25	32.09	4.58	36.67	Georgia.
790.0	59	2227	35.90	64.10	283.61	506.39	31.19	5.06	36.25	Georgia.
815.0	65	2390	34.50	65.50	281.17	533.83	30.92	5.33	36.25	South Carolina.
740.0	99	3270	37.60	62.40	278.24	461.76	30.60	4.61	35.21	North Carolina.
755.0	71	3157	36.40	63.60	274.82	480.18	30.23	4.80	35.03	South Carolina.
775.0	81	2558	33.30	66.70	258.07	516.93	28.38	5.16	33.54	South Carolina.
665.0	81	3343	40.30	59.70	267.99	397.01	29.47	3.97	33.44	South Carolina.
640.0	75	3059	37.00	63.00	236.80	403.20	26.04	4.03	30.07	South Carolina.

TABLE X—COMPILED RESULTS OF

EDGECOMBE

Varieties Tested.	1900.		1901.		1902.	
	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products
Russell's Big Boll	1265.6	3	1487.0	1	1675.0	1
Culpepper's Improved	1125.6	4	1302.0	3	1230.0	5
Moss' Improved	1305.0	1	999.0	6		
Breeden's Prolific	1205.0	2				
Todd's Improved	1000.0	5				
Strickland's Improved	950.0	6	1142.0	4		
Lewis' Prize	770.0	7				
Hawkins' Extra Prolific	740.0	8	1053.0	5		
Peterkin's Improved			1215.6	2	1372.5	2
Griffin's Improved			957.0	7		
Truitt's Improved					1335.0	3
Daughtridge's					1230.0	4
Blue Ribbon					1170.6	6
King's Improved					885.0	7
Excelsior Prolific						
Edgeworth						
Garrard's Improved Prolific						
Cook's Improved						
Hodge						
Mebane's Triumph						
Webb						
Tool's Early Prolific						
Shine's Extra Early Prolific						
Texas Big Boll						
Speight's Prolific						
Brown Texas Wood						
Black Texas Wood						
Missionary						
Peterkin's Improved (Craig)						
White's Long Staple						

VARIETY TESTS OF COTTON.

FARM.

1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
1193.7	7	1941.3	4	2096.5	3	1046.1	20	1134.9	5	1154.72	28	1443.8	1
1028.5	9	2031.3	1	1983.3	2	1201.6	13	926.4	13	1234.20	8	1340.3	2
		1287.9	17	1604.6	8	1038.2	10	709.3	20	972.74	17		
						1006.7	17						
1291.3	4	1363.6	16	1697.8	6			680.3	25	930.32	26		
1036.0	8			1397.6	21								
1336.3	6												
1381.4	3	1747.2	3			981.5	16	868.5	12	1257.57	9		
1621.6	2	1761.4	7	1756.9	1			733.4	23	1075.25	12		
1691.6	1	1733.0	10	1840.6	10	1251.6	8	878.2	16	1037.85	27		
1332.3	5												
		1818.2	2	1447.5	5	1329.4	1	969.8	6	1168.75	7		
		1756.6	5	1904.5	4			863.7	15	1439.90	2		
		1775.6	6										
		1780.3	8	1688.0	17	1270.1	4	1027.7	9	1280.95	11		
		1666.7	9	1668.3	7								
		1728.2	11	1850.4	15	982.9	21	1225.6	2	1262.25	19		
		1643.0	12			1089.6	14						
		1524.6	13										
		1415.7	14			827.4	26						
		1543.6	15	1747.5	9	977.6	15	521.1	27				
		1572.0	18										
		1534.1	19	1496.6	18								
		1548.3	20										

TABLE X—COMPILED RESULTS OF

EDGECOMBE

Varieties Tested.	1900.		1901.		1902.	
	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products
Florodora						
Wilson's Matchless						
Jackson Limbless (Wilt Resistant)						
Jackson Limbless (No. 128-1-29-1-11)						
Dozier's Improved						
Berry's Big Boll						
Layton's Improved						
Gold Standard						
Braswell's Cluster						
Butler's Early Prolific						
Brown's No. 1						
Broadwell's Double-jointed						
Bigham's Improved						
Double-header						
Drake's Defiance						
Simpkins' Prolific						
Russell's Big Boll Improved						
Mortgage Lifter						
Little's Improved						
Red Rust Proof						
Cleveland's Big Boll						
Sugar Loaf						
Culpepper's Reimproved						
Morgan's Climax						
Pullnot						
Alexander Moneymaker						
Cluster						
Thigpen's Prolific						
Russell's Big Boll Prolific						
Williams'						

VARIETY TESTS OF COTTON—CONTINUED.

FARM.

1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
.....	.....	1306.8	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1678.2	16	1242.4	12	849.2	18	.....	.....	.....	.....
.....	.....	.....	.....	1534.4	12	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1181.1	23	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1387.8	20	1193.7	11	844.4	17	.....	.....	.....	.....
.....	.....	.....	.....	1496.6	22	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1535.4	13	.....	.....	743.1	19	.....	.....	.....	.....
.....	.....	.....	.....	1643.7	14	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1520.7	19	1268.8	3	993.9	10	1224.85	18	.....	.....
.....	.....	.....	.....	1845.5	11	1030.3	19	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	1252.9	2	993.9	4	1168.75	10	.....	.....
.....	.....	.....	.....	.....	.....	1243.7	5	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	1303.0	6	1100.1	7	1262.25	13	.....	.....
.....	.....	.....	.....	.....	.....	1281.9	7	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	1196.3	9	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	952.6	18	931.2	8	1085.90	16	.....	.....
.....	.....	.....	.....	.....	.....	984.2	22	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	961.8	23	646.6	26	1079.92	23	.....	.....
.....	.....	.....	.....	.....	.....	876.1	24	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	797.1	25	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	1278.6	1	1299.65	3	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	1095.3	3	1107.97	20	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	954.4	11	1257.57	5	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	945.7	14	1538.07	1	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	757.5	21	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	694.8	22	1252.90	4	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	791.3	24	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1299.65	3	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1415.10	6	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1061.22	14	.....	.....

TABLE X—COMPILED RESULTS OF

EDGECOMBE

Varieties Tested.	1900.		1901.		1902.	
	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products
Shine's Cluster						
Triumph						
Carolina						
Dozier's Reimproved						
King's Improved (Native)						
Columbia Long Staple						
Morgan's Ten Lock						

VARIETY TESTS OF COTTON—CONTINUED.

FARM.

1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
------	------	------	------	------	------	------	------	------	------	1252.25	15	------	------
------	------	------	------	------	------	------	------	------	------	1159.40	21	------	------
------	------	------	------	------	------	------	------	------	------	1112.65	22	------	------
------	------	------	------	------	------	------	------	------	------	1117.32	24	------	------
------	------	------	------	------	------	------	------	------	------	1028.50	25	------	------
------	------	------	------	------	------	------	------	------	------	972.40	29	------	------
------	------	------	------	------	------	------	------	------	------	879.55	30	------	------

TABLE X—COMPILED RESULTS OF

IREDELL

Varieties Tested.	1900.		1901.		1902.	
	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
King's Improved (Native)						
King's Improved						
Russell's Big Boll						
Culpepper's Improved						
Edgeworth						
Excelsior Prolific						
Garrard's Improved Prolific						
Truitt's Improved						
Peterkin's Improved						
Webb						
Hodge						
Tool's Early Prolific						
Cook's Improved						
Missionary						
Speight's Prolific						
Shine's Extra Early Prolific						
Texas Big Boll						
Black Texas Wood						
Peterkin's Improved (Craig)						
Moss' Improved						
White's Long Staple						
Brown Texas Wood						
Florodora						
Jackson Limbless						
Mebane's Triumph						
Jones' Improved						
Excelsior						
Wilson's Matchless						
Jackson Limbless (Wilt Resistant)						
Jackson Limbless (No. 128-1-29-1-11)						

VARIETY TESTS OF COTTON—CONTINUED.

FARM.

1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
750.0	1	900.0	2	985.4	1	865.0	3	1208.40	4	930.0	6	939.6	2
655.0	2	1005.0	1	765.2	11	960.0	1	1344.20	2	995.0	2	954.0	1
640.0	3	835.0	7	------	------	------	------	------	------	850.0	21	------	------
630.0	5	790.0	8	974.0	4	560.0	16	------	------	1015.0	5	------	------
605.0	4	760.0	11	873.0	12	760.0	13	848.80	20	910.0	13	792.8	3
475.0	6	790.0	6	801.6	10	------	------	967.60	17	900.0	7	------	------
410.0	7	------	------	------	------	------	------	------	------	------	------	------	------
360.0	9	------	------	750.6	22	------	------	------	------	------	------	------	------
290.0	8	495.0	21	743.4	20	------	------	------	------	640.0	29	------	------
------	------	920.0	3	946.5	5	680.0	11	692.40	23	740.0	------	------	------
------	------	805.0	4	1082.0	2	------	------	------	------	820.0	25	------	------
------	------	575.0	17	816.6	13	------	------	------	------	------	------	------	------
------	------	695.0	10	938.0	3	------	------	1146.20	3	750.0	23	------	------
------	------	745.0	9	------	------	------	------	------	------	------	------	------	------
------	------	660.0	13	------	------	------	------	------	------	------	------	------	------
------	------	825.0	5	926.6	7	720.0	4	989.20	19	945.0	10	------	------
------	------	635.0	16	------	------	540.0	17	------	------	------	------	------	------
------	------	525.0	20	805.8	15	600.0	14	739.40	22	------	------	------	------
------	------	670.0	15	784.6	21	------	------	------	------	------	------	------	------
------	------	500.0	19	706.2	18	595.0	7	917.00	13	665.0	28	------	------
------	------	525.0	24	------	------	------	------	------	------	------	------	------	------
------	------	615.0	12	------	------	505.0	18	------	------	------	------	------	------
------	------	440.0	25	------	------	------	------	------	------	------	------	------	------
------	------	465.0	23	------	------	------	------	------	------	------	------	------	------
------	------	460.0	22	------	------	------	------	------	------	------	------	------	------
------	------	600.0	18	------	------	------	------	------	------	------	------	------	------
------	------	650.0	14	------	------	------	------	------	------	------	------	------	------
------	------	------	------	965.6	6	690.0	5	1083.00	11	------	------	------	------
------	------	------	------	720.2	19	------	------	------	------	------	------	------	------
------	------	------	------	558.4	23	------	------	------	------	------	------	------	------

TABLE X—COMPILED RESULTS OF

IREDELL

Varieties Tested.	1900.		1901.		1902.	
	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
Dozier's Improved						
Berry's Big Boll						
Layton's Improved						
Gold Standard						
Butler's Early Prolific						
Broadwell's Double-jointed						
Bigham's Improved						
Drake's Defiance						
Russell's Big Boll Improved						
Brown's No. 1						
Hawkins' Extra Prolific						
Mortgage Lifter						
Double Header						
Pullnot						
Sugar Loaf						
Cleveland's Big Boll						
Simpkins' Prolific						
Culpepper's Reimproved						
Alexander Moneymaker						
Williams'						
Cluster						
Braswell's Cluster						
Russell's Big Boll Prolific						
Dozier's Reimproved						
Shine's Cluster						
Thigpen's Prolific						
Morgan's Climax						
Triumph						
Columbia Long Staple						
Carolina						

VARIETY TESTS OF COTTON—CONTINUED.

FARM.

1903.		1904.		1905.		1906.		1907.		1908.		Averages.	
Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.	Yield in Pounds Seed Cotton per Acre.	Rank According to Value of Total Products.
------	------	------	------	890.8	9	685.0	8	1004.00	18	------	------	------	------
------	------	------	------	909.6	17	------	------	------	------	------	------	------	------
------	------	------	------	791.2	14	------	------	------	------	------	------	------	------
------	------	------	------	787.2	16	------	------	------	------	------	------	------	------
------	------	------	------	894.6	8	------	------	------	------	------	------	------	------
------	------	------	------	------	------	900.0	2	------	------	------	------	------	------
------	------	------	------	------	------	650.0	6	1066.00	14	910.0	14	------	------
------	------	------	------	------	------	690.0	9	1057.40	16	------	------	------	------
------	------	------	------	------	------	700.0	10	------	------	------	------	------	------
------	------	------	------	------	------	600.0	12	1106.00	5	880.0	11	------	------
------	------	------	------	------	------	560.0	15	------	------	------	------	------	------
------	------	------	------	------	------	545.0	15	1102.00	10	880.0	16	------	------
------	------	------	------	------	------	530.0	19	------	------	------	------	------	------
------	------	------	------	------	------	------	------	1432.80	1	------	------	------	------
------	------	------	------	------	------	------	------	1126.00	6	880.0	9	------	------
------	------	------	------	------	------	------	------	1161.20	7	1005.0	3	------	------
------	------	------	------	------	------	------	------	1070.00	8	955.0	4	------	------
------	------	------	------	------	------	------	------	1112.00	9	860.0	18	------	------
------	------	------	------	------	------	------	------	1014.00	12	875.0	8	------	------
------	------	------	------	------	------	------	------	952.20	15	810.0	20	------	------
------	------	------	------	------	------	------	------	825.00	21	------	------	------	------
------	------	------	------	------	------	------	------	683.00	24	810.0	22	------	------
------	------	------	------	------	------	------	------	------	------	1085.0	1	------	------
------	------	------	------	------	------	------	------	------	------	860.0	17	------	------
------	------	------	------	------	------	------	------	------	------	870.0	12	------	------
------	------	------	------	------	------	------	------	------	------	880.0	15	------	------
------	------	------	------	------	------	------	------	------	------	815.0	24	------	------
------	------	------	------	------	------	------	------	------	------	790.0	24	------	------
------	------	------	------	------	------	------	------	------	------	775.0	27	------	------
------	------	------	------	------	------	------	------	------	------	755.0	26	------	------

TABLE XI—SHOWING RELATIVE EARLINESS, VALUE, YIELD, AND SIZE OF BOLLS, SEED, AND STALKS OF VARIETIES OF COTTON TESTED IN 1908.

EDGECOMBE FARM.

Varieties.	Percentage of Cotton Open at the Several Pickings.			Rank According to the Following Characters.							
	First Picking—October 30.	Second Picking—November 11.	Third Picking.	Earliness as Shown by Percentage Open at First Picking.	Value of Total Products (Lint and Seed).	Yield of Lint per Acre—Pounds.	Yield of Seed per Acre—Pounds.	Percentage of Lint.	Percentage of Seed.	Largeness of Bolls.	Largeness of Seed.	Height of Stalks.
Morgan's Climax	46.20	53.80	....	14	1	2	1	21	9	9	9	12
Hodge	48.70	51.30	....	11	2	1	3	13	17	18	19	11
Thigpen's Prolific	43.43	56.57	....	17	3	5	4	15	15	6	5	10
Cleveland's Big Boll	51.07	48.93	....	9	3	3	14	12	18	6	2	13
Alexander Moneymaker	39.55	60.45	....	22	4	4	17	5	25	16	13	15
Culpepper's Reimproved	36.80	63.20	....	24	5	12	12	16	14	5	4	9
Russell's Big Boll Prolific	35.61	64.39	....	26	6	7	2	24	5	7	5	17
Cook's Improved	46.40	53.60	....	13	7	6	22	4	26	7	6	8
Culpepper's Improved	36.36	63.64	....	25	8	8	15	10	20	14	7	9
King's Improved	63.19	36.81	....	5	9	9	13	14	16	21	16	16
Brown's No. 1	42.00	58.00	....	20	10	13	10	8	22	2	2	3
Webb	52.55	47.45	....	8	11	14	7	19	11	17	18	16
Excelsior Prolific	46.08	53.92	....	15	12	10	27	3	27	19	15	11
Bigham's Improved	56.66	43.34	....	7	13	17	9	20	10	10	10	11
Williams'	75.77	24.23	....	2	14	11	28	2	28	24	16	18
Shine's Cluster	41.48	58.52	....	21	15	18	8	23	6	13	11	8
Simpkins' Prolific	71.05	28.95	....	3	16	16	25	6	24	15	15	16
Moss' Improved	28.36	71.64	....	31	17	15	31	1	29	15	14	7
Braswell's Cluster	50.76	49.24	....	10	18	20	11	21	8	20	8	4
Shine's Extra Early Prolific	48.14	51.86	....	12	19	21	6	25	4	21	17	5
Sugar Loaf	69.62	30.38	....	4	20	19	21	9	21	23	14	12
Triumph	38.30	61.70	....	23	21	22	16	22	7	8	6	2
Carolina	35.28	64.72	....	28	22	24	19	20	10	11	8	6
Mortgage Lifter	35.49	64.51	....	27	23	25	20	17	13	3	3	10
Dozier's Reimproved	78.66	21.34	....	1	24	26	18	22	7	18	12	11
King's Improved (Native)	59.09	40.91	....	6	25	23	26	11	19	22	16	17
Peterkin's Improved	32.16	67.84	....	29	26	27	30	7	23	16	16	14
Edgeworth	42.34	57.66	....	19	27	31	24	18	12	12	7	14
Russell's Big Boll	30.76	69.24	....	30	28	28	5	28	1	1	1	3
Columbia Long Staple	44.23	55.77	....	16	29	29	23	27	2	4	3	1
Morgan's Ten Lock	43.01	56.99	....	18	30	30	29	26	3	6	4	7

TABLE XI—SHOWING RELATIVE EARLINESS, VALUE, YIELD, AND SIZE OF BOLLS, SEED, AND STALKS OF VARIETIES OF COTTON TESTED IN 1908—CON.

IREDELL FARM.

Varieties.	Percentage of Cotton Open at the Several Pickings.			Rank According to the Following Characters.							
	First Picking—October 2.	Second Picking—November 7.	Third Picking—December 10.	Earliness as Shown by Percentage Open at First Picking.	Value of Total Products (Lint and Seed).	Yield of Lint per Acre—Pounds.	Yield of Seed per Acre—Pounds.	Percentage of Lint.	Percentage of Seed.	Largeness of Bolls.	Largeness of Seed.	Height of Stalks.
Russell's Big Boll Prolific	7.39	39.17	53.44	30	1	2	1	24	2	3	1	4
King's Improved	33.17	54.27	12.56	8	2	1	4	9	17	14	19	5
Cleveland's Big Boll	18.41	45.77	35.82	19	3	3	3	14	12	6	5	5
Simpkins' Prolific	39.69	46.56	13.75	3	4	4	6	7	19	18	24	5
Culpepper's Improved	21.19	51.23	27.58	15	5	5	2	21	5	10	7	2
King's Improved (Native)	29.04	49.46	21.50	10	6	6	9	11	15	20	11	5
Excelsior Prolific	27.79	43.33	28.88	11	7	8	13	5	21	16	17	5
Alexander Moneymaker	14.87	45.71	39.42	25	8	7	19	2	24	21	22	12
Sugar Loaf	38.65	47.72	13.63	4	9	9	16	4	22	19	18	5
Shine's Extra Early Prolific	27.52	46.56	25.92	12	10	12	5	22	4	15	14	2
Brown's No. 1	23.88	44.31	31.81	13	11	11	14	10	16	2	9	11
Shine's Cluster	18.40	47.12	34.48	20	12	10	17	6	20	9	16	3
Edgeworth	18.69	48.35	32.96	18	13	13	8	19	7	7	7	7
Bigham's Improved	19.79	43.95	36.26	17	14	17	7	20	6	13	13	9
Thigpen's Prolific	18.19	45.45	36.36	21	15	14	10	14	12	12	4	1
Mortgage Lifter	12.51	48.86	38.63	28	16	16	11	15	11	4	2	10
Dozier's Reimproved	53.48	37.20	9.32	1	17	15	30	11	15	17	20	14
Culpepper's Reimproved	13.96	41.86	44.18	27	18	18	15	16	10	1	3	11
Hodge	36.59	46.34	17.07	5	19	19	22	12	14	17	15	6
Williams'	21.15	56.35	22.50	16	20	20	23	4	22	19	19	6
Russell's Big Boll	14.13	38.82	47.05	26	21	22	12	23	3	7	12	15
Braswell's Cluster	34.58	48.14	17.28	7	22	23	20	18	8	16	15	8
Cook's Improved	21.48	40.66	37.86	14	23	21	27	3	23	6	8	2
Triumph	35.32	50.63	24.05	6	24	24	24	17	9	5	6	9
Morgan's Climax	29.46	46.62	23.92	9	24	25	18	22	4	8	9	11
Webb	48.65	40.54	10.81	2	25	26	26	8	18	22	25	12
Carolina	15.90	50.33	33.77	23	26	27	25	13	13	11	23	15
Columbia Long Staple	16.91	43.87	39.22	22	27	29	21	25	1	15	10	15
Moss' Improved	15.05	45.11	39.84	24	28	28	29	1	25	15	26	13
Peterkin's Improved	7.82	31.25	60.93	29	29	30	28	12	14	12	21	3

TABLE XII—COMPILED RESULTS OF VARIETY TESTS OF COTTON, SHOWING RELATIVE EARLINESS, VALUE, YIELDS, AND SIZE OF BOLLS AND STALKS.[1]

EDGECOMBE FARM.

Varieties.	Number of Years Tested.	Rank According to the Following Characters.								
		Value of Total Products—Seed and Lint.	Yield of Lint per Acre—Pounds.	Yield of Seed per Acre—Pounds.	Percentage of Lint.	Percentage of Seed.	Largeness of Bolls.	Largeness of Seed.	Earliness as shown by Percentage of Bolls Open at First Picking.[2]	Height of Stalks.[3]
Russell's Big Boll	5	4	4	1	6	1	1	1	6	2
Culpepper's Improved	5	2	2	2	2	5	2	4	5	4
Edgeworth	5	6	5	4	4	3	3	2	2	3
Cook's Improved	5	1	1	6	1	6	2	3	4	5
Webb	5	3	3	3	3	4	5	6	1	6
Shine's Extra Early Prolific	5	5	6	5	5	2	4	5	3	1

IREDELL FARM.

King's Improved (Native)	6	2	2	2	2	1	1	2	1	1
King's Improved	6	1	1	1	1	2	2	1	2	1
Edgeworth	6	3	3	3	2	1	3	3	3	1

[1]The comparisons of varieties in this table are the average of results of tests of 1903, 1904, 1905, 1906, 1907 and 1908 at Iredell; and of 1904, 1905, 1906, 1907 and 1908 at Edgecombe.

[2]Results in this column for Iredell were obtained from data of 1904, 1905, 1906, 1907 and 1908; and for Edgecombe from data of 1904, 1905, 1907 and 1908.

[3]Results in this column for the Edgecombe farm were obtained from data of 1906, 1907 and 1908.

COMMENTS ON VARIETY TESTS OF COTTON.

The varieties tested this year at the Edgecombe and Iredell farms are arranged in Table IX in the order of their selling price of "total products," when lint is selling at 11 cents per pound and seed at 30 cents per bushel. This order may not be the order of productivity of seed cotton, as is shown in the tests this year at both the Edgecombe and Iredell farms.

The reason for some varieties with smaller yields of seed cotton producing more lint and hence greater selling price per acre than some others with a larger amount of seed cotton per acre, is due to the former varieties producing a higher percentage of lint to seed.

To eliminate inequalities in the land, if any, the different varieties at the separate farms were planted each in separate rows, arranged consecutively, and this plan repeated a sufficient number of times to give the designated acreage. It is absolutely essential, in order to eliminate soil and weather conditions as much as possible, to continue work of this kind for some years on different types of soils before attempting to draw definite conclusions.

The yields for this year are presented in Table IX, while the average rank in value of total products of the several varieties tested during the past seven years is shown in Table X. Taking the whole variety test at the Edgecombe farm, the stand was very irregular and poor. The late, cold spring was largely the cause of this defect in stand. It should not be overlooked, however, that all the varieties were planted in the same way, on the same day, on uniform land, and given the same fertilization and cultural treatment, hence the results are valuable as showing the ability of certain varieties to withstand adverse seasonal conditions and produce paying yields, which is a matter of considerable importance. At the Iredell farm the stand of the different varieties was considerably better than at the Edgecombe. Two pickings were made of the varieties this year at the Edgecombe farm and three at the Iredell farm. Of the varieties that have been tested continuously at the different farms since the inauguration of variety testing at them, as seen by Table X, Russell's Big Boll and Culpepper's Improved, as an average of nine years' tests, have ranked as the best varieties at the Edgecombe farm; King's Improved, King's Improved Native and Edgeworth were highest at the Iredell farm as an average of six years' testing.

In this connection it is interesting to note that in the several tests of cotton on the different farms the differences between the one yielding the highest amount of seed cotton per acre and the one the lowest in the individual tests ranged from 530 to 915 pounds of seed cotton at Edgecombe, with the number of varieties ranging from seven to thirty-one; and at Iredell, from 455 to 565 pounds when using from nine to thirty varieties in the different tests during the past six years.

These results speak in no uncertain terms as to the importance and value of good seed which are adapted to the different soils and localities of the State.

In Table XI is given the rank of the varieties tested this year according to certain characteristics; while Table XII shows the average ranking of five years' testing at Edgecombe and six at Iredell. Both of these tables will be found to contain much information, compiled in compact form.

NOTES ON VARIETIES OF COTTON TESTED IN 1908.

Russell's Big Boll is a hardy, large-bolled and vigorous-growing variety that yields well, especially on a loamy or sandy soil in the eastern part of the State, and is very popular with pickers. In value of total products (lint and seed) it stood third in 1900 and 1905, first in 1901 and 1902, seventh in 1903, fourth in 1904, twentieth in 1906, fifth in 1907 and twenty-eighth in 1908 at the Edgecombe farm; third in 1903, seventh in 1904 and twenty-first in 1908 at Iredell. In ordinary seasons this variety is not only prolific, but fairly reliable, especially on the well-drained sandy or loamy soils of the east.

Culpepper's Improved is a large-bolled variety, yielding generally a little less per boll than Russell's Big Boll. It ranked fourth in 1900, third in 1901, fifth in 1902, ninth in 1903, seventeenth in 1904, second in 1905, thirteenth in 1906 and 1907 and eighth in 1908 at the Edgecombe farm; and fifth, eighth, fourth, sixteenth and fifth in 1903, 1904, 1905, 1906 and 1908, respectively, at Iredell. This variety is earlier by about ten days and seems to be more subject to variation than Russell's Big Boll, but, notwithstanding this last defect, it is considered a good, reliable variety. It has a large-sized weed with spreading limbs, well bolled and holds cotton well.

King's Improved has a boll a little smaller than Peterkin's Improved but does not generally yield quite as high percentage of lint. It has a rather small stalk with spreading limbs. It occupied seventh place in 1902, third in 1903 and 1904, sixteenth in 1906, twelfth in 1907 and ninth in 1908 at Edgecombe; second in 1903, first in 1904 and 1906, eleventh in 1905, second in 1907 and 1908 at Iredell.

Edgeworth stood first in 1903, tenth in 1904 and 1905, eighth in 1906, sixteenth in 1907 and twenty-seventh in 1908 at Edgecombe; fourth in 1903, eleventh in 1904, twelfth in 1905, thirteenth in 1906, twentieth in 1907 and thirteenth in 1908 at Iredell. It has a rather heavy stalk, large leaves and short stems, and is, ordinarily, a rather late maturing variety.

Moss' Improved stood first in 1900, sixth in 1901, seventeenth in 1904, eighth in 1905, tenth in 1906, twentieth in 1907 and seventeenth in 1908 at Edgecombe; nineteenth in 1904, eighteenth in 1905, seventeenth in 1906, thirtieth in 1907 and twenty-eighth in 1908 at Iredell.

Cook's Improved ranked second in 1904, fifth in 1905, first in 1906, sixth in 1907 and seventh in 1908 at Edgecombe; tenth in 1904, third in 1905 and 1907 and twenty-third in 1908 at Iredell. It is a medium early maturing variety.

Webb occupied eighth and seventh places at Edgecombe in 1904 and 1905, fourth in 1906, ninth in 1907 and eleventh in 1908; and third, fifth, eleventh, twenty-third and twenty-fifth in 1904, 1905, 1906, 1907 and 1908 at Iredell. Has rather small bolls and seeds.

Shine's Extra Early Prolific ranked eleventh in 1904, fifteenth in 1905, twenty-first in 1906, second in 1907 and nineteenth in 1908 at Edgecombe; and fifth in 1904, seventh in 1905, fourth in 1906, nineteenth in 1907 and tenth in 1908 at Iredell.

Black Texas Wood ranked fifteenth in 1904 and 1906, ninth in 1905 and twenty-seventh in 1907 at Edgecombe; twentieth in 1904, fifteenth in 1905, fourteenth in 1906, and twenty-second in 1907 at Iredell. This is a late maturing variety.

King's Improved (native) stood first in 1903 and 1905, second in 1904, third in 1906, fourth in 1907 and sixth in 1908 at Iredell; and twenty-fifth in 1908 at Edgecombe.

Wilson's Matchless ranked sixteenth in 1905, twelfth in 1906 and eighteenth in 1907 at Edgecombe; sixth in 1905, fifth in 1906, and eleventh in 1907 at Iredell.

Dozier's Improved ranked twentieth in 1905, eleventh in 1906 and seventeenth in 1907 at Edgecombe; ninth in 1905, eighth in 1906 and eighteenth in 1907 at Iredell. This is a small-bolled and very early maturing variety.

Brown's No. 1 ranked second in 1906, fourth in 1907 and tenth in 1908 at Edgecombe; twelfth in 1906, fifth in 1907 and eleventh in 1908 at Iredell.

Braswell's Cluster ranked nineteenth in 1905, third in 1906, tenth in 1907 and eighteenth in 1908 at Edgecombe; and twenty-fourth in 1907 and twenty-second in 1908 at Iredell.

Bigham's Improved ranked sixth in 1906, seventh in 1907 and thirteenth in 1908 at Edgecombe; sixth in 1906, fourteenth in 1907 and 1908 at Iredell.

Drake's Defiance ranked ninth in 1906 at Edgecombe; and ninth in 1906 and sixteenth in 1907 at Iredell.

Simpkins' Prolific ranked eighteenth in 1906, eighth in 1907 and sixteenth in 1908 at Edgecombe; eighth in 1907 and fourth in 1908 at Iredell.

Mortgage Lifter ranked twenty-third in 1906, twenty-sixth in 1907 and twenty-third in 1908 at Edgecombe; fifteenth in 1906, tenth in 1907 and sixteenth in 1908 at Iredell.

Cleveland Big Boll ranked first in 1907 and third in 1908 at Edgecombe; and seventh in 1907 and third in 1908 at Iredell.

Hodge ranked fifth in 1904, fourth in 1905, fifteenth in 1907 and second in 1908 at Edgecombe; and fourth in 1904, second in 1905 and nineteenth in 1908 at Iredell.

Peterkin's Improved ranked second in 1901 and 1902, fourth in 1903, sixteenth in 1904, sixth in 1905, twenty-fifth in 1907 and twenty-sixth in 1908 at Edgecombe; eighth in 1903, twenty-first in 1904, twentieth in 1905 and twenty-ninth in 1908 at Iredell.

Excelsior Prolific ranked second in 1903, seventh in 1904, first in 1905, twenty-third in 1907 and twelfth in 1908 at Edgecombe; sixth in 1903 and 1904, tenth in 1905, seventeenth in 1907 and seventh in 1908 at Iredell.

Alexander Moneymaker ranked twenty-second in 1907 and fourth in 1908 at Edgecombe; twelfth in 1907 and eighth in 1908 at Iredell.

Morgan's Climax ranked fourteenth in 1907 and first in 1908 at Edgecombe; and twenty-fourth in 1908 at Iredell.

Culpepper's Reimproved ranked eleventh in 1907 and fifth in 1908 at Edgecombe; ninth in 1907 and eighteenth in 1908 at Iredell.

Layton's Improved ranked thirteenth in 1905 and nineteenth in 1907 at Edgecombe; and fourteenth in 1905 at Iredell.

Pullnot ranked twenty-first in 1907 at Edgecombe and first in 1907 at Iredell.

Sugar Loaf ranked third in 1907 and twentieth in 1908 at Edgecombe; and sixth in 1907 and ninth in 1908 at Iredell.

Cluster ranked twenty-fourth in 1907 and fifteenth in 1908 at Edgecombe; sixth in 1907 and twelfth in 1908 at Iredell.

Williams' ranked fifteenth in 1907 and twentieth in 1908 at Iredell; and fourteenth in 1908 at Edgecombe.

Russell's Big Boll Prolific ranked sixth at Edgecombe and first at Iredell in 1908.

Thigpen's Prolific ranked third at Edgecombe and fifteenth at Iredell in 1908.

Triumph ranked twenty-first at Edgecombe and twenty-fourth at Iredell in 1908.

Carolina ranked twenty-second at Edgecombe and twenty-sixth at Iredell in 1908.

Dozier's Reimproved ranked twenty-fourth at Edgecombe and seventeenth at Iredell in 1908.

Columbia Long Staple ranked twenty-ninth at Edgecombe and twenty-seventh at Iredell in 1908.

Morgan's Ten Lock ranked thirtieth at Edgecombe in 1908.

STUDY OF COMPILED RESULTS OF VARIETY TESTS OF COTTON.

Nine years ago the Department of Agriculture, by means of its test farms, began comparative tests of varieties of cotton, with the purpose, primarily, of ascertaining, if possible, the varieties that are most prolific of seed cotton per acre when grown under our conditions of soil and climate. During this time tests have been made of seven varieties in 1900 to thirty-one in 1908 in the tests on the different farms. It is felt from these accumulated data of nine years' tests that some very reliable and valuable information has been derived, especially if taken and intelligently applied by the individual farmers of the State in their farming operations.

VARIATION IN YIELD OF VARIETIES.

In our variety tests we have had some variety or varieties to yield 700 to 900 pounds of seed cotton per acre more than other varieties in the same tests and grown under identical conditions of soil, fertilization and cultivation. This variation in yield has been no uncommon occurrence in our experience. Take, for instance, the results at the Edgecombe farm during the past nine years. In 1900, in a test of eight varieties, the difference between the variety yielding the largest amount of seed cotton per acre and the one the smallest was 565 pounds; in 1901 and 1902, in tests of seven varieties each, the differences were 530 and

790 pounds, respectively; in 1903, 663 pounds, when nine varieties were incorporated, 724 pounds in 1904 with twenty-one varieties, 576 pounds in 1905 with twenty-three varieties, 915 pounds in 1906 with twenty-six varieties, 758 pounds in 1907 with twenty-seven varities, and 659 pounds in 1908 with thirty-one varieties. The average of these differences is more than the average annual yield per acre of seed cotton in North Carolina. To grow cotton cheaply per pound, more must be produced per acre than is at present done on an average. To do this, better varieties must be planted, more thorough preparation and cultivation be given to the land, and more intelligent fertilization, either directly or indirectly, must be practiced. It costs no more to cultivate a prolific variety of cotton than one that has few bolls to the stalk or has a larger number of stalks missing in the row, due to imperfect germination of the seed, or some other avoidable or unavoidable cause.

WHAT A VARIETY SHOULD BE.

A variety of cotton should be a group of plants having some special excellencies, such as total yield of lint per acre, resistance to disease and insect pests, etc., and the seed of which should be able to transmit to their progeny, with certainty and without diminution, the excellent qualities of the parent plants. If the designated group of plants does not have these qualities, then it is not worthy to be styled a variety. Neither should the same variety have two names.

EARLY-MATURING VARIETIES.

The earliest varieties, judged from the percentage of total cotton open at first picking in the past three or four years' tests at the test farms of the Department, are Dozier's Improved, King's Improved, Hodge, Shine's Extra Early Prolific, and Webb. The first two named are probably the earliest-maturing varieties we have thus far tested. They are especially adapted for growth in regions where cotton is liable to be cut off by frost, mattering not whether the prolonged growth be due to climate or soil.

MEDIUM-MATURING VARIETIES.

Culpepper's Improved, Cook's Improved, Excelsior Prolific, Peterkin's Improved, and Edgeworth are varieties that matured during the past year at a medium date.

LATE-MATURING VARIETIES.

Russell's Big Boll, Black Texas Wood, and Moss' Improved were the latest varieties tested. Some of these are good yielding varieties when grown where the season is long enough for complete development of their bolls before frost.

VARIETIES WITH HIGH PERCENTAGE OF LINT.

Of the varieties tested, Moss' Improved, King's Improved, Brown Texas Wood, Peterkin's Improved, Cook's Improved, Tool's Early Prolific, Hodge, Excelsior Prolific, Brown's No. 1, Edgeworth, and Mortgage

Lifter are the ones that have yielded the highest percentage of lint to seed. With these varieties in 1904 the percentage of lint to seed varied from 35.42 per cent with Excelsior Prolific at the Edgecombe farm to 43.03 per cent with Moss' Improved at Iredell. The percentage yield of lint alone of a variety is frequently an unsafe guide in selecting a variety that will produce a large amount of lint cotton per acre.

VARIETIES WITH LARGE BOLLS.

Russell's Big Boll, Culpepper's Improved, Edgeworth, Double-header, and Brown's No. 1 are the five varieties thus far tested that possess the largest-sized bolls as well as seed. As an average of four years' tests at the Edgecombe farm and three years' at the Iredell farm, it has required the following number of bolls to yield a pound of seed cotton; Russell's Big Boll, at Edgecombe, 53; and at Iredell, 72. Culpepper's Improved, at Edgecombe, 60, and at Iredell, 74. Edgeworth, at Edgecombe, 66, and at Iredell, 79. These are late varieties and heavy producers of both lint and seed when planted upon soils that will mature them before frost.

VARIETIES ADAPTED TO THE EASTERN AND SOUTHEASTERN SECTIONS OF THE STATE.

After a study of our results with varieties obtained at the Edgecombe and Red Springs farms during the past six or seven years, it is found that of the varieties of cotton thus far tested, Excelsior Prolific, Edgeworth, Culpepper's Improved, King's Improved, Russell's Big Boll, and Peterkin's Improved have yielded the largest amounts of seed cotton per acre on an average. In the eastern part of the State, on the stiffer clayey soils, bottom lands, poorly drained lands and lands near the northern border of the State, it will generally be found advisable to use the best of the earlier maturing varieties, such as King's Improved, Edgeworth, and Excelsior Prolific; while on the more open, sandy and loamy soils of the east and southeast the larger-bolled and more vigorously growing varieties, such as Culpepper's Improved and Russell's Big Boll, will generally yield most satisfactory returns.

VARIETIES ADAPTED TO PIEDMONT SECTION OF THE STATE.

With reference to varieties of cotton suited to this portion of the State, we cannot assert with the same degree of certainty as we can for the eastern part of the State, as our experiments have only been conducted in Iredell for five years, and with some of the varieties for only the past season. So, with reference to this portion of the State, on a red-clay soil, we would recommend, tentatively, guided by our results, the use of either King's Improved, Culpepper's Improved, Edgeworth, or Excelsior Prolific as the best suited. King's Improved has, in our experiments at the Iredell farm, proved to be the earliest and decidedly the most prolific variety thus far tested there, where the growing season for cotton is comparatively short. There are other promising varieties being tested, but data for a sufficient number of years are not yet in hand to justify anything like definite statements in reference to them and their adaptability to different localities.

CORRELATION OF CHARACTERS OF VARIETIES OF COTTON.

With cotton, as with corn, it is of the highest importance for farmers, and imperative for all those who are studying or trying to improve varieties, to know what characters are usually antagonistic and what ones are mutually helpful in their economic development. In Table XII are compiled, in concise form, the results of five years' tests at Edgecombe and six at Iredell. From this compilation, supplemented by observation in the field and at the gin, the following tentative inferences are made in reference to the varieties of upland cotton tested, when grown under the conditions of climate and soil as represented by these farms:

Antagonistic Characters.—(1) Earliness in maturity is not usually conducive to large yields, although in areas where a short growing period is afforded the earlier maturing varieties often give the greater yields (but these are not large generally), as is shown by King's Improved, which, during the past five years, has proven the most prolific of seed cotton at the Iredell farm, where the growing period for cotton during an average season is comparatively short. (2) Varieties that have large seed generally yield a small percentage of lint to seed. (3) Late-maturing varieties do not generally produce seed cotton that yields a high percentage of lint, although the number of pounds of lint per acre may be large. (4) Small-bolled varieties are not generally easily picked, and hence are unpopular with pickers.

Associated Characters.—(1) Varieties that mature early tend to the production of seed cotton that contains a high percentage of lint to seed. (2) Varieties with short staple usually have a high percentage of lint, and *vice versa.* (3) Varieties with large bolls generally have large seed and small percentage of lint. (4) The larger the yield of seed cotton per acre, through proper fertilization or favorable seasonal conditions, the lower the percentage of lint to seed, even of the same variety. (5) Good root and leaf development of a variety tends to increase power of resistance to drought, insect and disease ravages.

PROPER PLACE TO SELECT SEED.

With cotton, as with any other staple crop, the place to select seed for the next year's planting is in the field—selecting with reference to total yield of seed cotton, percentage of lint, date of maturity, vigor, hardiness, form and size of bolls, leaves, stalks, limbs, and resistance to disease and insect ravages. By selecting from stalks that bear a large number of bolls per stalk, the tendency will be in the progeny to give an increased yield over the average of the patch, which is the seed obtained when one waits to secure his seed at random from the gin. Another objection to securing seed from the gin in the usual way is that it is usually deferred until late in the fall, and thereby, generally, seed from the last picking are obtained, which are not the best seed. The best seed, as a rule, are from the middle picking.

In selecting a variety one must not be guided entirely by total yield of seed cotton, for often between two varieties producing about the same quantity per acre the one with the smaller yield should be chosen because

of its production of a larger amount of lint and higher selling price of total products (lint and seed). It should be remembered that lint sells for from eight to fifteen times as much per pound as seed.

Other things being equal, preference should be given to the larger-bolled varieties, with a larger number of locks per boll, as they are much easier picked, and hence are most popular with pickers.

A few hours spent in the fall in selecting and gathering separately the seed cotton from stalks that have a large number of bolls well distributed over the stalks and with other desirable characteristics, will pay as well or better than any other form of farm work. The seed cotton thus gathered should be ginned separately and the seed carefully saved in some secure place for the next year's planting. Every one who has been through a cotton field in the fall has surely noticed the great difference in the same field, in the form, shape and number of bolls on different stalks, as well as in the characteristics of the stalks themselves. Now, remembering that the law of heredity is as strong and constant in plants as in animals will help to emphasize the great importance of selecting seed of the short-staple cotton only from those stalks that bear the largest amount of lint cotton per stalk. Of course, this latter statement does not apply to long-staple cottons in comparison with the short-staple ones, for a long-staple cotton may produce less lint per acre than a short-staple one, yet this smaller number of pounds may sell for more on the market, on account of its higher selling price per pound.

BUYING COTTON SEED.

Seed of cotton, as well as all other crops, should be purchased only from the most reliable sources, for frequently seeds advertised in extravagant superlatives are inferior. It is not always the cheapest seed that are secured for the smallest outlay; nor, on the other hand, are all expensive seed of superior quality; so the only safe plan to follow is to buy from the most reliable parties. It might be said, however, that if seed are properly selected they will have to bring a good price to compensate the seedsman or grower for his extra care and expense. The seed should possess strong vitality, for seed of low vitality produce a poor stand of stunted plants that do not produce as large yields as good seed when grown under identical conditions of soil, fertilization and cultivation. It will be remembered, however, that stunted cotton will give larger proportional yields than will corn. It is common to see cotton only a few inches high bearing one, two or more small bolls per stalk, while corn that only reaches three or four or five feet high will frequently produce not much more than a spindling stalk, small shuck and cob.

SOURCES OF VARIETIES OF COTTON TESTED.

The seed used in the variety tests of cotton at the Edgecombe and Iredell farms this year were received from the following sources:

Alexander Moneymaker.....Alexander Seed Co., Augusta, Ga.
Bigham's Improved.....J. N. Bigham, Charlotte, N. C.
Braswell's Cluster.....J. R. Pitt, Rocky Mount, N. C.
Brown's No. 1.....M. L. Brown, Decatur, Ga.
Carolina.....Excelsior Seed Farm, Cheraw, S. C.

Columbia Long Staple (S. C.)...Bureau of Plant Industry, Washington, D. C.
Cook's Improved.....J. R. Cook, Schley, Ga.
Culpepper's Reimproved.....J. E. Culpepper, Luthersville, Ga.
Cleveland's Big Boll.....J. R. Cleveland, Decatur, Miss.
Culpepper's Improved.....W. Killebrew, Rocky Mount, N. C.
Dozier's Reimproved.....M. D. Dozier, Camden, N. C.
Edgeworth.....J. C. Little, Louisville, Ga.
Excelsior Prolific.....Excelsior Seed Farm, Cheraw, S. C.
Hodge.....C. N. Allen, Auburn, N. C.
King's Improved.....Iredell Test Farm, Statesville, N. C.
King's Improved (native).....J. W. Sherrill, Statesville, N. C.
Morgan's Ten Lock.....J. W. Morgan, Glendale, S. C.
Morgan's Climax.....J. W. Morgan, Glendale, S. C.
Mortgage Lifter.....H. G. Hastings & Co., Atlanta, Ga.
Moss' Improved.....B. D. Moss, Norway, S. C.
Peterkin's Improved.....J. N. Peterkin, Fort Motte, S. C.
Russell's Big Boll.....Edgecombe Test Farm, Rocky Mount, N. C.
Russell's Big Boll Prolific.....J. L. Thornton, Alexander City, Ala.
Sugar Loaf.....I. W. Mitchell, Youngsville, N. C.
Shine's Extra Early Prolific.....J. A. Shine, Faison, N. C.
Shine's Cluster.....J. A. Shine, Faison, N. C.
Simpkins' Prolific.....W. A. Simpkins, Raleigh, N. C.
Triumph (Georgia).....Bureau of Plant Industry, Washington, D. C.
Thigpen's Prolific.....R. L. Thigpen, Mildred, N. C.
Webb.....C. L. Killebrew, Rocky Mount, N. C.
Williams'.....C. S. Williams, Franklinton, N. C.

RESULTS OF DISTANCE TESTS OF COTTON.

These results are found in Tables XIII and XIV, which follow:

TABLE XIII—RESULTS OF DISTANCE TESTS OF COTTON.

IREDELL FARM—1908.

Rank According to Value of Total Products (Lint and Seed).	Distance Between Rows.	Distance Between Stalks in Rows.	Number Stalks per Plat.		Average Height of Stalks in Inches at Maturity.	Yield Seed Cotton in Pounds per Plat at the Several Pickings.				Yield Seed Cotton per Acre.	Pounds of Lint per Acre.	Pounds of Seed per Acre.	Value of Lint per Acre at 11 Cents per Pound.	Value of Seed per Acre at $1.00 per Hundred Pounds or 30 Cents per Bushel.	Total Value of Lint and Seed per Acre.
			For Perfect Stand.	By Actual Count.		First Picking—October 2.	Second Picking—November 3.	Third Picking—December 3.	Total Pickings.						
7	3½ feet	12 inches	651	645	30.0	32.00	30.25	5.00	67.25	1345.00	480.00	865.00	$52.80	$ 8.65	$61.45
1	3½ feet	16 inches	490	504	33.0	35.00	35.00	7.00	77.00	1540.00	549.78	970.22	60.48	9.70	70.18
3	3½ feet	20 inches	408	411	36.0	32.00	35.00	8.50	75.50	1510.00	539.07	970.93	59.30	9.70	69.00
2	3½ feet	24 inches	325	393	36.0	29.50	36.00	10.25	75.75	1515.00	540.86	974.14	59.49	9.74	69.23
4	4 feet	12 inches	651	675	40.0	34.00	46.00	10.25	90.25	1498.15	534.84	963.31	58.83	9.63	68.46
6	4 feet	16 inches	490	513	40.0	34.75	39.00	15.00	88.75	1472.75	525.77	946.98	57.83	9.46	67.29
5	4 feet	20 inches	408	465	44.0	35.50	41.50	12.50	89.50	1485.70	530.40	955.30	58.34	9.55	67.89
8	4 feet	24 inches	325	384	44.0	27.50	38.75	9.00	75.25	1249.15	445.95	803.20	49.05	8.03	57.08

TABLE XIV—COMPILED RESULTS OF DISTANCE TESTS OF COTTON.

EDGECOMBE FARM.

Year.	Yield Seed Cotton in Pounds per Acre at Different Distancing.								
	3½ Feet by 12 Inches.	3½ Feet by 16 Inches.	3½ Feet by 20 Inches.	3½ Feet by 24 Inches.	4 Feet by 12 Inches.	4 Feet by 15 Inches.	4 Feet by 16 Inches.	4 Feet by 20 Inches.	4 Feet by 24 Inches.
1901	1286.0	1384.0	1410.0	1063.0	964.0	.....	.....	893.0	.....
1903	1507.1	1507.1	1342.9	1342.9	1506.3	.....	1331.1	1306.3	1312.5
1904	1541.2	1751.9	1632.4	1746.0	1723.3	.....	1828.9	1646.6	1861.1
Averages	1444.7	1547.6	1461.7	1383.9	1397.8	.....	.....	1281.9	.....

Year.	3½ Feet by 12 Inches.	3½ Feet by 16 Inches.	3½ Feet by 20 Inches.	3½ Feet by 24 Inches.	4 Feet by 12 Inches.	4 Feet by 15 Inches.	4 Feet by 16 Inches.	4 Feet by 20 Inches.	4 Feet by 24 Inches.
1905	1593.8	1457.7	1214.2	1683.4	1896.7	.....	2019.1	1577.1	1493.4

IREDELL FARM.

1903	743.2	743.2	630.6	750.8	612.5	700.0	675.0	862.5	791.7
1904	845.0	795.0	810.0	835.0	845.8	.....	812.5	779.2	762.5
1905	975.0	1100.00	1035.0	1110.0	1340.0	.....	1280.0	1170.0	1325.0
1906	1190.0	1785.0	1585.0	1280.0	1215.3	.....	937.5	720.5	612.0
1907	880.0	980.0	875.0	1030.0	1093.1	.....	853.9	635.3	759.0
1908	1345.0	1540.0	1510.0	1515.0	1498.2	.....	1472.8	1485.7	1249.2
Averages	996.3	1157.2	1077.9	1086.8	1100.8	.....	1005.2	942.2	916.5

COMMENTS ON DISTANCE TESTS OF COTTON.

The average results of the distance tests conducted at the Edgecombe farm during the past four years indicate that the best distancing of cotton for the Edgecombe section is about 3½ feet by 16 inches. As the average of six years' tests at the Iredell farm, the best distancing was 3½ feet by 16 inches.

The general deductions above should be accepted tentatively, as here, as with other tests, it will require a number of repetitions to arrive at a fair idea of the best width of rows and distance in rows for planting cotton on the types of soils on which these tests were made.

The plats at the two farms were arranged in lateral series, with each test occupying from three to five rows.

As the results of this test are likely to vary somewhat with different varieties, Russell's Big Boll seed were used at Edgecombe and King's Improved[1] at Iredell.

In Table XIV is presented a summary of four years' tests at Edgecombe and six at Iredell.

III. FERTILIZATION AND CULTIVATION OF CORN AND COTTON.

CORN.

Culture.—It unquestionably pays well to thoroughly break and broadcast-harrow land for corn. Using a two-horse plow and running it 8 to 10 inches deep, and afterwards harrowing with large smoothing harrow, puts the land in nice condition. It is also well to run a small-tooth harrow or weeder across corn rows about the time the plants are coming up, and even after they are several inches high, slanting the teeth of the harrow backward. Harrowing in this way saves after-cultivation, and is a quick and comparatively inexpensive way of getting over the land. The land being thoroughly broken before the corn is put in the ground, only shallow, level cultivation with some one of the considerable number of good cultivators need be given the crop during the growing season. The one-horse cultivators cover corn rows in two or three furrows, and the two-horse ones at a single trip. The cultivation should be frequent—about every ten to twelve days—and, if possible, just after rains, so as to break any crust formed by showers, leaving a dust mulch to retard the loss of moisture added to the soil by previous rains. Toward the end of the growing season the cultivators should only be run one to one and a half inches deep, so as to disturb as little as possible the roots of the plants, which, by that time, are well into the middle of the rows.

Fertilizers for Corn.—The experimental work on the sandy soils of the east, reports of which have been made previously, has progressed far enough, we feel, to draw some conclusions in reference to the best amounts and proportions of nitrogen, phosphoric acid and potash for corn. As the results of the past five years' work have not yet been published, the following formulas, based on the results of the first two years' tests, and tests in other States with similar soil and climatic conditions, are given as good ones for corn:

For Corn on Land in Fair Condition.

No. 1—	
Acid phosphate, 14 per cent phosphoric acid	900 pounds
Cotton-seed meal, 6.59[2] per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	960 pounds
Kainit, 12.5 per cent potash	140 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.5 per cent; potash, 1.6 per cent; nitrogen, 3.2 per cent (equal to ammonia, 3.9 per cent).

[1]Culpepper's Improved was used in the test of 1903.

[2]6.59 per cent nitrogen equals 8 per cent ammonia.

No. 2—

Acid phosphate, 14 per cent phosphoric acid	1,045 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	520 pounds
Nitrate of soda, 15 per cent nitrogen	225 pounds
Kainit, 12.5 per cent potash	210 pounds
	2,000 pounds

In this formula one-half of the nitrogen is supplied by nitrate of soda and the other one-half by cotton-seed meal. This mixture will contain: available phosphoric acid, 8.0 per cent; potash, 1.7 per cent; nitrogen, 3.4 per cent (equal to ammonia, 4.0 per cent).

No. 3—

Acid phosphate, 14 per cent phosphoric acid	965 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	750 pounds
Nitrate of soda, 15 per cent nitrogen	110 pounds
Kainit, 12.5 per cent potash	175 pounds
	2,000 pounds

In this formula one-fourth of the nitrogen is supplied by nitrate of soda and the other three-fourths by cotton-seed meal. This mixture will contain: available phosphoric acid, 7.7 per cent; potash, 1.7 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.0 per cent).

No. 4—

Acid phosphate, 16 per cent phosphoric acid	835 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	1,010 pounds
Kainit, 12.5 per cent potash	155 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.9 per cent; potash, 1.7 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.0 per cent).

No. 5—

Acid phosphate, 14 per cent phosphoric acid	860 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	850 pounds
Kainit, 12.5 per cent potash	290 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.6 per cent; potash, 1.8 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.3 per cent).

No. 6—

Acid phosphate, 16 per cent phosphoric acid	800 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	900 pounds
Kainit, 12.5 per cent potash	300 pounds
	2,000 pounds

This mixture is more concentrated than preceding ones, on account of the use of higher-grade materials, and will contain: available phosphoric acid, 9.1 per cent; potash, 1.9 per cent; nitrogen, 3.7 per cent (equal to ammonia, 4.5 per cent).

No. 7—

Acid phosphate, 14 per cent phosphoric acid	960 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	960 pounds
Muriate of potash, 50 per cent potash	80 pounds
	2,000 pounds

This mixture, too, is more concentrated than the preceding ones, on account of the use of a high-grade potassic material, muriate of potash, and will contain: available phosphoric acid, 9.6 per cent; potash, 2.0 per cent; nitrogen, 4.0 per cent (equal to ammonia, 4.8 per cent).

No. 8—

Acid phosphate, 14 per cent phosphoric acid	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	1,015 pounds
Muriate of potash, 50 per cent potash	35 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.9 per cent; potash, 1.6 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.0 per cent).

No. 9—

Acid phosphate, 16 per cent phosphoric acid	900 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	1,060 pounds
Muriate of potash, 50 per cent potash	40 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.5 per cent; potash, 1.8 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.3 per cent).

No. 10—

Acid phosphate, 14 per cent phosphoric acid	1,365 pounds
Dried blood, 13 per cent nitrogen	555 pounds
Muriate of potash, 50 per cent potash	80 pounds
	2,000 pounds

This mixture is a concentrated one, on account of high-grade nitrogenous and potassic materials being used, and will contain: available phosphoric acid, 9.6 per cent; potash, 2.0 per cent; nitrogen, 3.6 per cent (equal to ammonia, 4.4 per cent).

No. 11—

Acid phosphate, 16 per cent phosphoric acid	1,310 pounds
Dried blood, 13 per cent nitrogen	600 pounds
Muriate of potash, 50 per cent potash	90 pounds
	2,000 pounds

This mixture is quite concentrated, on account of the high-grade phosphatic and potassic materials used, and will contain: available phosphoric acid, 10.5 per cent; potash, 2.3 per cent; nitrogen, 3.9 per cent (equal to ammonia, 4.7 per cent).

No. 12—

Bone meal, 22.5 per cent phosphoric acid and 3.7 per cent nitrogen	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	975 pounds
Muriate of potash, 50 per cent potash	75 pounds
	2,000 pounds

This mixture is a concentrated one, on account of the high-grade phosphatic and potassic materials used, and will contain: available phosphoric acid, 11.9 per cent; potash, 2.6 per cent; nitrogen, 5.0 per cent (equal to ammonia, 6.0 per cent).

No. 13—

Acid phosphate, 14 per cent phosphoric acid	585 pounds
Cotton seed, 3.1 per cent nitrogen, 1.3 per cent phosphoric acid and 1.2 per cent potash	1,375 pounds
Kainit, 12.5 per cent potash	40 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 5.0 per cent; potash, 1.1 per cent; nitrogen, 2.1 per cent (equal to ammonia, 2.6 per cent).

Cotton Seed.—Cotton seed may replace the meal in preceding formulas containing meal by allowing 2 pounds of seed for one of meal.

Nitrate of Soda.—This material is quick-acting, because of its easy solubility in water. For this reason, when used in a considerable quantity in fertilizers at time of planting, especially on light sandy land, there is considerable danger of its being leached beyond the reach of the roots of the plants before they can use it. On clay lands and loams having good subsoils to them this danger does not exist, certainly not to the extent that it does on light soils. A small amount of nitrate of soda in the mixture will give the crop a quick start and make its cultivation easier and more economical. Formula No. 3 has been arranged with this idea in view, and in No. 2 one-half the nitrogen comes from nitrate of soda. On light lands it would likely be better to omit the nitrate from the mixture and apply it as a top dressing, between the 10th and last of June, on early corn. Nitrate of soda may take the place of a portion of the other nitrogen-furnishing materials in any of the formulas, one pound of nitrate being equal in its content of nitrogen to 2.2 pounds of cotton-seed meal, 2 pounds of fish scrap, 1.2 pounds of dried blood. Nitrate of soda is frequently used as a top dressing for corn, and is a very valuable material for use in this way. A good application is 50 to 75 pounds per acre, distributed along the side of the row or dropped beside the plants and three or four inches from them, or else, where there is a ridge in the center, it may be distributed on this, and when it is thrown out the nitrate will be thrown to the two sides of the row.

Application of Fertilizers to Corn.—On clay lands and loams having good subsoil the fertilizer should be applied in the drill, at or just before planting, at the rate of 200 to 400 pounds per acre. On light sandy

loams it is best to use 50 to 100 pounds in the drill at time of planting, to give the crop a good start, and the balance of the fertilizer as a side dressing when the corn has begun to grow well.

Fertilizers for Corn Following Peas and Other Legumes.

The best and most profitable yields of corn in our experimental work were where the corn followed velvet beans, bur clover, cowpeas, crimson clover and other leguminous crops. These crops, with acid phosphate and kainit, or some other potash salt, are the best previous treatment and fertilization for corn. Where light crops of peas have been grown in corn, or cut from the land and the stubble left, it would be safest to add some nitrogenous material in the fertilizer mixture. In cases of this kind it is suggested that the nitrogen-furnishing material in any of the preceding formulas be reduced one-half. Where corn is to follow good crops of velvet beans, peas, bur and crimson clover or soja beans, especially where the entire crops have been left on the soil, no further application of nitrogen need be made, but it is advised that 200 to 300 pounds per acre of the following mixture, in the drill, be used just before planting:

Acid phosphate	200 pounds
Kainit	100 pounds

COTTON.

Culture.—The remarks regarding the preparation and cultivation of corn also apply with equal force to cotton, unless it be the part regarding breaking the land well before planting. Some doubt the necessity of this for cotton. Cotton is generally grown on ridges. This is necessary on wet soils, but on all fairly well-drained upland and sandy soils we are convinced that level and frequent shallow cultivation, as was indicated for corn, is the best and most economical method to follow in growing cotton. Ridge culture may give better results in very wet years, but, taking the seasons as they come, the advantage will lie, we think, with flat culture.

Fertilizers for Cotton.—The preliminary remarks regarding fertilizers for corn also apply to cotton, the following formulas being offered tentatively and as the result of our best judgment, after studying the best obtainable data on this subject:

For Cotton on Land in Fair Condition.

No. 1—

Acid phosphate, 14 per cent phosphoric acid	895 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	790 pounds
Kainit, 12.5 per cent potash	315 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.2 per cent; potash, 2.6 per cent; nitrogen, 2.6 per cent (equal to ammonia, 3.2 per cent).

No. 2—

Acid phosphate, 14 per cent phosphoric acid	1,015 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	415 pounds
Nitrate of soda, 15 per cent nitrogen	180 pounds
Kainit, 12.5 per cent potash	390 pounds
	2,000 pounds

In this formula one-half of the nitrogen is supplied by nitrate of soda and the other one-half by cotton-seed meal. This mixture will contain: available phosphoric acid, 7.6 per cent; potash, 2.7 per cent; nitrogen, 2.7 per cent (equal to ammonia, 3.3 per cent).

No. 3—

Acid phosphate, 14 per cent phosphoric acid	955 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	605 pounds
Nitrate of soda, 15 per cent nitrogen	90 pounds
Kainit, 12.5 per cent potash	350 pounds
	2,000 pounds

In this formula one-fourth of the nitrogen is supplied by nitrate of soda and the other three-fourths by cotton-seed meal. This mixture will contain: available phosphoric acid, 7.4 per cent; potash, 2.6 per cent; nitrogen, 2.6 per cent (equal to ammonia, 3.1 per cent).

No. 4—

Acid phosphate, 16 per cent phosphoric acid	830 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	830 pounds
Kainit, 12.5 per cent potash	340 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.7 per cent; potash, 2.7 per cent; nitrogen, 2.7 per cent (equal to ammonia, 3.3 per cent).

No. 5—

Acid phosphate, 14 per cent phosphoric acid	850 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	690 pounds
Kainit, 12.5 per cent potash	460 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.0 per cent; potash, 2.9 per cent; nitrogen, 2.9 per cent (equal to ammonia, 3.5 per cent).

No. 6—

Acid phosphate, 16 per cent phosphoric acid	790 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	730 pounds
Kainit, 12.5 per cent potash	480 pounds
	2,000 pounds

This mixture is more concentrated than the foregoing ones, on account of the higher-grade materials used, and will contain: available phosphoric acid, 8.5 per cent; potash, 3.0 per cent; nitrogen, 3.0 per cent (equal to ammonia, 3.6 per cent).

No. 7—

Acid phosphate, 14 per cent phosphoric acid	1,020 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	890 pounds
Muriate of potash, 50 per cent potash	90 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.3 per cent; potash, 2.9 per cent; nitrogen, 2.9 per cent (equal to ammonia, 3.5 per cent).

No. 8—

Acid phosphate, 16 per cent phosphoric acid	965 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid and 1.5 per cent potash	940 pounds
Muriate of potash, 50 per cent potash	95 pounds
	2,000 pounds

This mixture is a concentrated one, on account of the high-grade phosphatic and potassic materials used, and will contain: available phosphoric acid, 8.9 per cent; potash, 3.1 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.8 per cent).

No. 9—

Acid phosphate, 14 per cent phosphoric acid	1,045 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	820 pounds
Muriate of potash, 50 per cent potash	135 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.8 per cent; potash, 3.4 per cent; nitrogen, 3.4 per cent (equal to ammonia, 4.1 per cent).

No. 10—

Acid phosphate, 16 per cent phosphoric acid	975 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	880 pounds
Muriate of potash, 50 per cent potash	145 pounds
	2,000 pounds

This mixture is considerably more concentrated than the others, on account of the high-grade materials used, and will contain: available phosphoric acid, 10.4 per cent; potash, 3.6 per cent; nitrogen, 3.6 per cent (equal to ammonia, 4.4 per cent).

No. 11—

Acid phosphate, 14 per cent phosphoric acid	1,355 pounds
Dried blood, 13 per cent nitrogen	510 pounds
Muriate of potash, 50 per cent potash	135 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.5 per cent; potash, 3.4 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.0 per cent).

No. 12—	
Acid phosphate, 16 per cent phosphoric acid	1,295 pounds
Dried blood, 13 per cent nitrogen	560 pounds
Muriate of potash, 50 per cent potash	145 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 10.4 per cent; potash, 3.6 per cent; nitrogen, 3.6 per cent (equal to ammonia, 4.4 per cent).

No. 13—	
Acid phosphate, 14 per cent phosphoric acid	630 pounds
Cotton seed, 3.1 per cent nitrogen, 1.3 per cent phosphoric acid and 1.2 per cent potash	1,190 pounds
Kainit, 12.5 per cent potash	180 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 5.2 per cent; potash, 1.8 per cent; nitrogen, 1.8 per cent (equal to ammonia, 2.2 per cent).

Cotton Seed and Nitrate of Soda.—The remarks under "Corn" regarding these two fertilizing materials apply also to cotton, as do the suggestions concerning the change in the quantity of nitrogen-supplying materials in the formulas, should cotton follow peas or any other leguminous crop. In Formula No. 3 one-fourth of the nitrogen is supplied by nitrate of soda, with the view of giving the crop a quick start, and in No. 2 one-half of the nitrogen comes from this source. On light lands it will be good practice to omit this nitrate from the mixture and apply it as a side dressing about the middle of June. Good results come from the use of it in this way on heavy types of land. Where land does not produce a good stalk of cotton, and fertilizers are used which contain only a moderate amount of nitrogen or ammonia, good results are obtained from a side dressing of 50 to 100 pounds of nitrate of soda per acre. The nitrate should be distributed along one side of the row, or, where there is a ridge in the middle, it may be put on this, and when the ridge is thrown out the nitrate will be thrown on two sides of the row.

Application of Fertilizer to Cotton.—The fertilizer should be applied in the drill at or just before planting. The quantity used for cotton varies from 200 to 1,000 pounds per acre; 400 to 600 pounds are the more common quantities used of the grade of Formula No. 1. Some of the mixtures in this BULLETIN are much more concentrated than No. 1, and when they are used the quantity may be reduced proportionately.

IV. COMPOSTS AND COMPOSTING.

Compost for General Use.—Frequent requests are made for compost formulas, and the following one, with barnyard manure, rich dirt, or woods mould, or all, and acid phosphate and kainit, is well suited for general use:

Barnyard manure, rich dirt or woods mould	1,750 pounds
Acid phosphate	200 pounds
Kainit	50 pounds
	2,000 pounds

With average barnyard manure the above compost would contain: phosphoric acid, 1.7 per cent; potash, .7 per cent, and ammonia, .6 per cent. One ton of this compost is worth between 500 and 600 pounds of the average fertilizer containing 8 per cent of available phosphoric acid, 2 per cent of potash and 2 per cent of ammonia. It should be applied at the rate of 600 to 1,600 pounds per acre in the drill, 1,400 pounds of the compost being about equal to an application of 400 pounds of the 8-2-2 fertilizer.

The compost may be made under shelter or out of doors. In either case select a place where the soil is compact, and arrange it so that the water that may run through the heap will not drain from it. Put down the materials in alternate layers—first, a layer 3 to 6 inches thick, according to the size of the compost to be made, of the manure, woods mould or rich dirt, then sprinkle upon this layers of acid phosphate and kainit, and continue in this way to put down alternate layers of the materials till the compost is complete. If dry, the manure, mould, etc., should be moistened by sprinkling with water, and the heap should be brought to a conical or wedge shape, covered with dirt, preferably rich dirt, and thoroughly compacted to prevent undue entrance of air, which brings about heating and injurious fermentation of the heap. The compost must be watched, and if it becomes hot a hole should be made in the side and towards the top and water poured in to cool it. Heating is likely to occur if made under shelter, while if made out of doors in the winter and early spring the rains are apt to be sufficient to keep it moist, but here there is danger of loss, especially of the very soluble potash and phosphoric acid, from leaching, and the heaps made out of doors need careful watching to see that they do not get too hot just after making and between rains, and more especially to see that they are thoroughly covered with dirt and compacted, so as to make the water run mostly off the sides instead of through the heap and draining off with the most valuable part of the manure. The heap should remain 40 to 60 days, and may stay longer. Before using, it should be thoroughly cut up and mixed by means of hoes and shovels. If the manure, woods mould and dirt are reasonably free from litter and trash, the mixture may be put through a sand screen and be in condition to drill as other fertilizers are. This will require care in selecting the manure, mould and dirt.

Unquestionably, there is great advantage, if it is not, indeed, an absolute necessity, to save scrupulously all the manure and other waste material on and around the farm to assist in maintaining or increasing its productiveness. One way to do this is to use the compost in some way similar to that suggested in the foregoing. Another and perhaps somewhat cheaper way, unless the compost is made at a time when the farm labor is not profitably occupied with other work, is to apply the manure and woods mould, etc., broadcast where there are large quantities of them, or in the drill when the amounts are limited and less than 1,500 to 2,000 pounds to the acre, and drill the acid phosphate and kainit or other materials on them. This saves the cost of mixing. Each plan has its advantages, and each farmer can decide for himself which best suits his individual case and which will enable him to save to best advantage these exceedingly important and valuable fertilizer

materials on and about the farm, and which go to waste, or partial waste, in far too many instances.

Compost with Cotton Seed.—Frequently cotton seed are used as a fertilizer. One difficulty in the way of their use is the killing of the germs of the seed so as to prevent them from sprouting and growing. A common custom is to pile the seed in the field early in the spring and allow them to become wet and afterwards heat. They are then put in the drill as other fertilizers, or sometimes broadcast. They are also killed by composting, and the following compost with cotton seed is a well-balanced and rich one for general farm crops:

Acid phosphate	300 pounds
Cotton seed, 13½ bushels	400 pounds
Kainit	75 pounds
Barnyard manure, etc	1,225 pounds
	2,000 pounds

This compost will contain: phosphoric acid, 2.6 per cent; potash, .9 per cent; ammonia, 1.1 per cent. One ton of it is worth between 800 and 900 pounds of the average fertilizer containing 8 per cent available phosphoric acid, 2 per cent ammonia and 2 per cent potash, and a good application for cotton would be 600 to 1,200 pounds in the drill, and for corn 400 to 800 pounds in the drill.

Compost with Cotton-seed Meal.—Cotton-seed meal may replace the seed in the preceding compost. In fact, it is much better to use some of the insoluble forms of nitrogen or ammonia in composts rather than nitrate of soda or sulphate of ammonia, which are already in easily soluble condition and ready to feed plants. Besides, there is not the same danger of loss when materials like cotton seed, cotton-seed meal, etc., are used as when nitrate of soda and sulphate of ammonia are employed. The following compost with cotton-seed meal is some richer than the one with seed given above:

Acid phosphate	325 pounds
Cotton-seed meal	200 pounds
Kainit	100 pounds
Barnyard manure, etc	1,375 pounds
	2,000 pounds

This mixture will contain: phosphoric acid, 2.8 per cent; potash, 1.0 per cent; ammonia, 1.2 per cent. One ton of this is equal in fertilizing value to about one-half ton of a mixed fertilizer containing 8 per cent available phosphoric acid, 2 per cent ammonia and 2 per cent potash. A good application of it for cotton would be 400 to 800 pounds in the drill, and for corn 300 to 600 pounds in the drill.

Use Lime in the Compost.—Where lime is used at all in the making of compost, it should not be put in contact with either the barnyard manure or acid phosphate, as it has an injurious action on both of these, endangering the loss of ammonia from the manure by setting it free and enabling it to pass off in the air, and changing the phosphoric acid of the acid phosphate into an insoluble form. Where sour muck or black soil is used, the lime mixed with these would correct their acidity or sourness and prove beneficial.

V. FERTILIZERS FOR TOBACCO.

There are few products whose quality and quantity are more affected by the kind of soil and fertilizer used than is tobacco. For bright tobacco, the main kind grown in this State, the fine and deep, sandy loam with yellow-colored sandy clay subsoil is the type of land most largely used, and the one which grows the best grade of this character of tobacco. Generally, the kind of soil that is suited to the production of tobacco is better understood than the fertilizer that should be used on it. Evidence of this is seen in the great variation in the composition of fertilizers sold in the State, especially for use on the tobacco crop. In 1901 there were registered with the Department of Agriculture one hundred and eight (108) special fertilizers for tobacco. It is interesting in this connection to note the wide variation as well as the average composition of these fertilizers. The highest amount of available phosphoric acid guaranteed in any of them was 9.25 per cent, the lowest 5 per cent, and the average 8.12 per cent. The highest amount of ammonia guaranteed was 10 per cent, the lowest 2 per cent, and the average 2.73 per cent. The highest amount of potash guaranteed was 5 per cent, the lowest 1 per cent, and the average 2.64 per cent. These wide variations in the amounts of the valuable fertilizing constituents indicate that the fertilizers themselves must have had very varying effects on the quality and quantity of the tobacco crop.

A study of the experiments in tobacco growing, and a consideration of the experiences of good tobacco growers, show that the amounts of ammonia and potash in the average tobacco fertilizers, as stated above, are not as large as are needed to give the best results. It would appear that the largest amount of ammonia (10 per cent) in any of these "specials" is greater than is required for bright tobacco, while the maximum quantity of potash (5 per cent) in any of the 108 brands is less than is used by numbers of our best bright tobacco growers, especially in the eastern part of the State. A considerable number of these growers either mix their own tobacco fertilizers or else have them put up according to formulas of their suggestion. Below are given eight formulas for mixing fertilizers for tobacco. The grade of those fertilizers will be higher and they will, of course, cost more than the goods that are generally used in the State on tobacco, but we feel confident that the increased yield will more than justify the additional expense. In THE BULLETIN of the Department of Agriculture, and in our correspondence with farmers, we have been recommending formulas of about the composition of these for a number of years, and evidence is accumulating which shows that the character of tobacco fertilizers is undergoing quite a considerable change.

No. 1—

Acid phosphate, 14 per cent	750 pounds
Cotton-seed meal	900 pounds
Nitrate of soda	100 pounds
Sulphate of potash, high grade	250 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 6.3 per cent; potash, 6.9 per cent; nitrogen, 3.7 per cent (equal to ammonia, 4.5 per cent).

No. 2—

Acid phosphate	1,065 pounds
Dried blood, high grade	500 pounds
Nitrate of soda	125 pounds
Sulphate of potash, high grade	310 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.4 per cent; potash, 7.7 per cent; nitrogen, 4.3 per cent (equal to ammonia, 5.2 per cent).

No. 3—

Acid phosphate	875 pounds
Fish scrap	725 pounds
Nitrate of soda	100 pounds
Sulphate of potash, high grade	300 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.2 per cent; potash, 7.5 per cent; nitrogen, 3.8 per cent (equal to ammonia, 4.6 per cent).

No. 4—

Acid phosphate	1,000 pounds
Dried blood	500 pounds
Nitrate of soda	100 pounds
Sulphate of potash, high grade	400 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7 per cent; potash, 10 per cent; nitrogen, 4.1 per cent (equal to ammonia, 5 per cent).

No. 5—

Acid phosphate	900 pounds
Cotton-seed meal	700 pounds
Nitrate of soda	100 pounds
Sulphate of potash, high grade	300 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.2 per cent; potash, 7.7 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.8 per cent).

No. 6—

Acid phosphate	745 pounds
Cotton-seed meal	1,140 pounds
Sulphate of potash, high grade	115 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 6.6 per cent; potash, 3.7 per cent; nitrogen, 3.8 per cent (equal to ammonia, 4.6 per cent).

No. 7—

Acid phosphate	885 pounds
Dried blood	575 pounds
Nitrate of soda	170 pounds
Sulphate of potash, high grade	370 pounds
	2,000 pounds

In this formula one-fourth of the nitrogen is derived from nitrate of soda and the other three-fourths from dried blood. This mixture will contain: available phosphoric acid, 6.2 per cent; potash, 9.2 per cent; nitrogen, 5.2 per cent (equal to ammonia, 6.2 per cent).

No. 8—

Acid phosphate	874 pounds
Cotton-seed meal	782 pounds
Nitrate of soda	116 pounds
Sulphate of potash, high grade	228 pounds
	2,000 pounds

In this formula one-fourth of the nitrogen is derived from nitrate of soda, and the other three-fourths from cotton-seed meal. This mixture will contain: available phosphoric acid, 4.2 per cent; potash, 6.3 per cent; nitrogen, 4.2 per cent (equal to ammonia, 5.1 per cent).

Five hundred and seventy-five pounds of No. 8 is equivalent to 600 pounds of a mixture analyzing 4 per cent available phosphoric acid, 6 per cent potash and 4 per cent ammonia.

Three hundred and fifty to one thousand pounds of these mixtures should be used to the acre.

The mixtures made from Formulas Nos. 2 and 3 are somewhat more concentrated than that from No. 1, on account of cotton-seed meal containing less ammonia than fish scrap and dried blood. The three formulas are given to enable the use of any one of the three main organic nitrogenous materials—dried blood, fish scrap and cotton-seed meal. In the coastal sections fish scrap and meal are both easily obtained; some distance inland meal is more accessible, while in the more western end of the tobacco belt it will be found convenient to use dried blood. All three are good sources of ammonia for tobacco. The other materials—nitrate of soda, sulphate of potash, and acid phosphate—are the same for all mixtures.

Occasional requests are made for formulas furnishing as much as 10 per cent of potash, and No. 4 has been arranged to meet needs of this nature. It is known that excellent tobacco, in quality and quantity, is grown by the use of fertilizers of this class, and some of our farmers

greatly prefer them to others containing less potash. It takes considerable observation and experimentation to determine the best practice in matters of this kind.

Formula No. 7, in 1905, in some tobacco experiments conducted on the bright-leaf soils of Granville County, gave very promising results. Three hundred and eighty-eight pounds per acre of this mixture were used, which was equal to an application of 600 pounds of a mixture analyzing 4 per cent available phosphoric acid, 6 per cent potash and 4 per cent ammonia.

A limited quantity of stable manure is very beneficial to tobacco, and it succeeds well after peanuts. These materials add ammonia to the soil, and where heavy applications of fertilizers are to be made in connection with manure, and on peanut land, it would be well not to have so much ammonia in the fertilizers as is used in the ones employed on land not having other ammoniated materials put on them. Formula No. 5 is destined to meet cases of this kind. A good many eastern tobacco growers plant tobacco after peanuts, and some of them grow peas between the hills of tobacco, planting them with hoes and putting six to ten peas in a place, the latter part of June or early in July. This improves the soil for after-crops, but tobacco grown after tobacco and peas is said not to be of good quality, though, as would be expected, the growth is very large.

Good results will come from the use of high-grade fertilizers, such as are suggested above, or similar ones, and we believe that when once tried there will be no inclination to go back to the lower-grade ones, now so largely used.

LEAF TOBACCO SALES FOR JANUARY, 1909.

Pounds sold for producers, first hand	9,813,814
Pounds sold for dealers	689,614
Pounds resold for warehouse	495,994
Pounds resold for other warehouses	56,894
	11,056,316

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PEANUT CULTURE.

BY
B. W. KILGORE, STATE CHEMIST,
AND
T. E. BROWNE.

History.—The peanut *(Arachis-Hypogœa)* is a native of Brazil, although authorities have endeavored to trace its origin to the Eastern Hemisphere. It was known to planters of the old country at an early date, having been used as a staple food on board the slave ships in the trade with America. It was introduced into North America soon after colonization, but it was not until about the close of the War Between the States that it began to spread throughout the South, and become of importance as a commercial crop. It was carried to various parts of the country by the soldiers traveling throughout the peanut sections of North Carolina and Virginia. They found how good it was to eat and took some home in their pockets and planted on their own farms. From this the cultivation of peanuts began to spread, until to-day it is grown in nearly all of the Southern States and several of the Western States.

Statistics.—According to the Census of 1900, the total area devoted to the cultivation of peanuts in the United States in 1899 was 516,658 acres, and the total number of bushels produced was 11,964,957, or an average of 23.2 bushels per acre. The total value of the crop was estimated at $7,271,230, an average of 61 cents per bushel, or $14.07 per acre. The total area under this crop in 1889 was 203,946 acres, and the total yield 3,588,143, an average of 17.6 bushels per acre. A comparison of these figures shows an increase in ten years of 312,712 acres or 153 per cent in area, and of 8,376,814 bushels or 233.5 per cent in production. North Carolina and Virginia are the two largest peanut-growing States, these two States in 1899 producing 7,173,786 bushels or 60 per cent of the entire peanut crop of that year. In North Carolina in 1889 there were planted 17,776 acres in peanuts, the production in bushels being 421,138, and in 1899 there were planted 95,856 acres, with a production of 3,460,439 bushels—an average of 36.1 bushels per acre as against 23.2 bushels for the entire United States, the value of the North Carolina crop being estimated at $1,852,110.

In the decade referred to above the largest gain in area and production of any State in the Union was in North Carolina, where the area cultivated increased 439.5 per cent and the production increased 721.7 per cent. The acreage for North Carolina in 1899 was 18.6 per cent of the total acreage and its production 28.9 per cent of the entire United States. There has been a marked increase in acreage and production since the figures referred to above were collected.

Characteristics.—The appearance of the vines of the peanut vary somewhat with the variety, the bunch varieties having an upright vine, whereas the flat have a trailing vine. However, the foliage of all varieties is somewhat similar, resembling to some extent the clovers. There is a main branch or limb from which emanate the other branches, and along these branches are the small leaf stems, on each of which are two pairs of oval-shaped leaves, which have the peculiarity of closing their upper sides together with the approach of night.

At the joints along the main branches appear the small yellow blossoms. The blossoms last only a few hours, and when they fall off, the flower stem curves downward and enters the mellow earth. It is the enlargement of this stem, or the ovary, that makes the fruit. If this stem, or peg (as it is commonly called), fails to enter the soil, on account of a crust or any obstacle, there will be no fruit. Hence the great necessity of keeping the soil in a mellow condition during the fruiting period.

Description of Varieties.—There are several varieties of peanuts known; however, those of most importance to the farmers of North Carolina and Virginia are the Virginia and Running varieties, the North Carolina Bunch and Running (much the same as the Virginia), the Spanish, and the Wilmington or North Carolina. Some of these varieties are more adapted to certain sections than to others. For instance, in Brunswick and New Hanover counties the Wilmington pea is grown to the exclusion of all others. Along the Roanoke River the Spanish is grown more than any other. The latter is the best to grow for hogs and stock, for the reason that it will grow on any soil that the cowpea will, and without the use of lime and land plaster. The large varieties are the best sellers, as the bulk of the American crop is sold by vendors on the streets, and the large peas are prettier and fill up faster than the small.

The Bunch varieties have an upright vine, sometimes growing to a height of twenty and twenty-four inches. A field of these just before frost has very much the appearance of a clover field. The nuts are larger than with the ordinary flat peas and are more uniform in size, making this variety a better seller. The fruit is produced in a cluster around the tap root, whereas with the flat peas the nuts are spread over a much larger area just under the lateral branches. The hull is a hard, woody substance, with a netted surface, containing from one to three kernels.

There is a variety known as the Jumbo Flat, which is rapidly gaining favor on account of its size and large yield. The Wilmington has a trailing vine and a nut much smaller than the common Flat pea. The Spanish has an upright vine and is the smallest nut of any.

Climate and Soil.—It has been ascertained that peanuts will grow in any climate in which Indian corn will. A season of five months free from frost is necessary for the maturing of the crop; however, it has been proven that they do not require a very warm climate. As the American nuts are sold chiefly on the streets, the color of the hulls greatly affects the sale; consequently, a warm, rainy fall is very injurious to the crop, as it turns the hulls dark. The season best suited to producing the most marketable stock is a spring and summer of moderate rainfall, and a very small rainfall during September and October.

Any soil which can be put into a mellow, friable condition to a depth of four or five inches will grow peanuts. However, a gray, sandy loam produces nuts of the best quality, as red or dark lands are apt to discolor the hulls. A soil rich in iron is not good for peanuts for the same reason. The best American trade demands a bright, pretty hull, and the farmers have to cater to that demand. The deeper and more thoroughly pulverized the soil is before planting, the better the results to be obtained. However, a soil very rich in humus and other ammoniated materials is not so well suited, as it has a tendency to produce too many vines and pops.

Seed Selection.—The subject of careful selection of seed for farm crops is fast becoming one of vital importance to the farmers at large. All experiments have proven that plants from carefully selected seed will give a much larger yield than from seed taken indiscriminately from the barn. We have no crop which shows more marked increase from carefully selected and saved seed than the peanut, and yet a large majority of the peanut growers pay no attention whatever to this point.

In order to get the best yield of good merchantable nuts, it is absolutely essential to get a stand from the first planting. Replanted peas never pay, as they do not mature with the first crop—if they produce anything—and, on account of being dug before maturity, are apt to turn brown or mildew, and thereby injure the sale of the good nuts. For this reason every peanut farmer should make a special effort to plant seed of as great vitality as possible. As the large varieties are graded according to size and color, great care should be taken to keep up the size of the nuts when they are grown for market. This can only be done by carefully selecting the seed and breeding for size. In saving peanuts for seed several points should be kept in mind:

First. The experience of the best farmers of North Carolina and Virginia has been that peas dug before they are thoroughly mature have greater germinating power. If the kernel is mature the skin is naturally full and tight. When planted in warm, moist soil the swelling of the kernel is apt to be quite rapid, and in many cases the skin does not

become elastic rapidly enough to prevent its being burst before the germination has advanced sufficiently. On the other hand, where peanuts are dug before they are thoroughly mature the skin on the kernel is slightly wrinkled on account of the shrinking of the kernel. This wrinkled skin provides for the rapid swelling of the kernel referred to above and prevents premature bursting.

Second. They should always be dug before the frost kills the vines. If the frost kills the vines it seems to injure the germ also.

Third. They should be allowed to dry some after they are shaken out before stacking. It is better to allow them to get quite dry before stacking, as there is danger of their taking a heat if stacked green, especially if a few days of warm, rainy weather follow digging.

Fourth. They should be put under a shelter as soon as dry enough to shake in the hull, or picked off by hand and spread in a dry, airy place. It is always better to have seed peas picked by hand, as there is danger of the machine breaking the hull and skin.

Fifth. As the large varieties have to be shelled for planting in the spring, it is necessary to be careful not to break the skin on the kernel. Some people use a popper, made of a limber piece of wood, between the ends of which the hull is broken. This should be used by particular hands, otherwise the skin will be broken on a large per cent of the nuts. It pays to go over them carefully after they are shelled and get out all inferior and broken nuts to insure a good stand.

Fertilization.—The peanut belongs to the family of leguminous plants, as will be shown on examining the roots, on which are an abundance of the small nodules or tubercles. As plants of this family have the power of getting nitrogen from the atmosphere, it is not necessary to use a fertilizer with a large content of ammonia for them. The tendency of too much ammonia, or nitrogen, is to produce too much vine and too many pops (hulls without kernels). The mineral elements—potash and phosphoric acid—are essential for the development and maturity of the fruit, and if these elements are not already present in the soil in sufficient quantities they must be supplied by the use of acid phosphate and kainit, or some other potash salt. If peanuts are grown in rotation with some other crops which have been well fertilized, and there is some humus in the soil, large crops can be produced without the use of commercial fertilizers.

Lime is very essential for the successful production of the large varieties of peanuts. They will not grow well on an acid soil, and lime has a tendency to counteract this acidity, so prevalent along the Atlantic Coast. It also makes available the elements of plant food already present in an unavailable condition. The kind of lime to be used depends,

to some extent, on the nearness to the source. In the eastern part of North Carolina and Virginia, agricultural lime, made by burning oyster shells, is used, and has been found to be one of the best forms for agricultural purposes.

Lime may be applied in the drill and incorporated with the soil before the fertilizers are distributed, or drilled on top of the row behind the planter, where it will be mixed with soil in cultivation. On uplands, from 400 to 700 pounds per acre is sufficient, and should be drilled. On new or lowlands, 1,000 or 1,500 pounds per acre may be used with impunity, and should be broadcasted.

It is the custom in many sections of the country to distribute land plaster or calcium sulphate on the rows in late July or during August, at the rate of 300 to 500 pounds per acre. Good results come from this practice.

As peanuts obtain nitrogen from the air, it is not necessary to use so much of this constituent in fertilizers for this crop. The main office of nitrogen, or ammonia, in a fertilizer is to produce vine, without a good growth of which a large crop of peanuts cannot be obtained. Too much nitrogen or ammonia in fertilizer produces vines at the expense of fruit, and it is necessary to use nitrogen only in such quantities as are necessary to produce a good proportion of vines to nuts. Where the land will already produce sufficient vines for a good crop, all that is needed, in addition to lime and plaster, are phosphoric acid and potash-supplying materials, and it is suggested that 400 to 500 pounds of the following mixture be employed:

No. 1—Acid phosphate, 14 per cent	200 pounds
Kainit	100 pounds

This mixture would contain, available phosphoric acid, 9.3 per cent; potash, 4 per cent. Where the land needs only a small amount of nitrogen to produce an increased growth of vines, formula No. 2 is recommended, and where a still larger growth of vines is required, formula No. 3; and where the land is quite poor and needs a great deal of help to produce sufficient growth of vines, formula No. 4 is recommended. These should be applied in the drill at the rate of 300 to 600 pounds per acre.

No. 2—Acid phosphate, 14 per cent	1,100 pounds
Cotton-seed meal	300 pounds
Kainit	600 pounds
	2,000 pounds

This mixture would contain, available phosphoric acid, 8 per cent; ammonia, 1.10 per cent; potash, 3.8 per cent.

No. 3—Acid phosphate, 14 per cent	1,050 pounds
Cotton-seed meal	400 pounds
Kainit	550 pounds
	2,000 pounds

This mixture would contain, available phosphoric acid, 7.8 per cent; ammonia, 1.50 per cent; potash, 3.6 per cent.

No. 4—Acid phosphate, 14 per cent	1,000 pounds
Cotton-seed meal	500 pounds
Kainit	500 pounds
	2,000 pounds

This mixture would contain, available phosphoric acid, 7.6 per cent; ammonia, 1.8 per cent; potash, 3.3 per cent.

Planting.—The land should be well broken to a depth of six inches and harrowed to get in good condition. The time of planting depends very largely on location and climate. As soon as a farmer feels satisfied that all danger of killing frost is past he should begin to plant. In the peanut section of North Carolina and Virginia the bulk of the crop is planted between the first and tenth of May.

The distance between rows and hills must be determined by fertility of the soil and the variety to be planted. The Running varieties must be given more space than the Bunch varieties. On fertile soil all varieties should be planted farther apart. Three-foot rows and 12 inches in the drill are average distances for Bunch peas. The Flat or Running varieties are planted in rows of the same width as the Bunch, but are given more distance in the drill on an average, about 16 inches being a good distance. The Wilmington or North Carolina variety is often planted in checks 2½ feet one way and 2 feet the other way. The branches grow to a length of eighteen or twenty inches on fertile soil, in which case the rows have to be further apart. The Spanish can be planted more closely together than any of the varieties mentioned. In some sections the prevailing distances are 2½-foot rows and 6 inches in the drill.

It takes about two bushels of unshelled or one-half bushel of shelled peas of the large varieties to plant an acre. It is much better to plant too many and thin them than to replant.

Culture.—As is the case with most crops, the best cultivation given the peanut is that given before planting. If the land is broken early and thoroughly harrowed several times before planting, the majority of the weed and grass seeds will be destroyed before the plants are up.

There are two methods of cultivation prevalent among peanut growers, known as the "flat" and "ridge" culture. The flat or level culture is better for high, sandy loam soils, and the ridge for low or heavy lands. With the level culture the crop can be cultivated almost entirely with weeders and cultivators, to the exclusion of hoe labor—the most expensive item on the farm. The weeder should be started before the peas are up, as soon as a crust is formed, and kept going till the plants begin to branch and the blooms to appear. With this method it is the most easily cultivated of the clean-cultured crops. On stiff, heavy land the ridge method has to be resorted to, and weeders and cultivators do not work so well. If weeds and grass are kept down during the early growth of the plant they do not do much harm later. Rapid and shallow cultivation during the early growth of the plants is what is needed. In fact, after the "pegs" begin to form and enter the soil, cultivation does a great deal more harm to the crop than would the weeds and grass, because if the spikes or "pegs" are injured the yield is greatly reduced.

Harvesting.—There is no period during the growth of the peanut crop when more careful attention is required than at digging time. A large per cent of the peanuts of North Carolina are injured every year by being dug too early. Farmers with a large acreage get in too great a hurry to begin, and dig a large part of the crop before the nuts are mature, consequently they have inferior stock. The time to dig is when the largest per cent of mature peas can be saved, and that is usually when they begin to shed around the tap root. It is far better to allow a few of the peas around the tap root to shed and be saved by the porkers, than to dig earlier and lose the peas near the ends of the branches, which are not mature. The shedding of the nuts and not of the leaves should determine the time of digging.

The common method of digging is to run under the peas with a point prepared for the purpose and loosen them in the soil. They are shaken out with pitchforks or the hands and allowed to dry for a few hours before they are stacked. They are then stacked around small poles seven or eight feet high, set at convenient distances along the field. These poles should be well set in the ground to a depth of twelve or eighteen inches and should have a short piece of wood nailed on them six or eight inches from the ground to prevent the peas from coming in contact with the damp earth. The stacks should be put as high as practicable and as small around as possible, and in the case of the bunch peas care should be taken to turn the nuts to the pole, in order that the vines may protect them from the rain. It is becoming the custom, on light sandy soil, to stack the peas as they are shaken out, that is, every man takes the peas from the loose soil into his hands and immediately carries them

and places them around the pole. This method saves time, but there is more danger of the nuts being damaged by damp weather when they are not allowed to dry awhile before stacking.

Picking Off.—Until a few years ago the nuts were gathered from the vines by hand, negro women and children doing a greater part of this work. There are now several kinds of threshers and peanut pickers on the market, and only a small per cent of the crop is picked by hand. They should never be picked off till they are dry enough to shake in the hull. If picked earlier there is danger of their taking a heat and being ruined.

Where large quantities of peanuts are raised, the farmers are entirely too careless in saving them for market. The poles are often not well set in the ground and blow down with the first wind, or the peas are carelessly thrown around the poles by indifferent hands and a great many damaged. These damaged peas injure the sale of the entire crop. It would be far better if the farmers would plant fewer acres, try to improve their stock, and take care of what they make.

Rotation.—The growing of peanuts for domestic purposes should be encouraged. Being a leguminous and deep-rooted plant, it is one of the best soil improvers known. Of course, as is often the case, if they are grown on land successively for several years and the vines removed, the soil will be impoverished, as will be the case with any crop if the whole plant is removed. Several years ago peanut farmers claimed that it did not pay to fertilize peanuts, and planted them successively on land for several years with only an application of lime, with the result that the land soon produced only about half a crop. This was a natural sequence, as they did not add any plant food in the form of fertilizer, and by the use of lime made available each year some of the plant food in the soil and by taking off nuts, roots and vines, returned nothing to the soil. On the other hand, if fertilizers are used and the vines returned to the land, the soil will improve in fertility. However, peanuts should come in a three-year rotation with some other crops, one of which should add humus to the soil. The most common three-year rotation is: Peanuts first year, followed by corn, with cowpeas sown between rows at last cultivation, and the corn followed by cotton with crimson clover or rye sown in September or first of October, between the rows.

It is rather difficult to follow peanuts with a clover crop, on account of the hogs rooting the land for the peanuts. However, by putting the hogs on the field early, rye can be sown the latter part of November or first of December. In the corn, clover may be sown in the place of the cowpeas. When following cotton and crimson clover with peanuts, an extra application of potash, phosphoric acid and lime should be used

on account of the abundance of humus and ammonia left in the soil by the clover. The clover can be gotten off or plowed under from the middle to the last of April, in good time for the planting of peanuts. In some sections, where very little cotton is grown, small grain followed by cowpeas for hay, may take the place of cotton, or a two-year rotation with peanuts and corn sown down in cowpeas or clover may be followed to advantage.

If planted for hogs and vines are rooted in the ground they rank along with crimson clover and cowpeas as soil improvers. Well-rotted pea vines are one of the best manures on the farm. Wherever peanuts are picked off in the field and an abundance of leaves and vines are left, the results can be traced for a number of years by the large plant growth on the land. In Table I (given below) are given the analyses of the

TABLE I—SHOWING FERTILIZER CONSTITUENTS OF DIFFERENT PARTS OF THE PEANUT PLANT.

Laboratory Number.	Variety.	Nitrogen.	Phosphoric Acid.	Potash.	Lime.
938	Virginia Bunch, vines and leaves	1.38	0.31	0.82	1.25
942	Virginia Bunch, vines and leaves	1.86	0.38	0.99	1.66
946	Spanish, vines and leaves	1.44	0.43	0.45	2.38
950	Running, vines and leaves	1.24	0.31	0.88	1.63
	Average	1.48	0.38	0.79	1.73
940	Virginia Bunch, hulls or shells	0.92	0.16	0.85	0.16
944	Virginia Bunch, hulls or shells	1.78	0.39	0.88	0.12
948	Spanish, hulls or shells	1.02	0.24	0.70	0.10
952	Running, hulls or shells	1.00	0.19	1.53	0.31
	Average	1.18	0.25	0.99	0.17
941	Virginia Bunch, nuts or kernels	4.72	0.96	0.94	0.01
945	Virginia Bunch, nuts or kernels	4.42	1.09	0.94	0.01
949	Spanish, nuts or kernels	4.54	1.07	0.82	0.02
953	Running, nuts or kernels	4.06	1.03	1.88	0.02
	Average	4.44	1.04	1.15	0.02
939	Virginia Bunch, roots	1.46	0.30	2.39	1.17
943	Virginia Bunch, roots	1.84	0.33	0.62	0.48
947	Spanish, roots	1.58	0.39	0.50	0.81
951	Running, roots	1.64	0.40	0.91	1.05
	Average	1.63	0.35	1.10	0.88

different parts of the peanut plant, showing the fertilizer constituents in hay (leaves and vines), hulls or shells, roots, and kernels, or nuts. The leaves and vines (or hay), as an average of the analyses given in the table, contain 1.48 per cent nitrogen, 0.38 per cent phosphoric acid and 0.79 per cent potash. Giving these three constituents the same values as are ascribed to them in fertilizers, one ton of the hay (or leaves and vines) would be worth $6.42 as fertilizer. In addition to this value, the humus furnished by the vines would have a value beyond what would be obtained from the same fertilizer constituents in commercial fertilizers. If the vines were cut at the proper haying stage they would have a higher fertilizer and feeding value, as a great many of the leaves have dropped and some of the plant food been washed out by the rains when left till the nuts are ready to gather. The fertilizer and feeding value of peanut vines are about the same as cowpea hay and the clovers when cut at the proper haying stage.

Feeding Value of the Nuts.—The feeding value of the peanut was appreciated in its early history by the slave dealers. The spread of the peanut in the United States was caused by its palatableness. The fact that the people in the cities of America consume about seven million bushels of this crop annually as a luxury proves its value as a human food.

In Table II (given below) are analyses of a number of varieties of nuts or kernels, showing their value for human food, and of peanut-vine hay, showing their value for feed for domestic animals. The nuts are specially high in protein or the lean meat and muscle-forming constituents of foods and in oil or fat.

Peanut oil ranks next to olive oil as a desirable oil for domestic use. Wherever it can be had at sufficiently reasonable price, it is used instead of olive and other oils and fats for cooking, preparation of salads, etc. On account of the high price of the peanut, the manufacture of peanut oil has not succeeded in this country, though it is made in considerable quantities in foreign countries. When the oil is pressed from the nuts, peanut cake, which is ground to make peanut meal, is left and is a highly nutritious and valuable food for both human and animal consumption. It is largely used in some countries as a human food. It contains 50 or more per cent of protein, which is the most costly constituent in food and enables it to take largely the place of meat.

As food for hogs the peanut has no equal. Pork fattened on nuts left in the ground after picking is one of the chief crops of the peanut belt. Hams of hogs fattened on peanuts are noted for their delicate flavor. In a series of experiments made in Alabama, it was found that pigs made more rapid increase on peanuts than on any other ration.

TABLE II—SHOWING FEEDING VALUE OF PEANUT HAY AND PEANUT KERNELS.

Laboratory Number.	Variety.	Water.	Protein.	Fat.	Nitrogen-Free Extract.	Crude Fiber.	Ash.	Total Nitrogen.
196	Peanut Hay, vines and leaves	6.25	10.31	3.46	50.36	20.33	7.29	1.65
322	——, nuts or kernels	4.87	29.12	48.79	12.42	2.93	1.90	4.66
941	Virginia Bunch, nuts or kernels	3.92	29.50	42.58	———	———	2.41	4.72
945	Virginia Bunch, nuts or kernels	5.06	27.62	43.67	———	———	2.56	4.42
949	Spanish, nuts or kernels	3.57	28.37	48.80	———	———	2.41	4.54
953	Running, nuts or kernels	4.47	25.37	46.41	———	———	2.43	4.06
	Average	4.38	27.99	46.05	———	———	2.34	4.48

Feeding Value of Vines.—When peanuts are picked off by machinery the vines make a palatable and nutritious hay, provided it is properly cured. This must be looked after carefully, as trouble may be caused if the vines are allowed to mould. The hay is one of the chief sources of roughage in the peanut counties of North Carolina and Virginia. There are always some nuts and faulty peas left on the vines, and stock doing light work during the winter do very well on them without other feed. An analysis is given in Table II, showing the feeding constituents of the vines and leaves (or hay), and, as previously stated, the feeding value is greater when the vines are cut early and not left until the peas mature. In most cases, however, this is impossible. Sometimes the Bunch varieties are cultivated level, and just before frost the vines are mown for hay and the nuts left for hogs. Under these conditions the land will improve in productiveness.

Taken altogether, the peanut is one of the best crops to grow on land suited to it, as all parts of it are valuable for either human or animal food and no part is lost. Besides, when properly handled the soil will increase in fertility under its growth.

LEAF TOBACCO SALES FOR FEBRUARY, 1909.

Pounds sold for producers, first hand	6,987,201
Pounds sold for dealers	468,716
Pounds resold for warehouse	358,180
Pounds resold for other warehouses	40,584
Total	7,854,681

THE BULLETIN

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I. ANALYSES OF FERTILIZERS—SPRING SEASON, 1909.

II. REGISTRATION OF FERTILIZERS.

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I. ANALYSES OF FERTILIZERS—SPRING SEASON, 1909.

By B. W. KILGORE, State Chemist,
AND
W. G. HAYWOOD, J. M. PICKEL, L. L. BRINKLEY and S. O. PERKINS,
Assistant Chemists.

The analyses presented in this Bulletin are of samples collected by the fertilizer inspectors of the Department, under the direction of the Commissioner of Agriculture, during the spring months of 1909. They should receive the careful study of every farmer in the State who uses fertilizers, as by comparing the analyses in the Bulletin with the claims made for the fertilizers actually used, the farmer can know by the time fertilizers are put in the ground whether or not they contain the fertilizing constituents in the amounts they were claimed to be present.

TERMS USED IN ANALYSES.

Water-soluble Phosphoric Acid.—Phosphate rock, as dug from the mines, mainly in South Carolina, Florida and Tennessee, is the chief source of phosphoric acid in fertilizers.

In its raw, or natural, state the phosphate has three parts of lime united to the phosphoric acid (called by chemists tri-calcium phosphate). This is very insoluble in water and is not in condition to be taken up readily by plants. In order to render it soluble in water and fit for plant food, the rock is finely ground and treated with sulphuric acid, which acts upon it in such a way as to take from the three-lime phosphate two parts of its lime, thus leaving only one part of lime united to the phosphoric acid. This one-lime phosphate is what is known as water-soluble phosphoric acid.

Reverted Phosphoric Acid.—On long standing some of this water-soluble phosphoric acid has a tendency to take lime from other substances in contact with it, and to become somewhat less soluble. This latter is known as reverted or gone-back phosphoric acid. This is thought to contain two parts of lime in combination with the phosphoric acid, and is thus an intermediate product between water-soluble and the original rock.

Water-soluble phosphoric acid is considered somewhat more valuable than reverted, because it becomes better distributed in the soil as a consequence of its solubility in water.

Available Phosphoric Acid is made up of the water-soluble and reverted; it is the sum of these two.

Water-soluble Ammonia.—The main materials furnishing ammonia in fertilizers are nitrate of soda, sulphate of ammonia, cotton-seed meal, dried blood, tankage, and fish scrap. The first two of these (nitrate of soda and sulphate of ammonia) are easily soluble in water and become

well distributed in the soil where plant roots can get at them. They are, especially the nitrate of soda, ready to be taken up by plants, and are therefore quick-acting forms of ammonia. It is mainly the ammonia from nitrate of soda and sulphate of ammonia that will be designated under the heading of water-soluble ammonia.

Organic Ammonia.—The ammonia in cotton-seed meal, dried blood, tankage, fish scrap, and so on, is included under this heading. These materials are insoluble in water, and before they can feed plants they must decay and have their ammonia changed, by the aid of the bacteria of the soil, to nitrates, similar to nitrate of soda.

They are valuable then as plant food in proportion to their content of ammonia, and the rapidity with which they decay in the soil, or rather the rate of decay, will determine the quickness of their action as fertilizers. With short season, quick-growing crops, quickness of action is an important consideration, but with crops occupying the land during the greater portion, or all, of the growing season, it is better to have a fertilizer that will become available more slowly, so as to feed the plant till maturity. Cotton-seed meal and dried blood decompose fairly rapidly, but will last the greater portion, if not all, of the growing season in this State. While cotton seed and tankage will last longer than meal and blood, none of these act so quickly, or give out so soon, as nitrate of soda and sulphate of ammonia.

Total Ammonia is made up of the water-soluble and organic; it is the sum of these two.

The farmer should suit, as far as possible, the kind of ammonia to his different crops, and a study of the forms of ammonia as given in the tables of analyses will help him to do this.

FORM OF POTASH IN TOBACCO FERTILIZERS.

Tobacco growers are becoming yearly more disposed to know the form of potash, whether from kainit, muriate or sulphate, which enters into their tobacco fertilizers. Considerable work of this kind has been done for individuals, and we now determine the form of potash in all tobacco brands, for the benefit of tobacco growers.

The term potash from muriate, as reported in the analyses, does not mean, necessarily, that the potash was supplied by muriate of potash. Sulphate or some other potash salt may have been used, but in all fertilizers where the term potash from muriate is used, there is enough chlorine present to combine with all the potash. though it may have come from salt in tankage, kainit, or karnalite. As the objection to the use of muriate of potash in tobacco fertilizers arises from the chlorine present, it does not matter whether this substance is present in common salt or potash-furnishing materials.

The use of sulphate of potash where there is chlorine present in the other ingredients of the fertilizer will not prevent the injurious effect of the chlorine. The term potash from muriate in our analyses, therefore, means that there is sufficient chlorine present in the fertilizer from all sources to combine with the potash to the extent indicated by the analyses.

VALUATIONS.

To have a basis for comparing the values of different fertilizer materials and fertilizers, it is necessary to assign prices to the three valuable constituents of fertilizers—ammonia, phosphoric acid, and potash. These figures, expressing relative value per ton, are not intended to represent crop-producing power, or agricultural value, but are estimates of the commercial value of ammonia, phosphoric acid and potash in the materials supplying them. These values are only approximate, as the cost of fertilizing materials is liable to change as other commercial products are, but they are believed to fairly represent the cost of making and putting fertilizers on the market. They are based on a careful examination of trade conditions, wholesale and retail, and upon quotations of manufacturers.

Relative value per ton, or the figures showing this, represents the prices on board the cars at the factory, in retail lots of five tons or less, for cash.

To make a complete fertilizer the factories have to mix together in proper proportions materials containing ammonia, phosphoric acid and potash. This costs something. For this reason it is thought well to have two sets of valuations—one for the raw or unmixed materials, such as acid phosphate, kainit, cotton-seed meal, etc., and one for mixed fertilizers.

VALUATIONS FOR 1908.

In Unmixed or Raw Materials.

For phosphoric acid in acid phosphate.....	4	cents per pound.
For phosphoric acid in bone meal, basic slag and Peruvian guano.....	3½	cents per pound.
For nitrogen.....	18	cents per pound.
For potash.....	5	cents per pound.

In Mixed Fertilizers.

For phosphoric acid.....	4½	cents per pound.
For nitrogen.....	19½	cents per pound.
For potash.....	5½	cents per pound.

The valuations decided on this season, for reasons already given, are:

VALUATIONS FOR 1909.

In Unmixed or Raw Materials.

For phosphoric acid in acid phosphate.....	4	cents per pound.
For phosphoric acid in bone meal, basic slag and Peruvian guano.....	3½	cents per pound.
For nitrogen.....	18	cents per pound.
For potash.....	5	cents per pound.

In Mixed Fertilizers.

For available phosphoric acid.....	4½	cents per pound.
For nitrogen	19½	cents per pound.
For potash.....	5½	cents per pound.

HOW RELATIVE VALUE IS CALCULATED.

In the calculation of relative value it is only necessary to remember that so many per cent means the same number of pounds per hundred, and that there are twenty hundred pounds in one ton (2,000 pounds).

With an 8—2—1.65 goods, which means that the fertilizer contains available phosphoric acid 8 per cent, potash 2 per cent, and nitrogen 1.65 per cent, the calculation is made as follows:

Percentage, or Lbs. in 100 Lbs.	Value Per 100 Lbs.	Value Per Ton, 2,000 Lbs.
8 pounds available phosphoric acid at 4½ cents..	0.36 ×20=	$7.20
2 pounds potash at 5½ cents.....	0.11 ×20=	2.20
1.65 pounds nitrogen at 19½ cents.....	0.321×20=	6.42
Total value	0.791×20=	$15.82

Freight and merchants' commission must be added to these prices. Freight rates from the seaboard and manufacturing centers to interior points are given in the following table:

FREIGHT RATES FROM THE SEABOARD TO INTERIOR POINTS.—From the Published Rates of the Associated Railways of Virginia and the Carolinas. In car-loads, of not less than ten tons each, per ton of 2,000 pounds. Less than car-loads, add 10 per cent.

Destination.	From Wilmington, N. C.	From Norfolk and Portsmouth, Va.	From Charleston, S. C	From Richmond, Va.
Advance	$ 3.20	$ 3.20	$ 3.40	$ 3.20
Apex	2.70	----------	3.80	3.00
Ashboro	3.20	3.20	3.60	3.20
Asheville	4.00	4.00	4.00	4.00
Chapel Hill	2.95	3.20	3.90	3.20
Charlotte	2.65	3.20	2.85	3.20
Clayton	2.48	2.86	3.63	2.80
Cherryville	3.85	3.60	3.40	3.63
Clinton	1.60	3.00	3.20	3.00
Creedmoor	3.00	3.00	3.80	3.00
Cuningham	3.00	2.40	4.00	2.40
Dallas	3.00	3.60	3.40	3.60
Davidson College	3.00	3.20	2.20	3.20
Dudley	1.70	3.00	3.20	3.00
Dunn	2.00	2.80	3.20	2.80
Durham	2.80	2.83	3.20	2.83
Elkin	3.60	3.20	3.60	3.20
Elm City	2.10	2.60	3.20	2.60
Fair Bluff	1.60	3.80	2.40	3.80
Fayetteville	1.80	3.00	3.00	3.00
Forestville	2.85	3.00	3.80	3.06
Gastonia	3.12	3.25	3.12	3.25
Gibson	2.10	3.50	2.10	3.50
Goldsboro	1.80	2.80	3.20	2.80
Greensboro	2.96	3.00	3.40	3.00
Hamlet	2.00	3.00	3.60	3.00
Henderson	3.00	2.83	3.55	2.83
Hickory	3.20	3.60	3.20	3.60
High Point	3.00	3.08	3.40	3.08
Hillsboro	2.88	2.88	2.68	2.88
Kernersville	3.00	3.00	3.40	3.00
Kinston	2.10	2.80	3.50	2.80
Laurel Hill	1.90	2.40	3.80	3.40
Laurinburg	1.90	3.40	3.80	3.40
Liberty	2.72	3.60	3.80	3.60
Louisburg	2.95	3.00	3.80	3.00
Lumberton	1.60	3.60	3.70	3.60
Macon	3.05	3.00	3.85	3.00
Madison	3.00	3.00	3.40	3.00
Matthews	2.60	3.20	3.20	3.20
Maxton	1.80	3.40	2.70	3.40
Milton	3.44	2.40	4.00	2.40
Mocksville	3.36	3.20	3.40	3.20
Morven	2.55	3.60	2.50	3.60
Mount Airy	2.20	3.40	3.80	3.40
Nashville	2.30	2.90	3.40	2.90
New Bern	1.25	1.75	3.95	1.75
Norwood	3.68	3.20	3.20	2.23
Oxford	3.04	2.83	3.55	2.83
Pineville	2.77	3.25	3.00	3.20
Pittsboro	2.60	3.30	4.10	3.30
Polkton	2.40	3.00	2.20	3.00
Raleigh	2.56	2.83	3.40	2.83
Reidsville	3.00	2.96	3.40	2.36
Rockingham	2.10	3.00	3.80	3.00
Rocky Mount	2.20	2.50	3.40	2.50
Ruffin	3.28	2.80	3.40	2.20
Rural Hall	3.28	3.20	3.60	3.20
Rutherfordton	3.05	3.65	3.05	3.65
Salisbury	3.25	3.20	3.20	3.20
Sanford	2.10	3.00	3.40	3.00
Selma	2.10	2.80	3.20	2.80
Shelby	2.90	3.60	3.90	3.60
Siler City	2.60	3.60	3.80	3.60
Smithfield	2.20	2.80	3.20	2.80
Statesville	3.50	3.20	3.60	3.20
Stem	2.95	2.83	3.80	2.83
Tarboro	2.30	2 40	3.00	2.40
Waco	2.96	3.60	3.40	3.60
Wadesboro	2.30	3.00	2.50	3.00
Walnut Cove	3.00	3.00	3.40	3.00
Warrenton	3.05	3.25	4.10	3.25
Warsaw	1.50	3.00	3.20	3.00
Washington	2.65	1.75	2.25	1.50
Weldon	2.55	1.90	3.85	1.90
Wilson	2.00	2.60	3.20	2.60
Winston-Salem	3.00	3.00	3.40	3.00

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-Soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia	Total Potash.	Relative Value per ton at Factory.
					MIXED FERTILIZERS.						
	Brands claiming				**8.00**			**1.65**	**2.00**	**2.00**	**$ 15.82**
6991	Acme Mfg. Co., Wilmington, N. C.	Cotton Seed Meal Guano	Mt. Olive	R	8.20	.76	1.16	1.92	2.32	2.00	17.07
6963	American Fertilizing Co., Norfolk, Va.	Bone and Peruvian Guano	Greenville	R	8.09	.78	1.38	2.16	2.62	2.48	18.43
6936	Baugh & Sons Co., Norfolk, Va.	Baugh's Animal Bone and Potash.	Edenton	S	8.02	.96	.72	1.68	2.04	2.38	16.40
6948	do	Baugh's Fish Mixture	Elizabeth City	R	9.29	.28	1.58	1.86	2.26	2.05	17.87
6966	Bragaw Fertilizer Co., Washington, N. C.	Tar Heel Special Guano	Washington	R	8.57	.30	1.38	1.68	2.04	2.82	17.37
6978	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Exchange Guano	New Bern	R	8.35	1.06	.76	1.82	2.21	2.52	17.38
7004	Imperial Co., Norfolk, Va.	Imperial Champion Guano	Dunn	R	**7.81**	1.18	1.28	2.46	2.99	2.11	18.94
6927	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Craven County Guano	Edenton	R	**7.45**	.30	1.14	**1.44**	1.75	2.33	**14.88**
6956	Pamlico Chemical Co., Washington, N. C.	Pamlico Bone and Fish Guano	Washington	R	8.54	.42	1.26	1.68	2.04	2.67	17.17
6985	Powhatan Chemical Co., Richmond, Va.	Magic Cotton Grower	New Bern	S	8.85	.92	.76	1.68	2.04	2.13	16.86
6930	Richmond Guano Co., Richmond, Va.	Premium Brand Fertilizer	Edenton	S	8.80	.94	.82	1.76	2.14	**1.70**	16.65
6921	Royster, F. S., Guano Co., Norfolk, Va.	Farmers Bone Fertilizer	Kinston	S	8.08	1.26	.70	1.96	2.38	2.95	18.16
7000	Union Guano Co., Winston, N. C.	Old Honesty Guano	Mt. Olive	R	8.15	.78	1.12	1.90	2.31	2.00	16.94
7007	Va.-Car. Chemical Co., Richmond, Va.	Diamond Dust	Seven Springs	R	8.35	.50	1.36	1.86	2.26	2.36	17.36
6946	do	Old Dominion Guano Co.'s Farmers Friend Fertilizer.	Hertford	S	**6.97**	1.01	1.06	2.07	2.51	2.50	17.09
	Brand claiming				**8.00**			**1.65**	**2.00**	**3.00**	**16.94**
6982	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Fish Compound	New Bern	R	8.64	.32	1.50	1.82	2.21	3.46	18.68
	Brand claiming				**8.00**			**2.06**	**2.50**	**2.50**	**17.98**
7036	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' All Crop Guano	New Bern	S	8.19	.46	1.56	**2.02**	2.45	2.74	18.23
	Brands claiming				**8.00**			**2.06**	**2.50**	**3.00**	**18.53**
6999	Union Guano Co., Winston, N. C.	Union Water Fowl Guano	Mt. Olive	D	**7.97**	1.24	.86	2.10	2.55	**2.79**	**18.43**
6945	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s N. C. Farmers Alliance Guano.	Elizabeth City	R	**7.83**	.84	1.36	2.20	2.67	3.19	19.13
	Brand claiming				**8.00**			**2.47**	**3.00**	**2.00**	**19.03**
6995	Navassa Guano Co., Wilmington, N. C.	Navassa C. S. M. Special 3 Per Cent Guano.	Wilmington	R	8.21	1.08	1.38	**2.46**	2.99	2.11	19.30

					8.00			**2.47**	**3.00**	**3.00**	**20.13**
	Brands claiming										
6950	Baugh & Sons Co., Norfolk, Va.	Baugh's Grand Rapid High Grade Truck Guano.	Elizabeth City	S	10.32	1.44	1.42	2.86	3.47	**2.68**	23.39
6937	Bragaw, Wm., & Co., Washington, N. C	Beaufort County Guano	Washington	R	8.17	.94	1.56	2.50	3.04	3.51	20.96
7014	Craven Chemical Co., New Bern, N. C.	Foy's High Grade	Battleboro	R	8.06	.70	1.44	**2.14**	2.60	3.01	**19.91**
6972	Hubbard, M. P., & Co., Baltimore, Md.	Gold Leaf Guano	Williamston	R	9.37	.26	2.60	2.86	3.47	**2.20**	22.00
7015	Imperial Co., Norfolk, Va.	Imperial X. L. O. Cotton Guano	Edenton	R	8.60	1.34	1.14	2.48	3.01	3.20	20.93
					8.00			**2.47**	**3.00**	**4.00**	**21.23**
	Brand claiming										
6979	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Royal Ensign	New Bern	S	8.45	1.50	.80	**2.30**	2.79	4.32	21.33
					8.00			**3.30**	**4.00**	**4.00**	**24.47**
	Brands claiming										
7035	Baugh & Sons Co., Norfolk, Va.	Baugh's Fish, Bone and Potash	New Bern	D	9.06	1.90	1.50	3.40	4.13	4.62	26.50
6918	Martin, D. B., Co., Baltimore, Md.	Martin's Red Steer Brand Fertilizer.	Goldsboro	S	**7.66**	2.80	.52	3.32	4.03	4.00	**24.24**
6996	Navassa Guano Co., Wilmington, N. C.	Navassa Special Truck Guano	Wilmington	R	8.68	2.78	.30	**3 08**	3.74	4.23	24.47
6960	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Special C. S. M.	Edenton	R	8.18	1.48	2.04	3.52	4.27	**3.94**	25.42
					8.00			**3.29**	**4.00**	**7.00**	**27.69**
	Brand claiming										
6980	Hubbard Fertilizer Co., Baltimore, Md	Hubbard's Blood, Bone and Potash.	New Bern	R	**7.47**	1.74	1.24	**2.98**	3.62	**6.71**	25.72
					8.00			**3.29**	**4.00**	**5.00**	**25 57**
	Brand claiming										
6947	Va.-Car. Chemical Co., Richmond, Va.	Powers, Gibbs & Co.'s Truck Farmers Sp'l Ammo. Guano.	Elizabeth City	S	8.92	2.68	1.06	3.74	4.54	**4.98**	28.09
					8 00			**4.12**	**5.00**	**7.00**	**30 97**
	Brand claiming										
6998	Southern Exchange Co., Maxton, N. C.	McKinnon's Special Truck Formula.	Wilmington	S	8.54	3.28	.86	4.14	5.03	**6.81**	31.32
					9 00			**2.26**	**2.75**	**2.00**	**19.16**
	Brands claiming										
6922	Acme Mfg. Co., Wilmington, N. C.	Acme Cotton Grower	Goldsboro	R	**8.80**	1.34	1.62	2.96	3.59	2.58	22.30
7026	Imperial Co., Norfolk, Va.	Imperial Martin County Special Crop Grower.	Edenton	R	9.60	.84	1.54	2.38	2.89	2.25	20.39
6955	Pamlico Chemical Co., Washington, N. C.	Prosperity Cotton Grower	Washington	R	9.05	2.34	1.38	2.72	3.30	2.50	21.50
6959	Va.-Car. Chemical Co., Richmond, Va.	Prolific Cotton Grower	Edenton	R	9.10	.70	1.72	2.42	2.94	2.06	19.62
6969	do.	White Stem	Williamston	R	9.41	.64	1.50	2.14	2.60	2.07	19.09
					7.00			**2 00**	**2.43**	**5.00**	**19.60**
	Brand claiming										
6971	Hubbard, M. P., & Co., Baltimore, Md.	Hobgood's Special Cotton and Corn Fertilizer.	Williamston	R	8.60	.30	1.44	**1.74**	2.11	5.25	20.30
					7.00			**3 30**	**4.00**	**4.00**	**23.57**
	Brand claiming										
6997	Pocomoke Guano Co., Norfolk, Va.	Faultless Ammoniated Superphosphate.	Wilmington	S	7.22	2.24	1.12	3.36	4.08	**3.93**	23.92
					7.00			**3.36**	**4.08**	**8.00**	**28 24**
	Brand claiming										
6953	Baugh & Sons Co., Norfolk, Va.	Glover's Special Potato Guano	Elizabeth City	R	7.92	1.58	1.92	3.50	4.25	8.68	30.32
	Brands claiming				**7.00**			**4.12**	**5.00**	**5.00**	**27.87**
7013	American Fertilizer Co., Norfolk, Va.	American Irish Potato Grower	Elizabeth City	S	7.22	2.66	1.34	**4.00**	**4.86**	5.00	**27.59**
6974	Hubbard, M. P., & Co., Baltimore, Md.	Hubbard's Maryland Special Vegetable Grower.	Williamston	R	7.32	2.25	2.16	4.41	5.35	**3.80**	29.76
7029	Pocomoke Guano Co., Norfolk, Va.	Standard Truck Guano	Edenton	R	**7.39**	2.86	1.56	4.42	5.37	5.26	29.67
					7.00			**4.12**	**5.00**	**7.00**	**30 07**
	Brand claiming										
6943	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Ives' Irish Potato Guano	Edenton	S	7.64	1.56	2.44	**4.00**	**4.86**	7.26	30 46
					7.00			**6.58**	**8.00**	**5.00**	**37.46**
	Brand claiming										
6938	Dixie Agricultural Co., Washington, N. C.	Honeypod Special Trucker	Washington		**7.43**	3.14	1.24	**4 38**	5.32	8.39	33.25

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per ton at Factory.
					Available Phosphoric Acid.	Water-Soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia	Total Potash.	
MIXED FERTILIZERS.											
	Brand claiming				**7.00**			**5.76**	**7.00**	**7.00**	**$ 35.76**
6964	American Fertilizing Co., Norfolk, Va.	American 7-7-7 for Irish Potatoes.	Greenville	R	7.22	4.32	1.26	**5.58**	7.14	7.27	36.06
	Brand claiming				**6.00**			**3.28**	**4.00**	**10.00**	**29.19**
6977	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Special Potato Guano.	New Bern	R	6.36	2.54	.66	**3.20**	**3.88**	10.08	29.29
	Brand claiming				**6.00**			**4.12**	**5.00**	**5.00**	26.97
6951	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano Substitute for Potatoes, etc.	Elizabeth City	R	6.87	2.14	2.06	4.20	5.10	7.01	30.27
	Brand claiming				**6.00**			**4.12**	**5.00**	**7.00**	**29.17**
6994	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano Substitute for Potatoes.	Chadbourn	R	6.67	2.18	2.10	4.28	5.20	7.02	30.42
	Brands claiming				**6.00**			**5.77**	**7.00**	**5.00**	**33.40**
6934	American Agricultural Chemical Co., New York City.	Lazaretto Truckers' Favorite	Washington	R	6.51	4.52	1.44	5.94	7.21	5.34	34.89
6949	Baugh & Sons Co., Norfolk, Va.	Baugh's 7 Per Cent Guano	Elizabeth City	R	6.79	4.34	1.56	5.90	7.16	5.21	34.85
	Brand claiming				**5.00**			**4.12**	**5.00**	**5.00**	**26.07**
6952	Baugh & Sons Co., Norfolk, Va.	Baugh's 5-6-5 Guano	Elizabeth City	R	7.52	1.98	2.28	4.26	5.17	6.29	30.20
	Brand claiming				**4.00**			**3.29**	**4.00**	**6.00**	**22.99**
7025	Imperial Co., Norfolk, Va.	Imperial Laughinghouse Special	Edenton	R	4.77	1.36	2.12	3.48	4.22	6.20	24.68
RAW OR UNMIXED FERTILIZER MATERIALS.											
	Brands claiming				**14.00**						**11.20**
7008	Acme Manufacturing Co., Wilmington, N. C.	Acme High Grade Acid Phosphate	Fayetteville	D	14.49						11.59
7093	Arps, Geo. L., Norfolk, Va.	14 Per Cent Acid Phosphate	Edenton	D	**13.34**						**10.67**
7002	Craven Chemical Co., New Bern, N. C.	Jewel Acid Phosphate	Mt. Olive	D	**13.97**						**11.18**
6989	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Soluble Bone Phosphate	New Bern	N	14.43						11.54
6975	Hubbard, M. P., & Co., Baltimore, Md.	Hubbard's Soluble S. C. Phosphate.	Williamston	D	15.10						12.08

7032	Imperial Co., Norfolk, Va.	Imperial High Grade Acid Phosphate.	Edenton	N	**13.04**						**10.43**
6939	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	14 Per Cent Acid Phosphate	do	R	14.81						11.84
7033	Pocomoke Guano Co., Norfolk, Va.	Peerless Acid Phosphate	do	D	14.29						11.43
7058	Swift's Fertilizer Works, Wilmington, N. C.	Swift's High Grade Acid Phosphate.	Burgaw	N	16.96						13.56
	Brand claiming				**16.00**						**12.80**
7010	Richmond Guano Co., Richmond, Va.	Rex Dissolved Bone Phosphate	Dunn	N	16.23						12.98
	Brands claiming									**12.00**	**12.00**
7009	Acme Manufacturing Co., Wilmington, N. C.	Pure German Kainit	Fayetteville	S						12.10	12.10
7092	Arps, Geo. L., Norfolk, Va.	Genuine German Kainit	Edenton	B						12.42	12.42
7034	Imperial Co., Norfolk, Va.	do	do	S						12.36	12.36
7043	Meadows, E. H. & J. A., Co, New Bern, N. C.	do	New Bern	S						12.84	12.84
7070	Powhatan Chemical Co., New Bern, N.C.	do	Kinston	S						12.40	12.40
6940	Richmond Guano Co., Richmond, Va.	do	Edenton	S						12.60	12.60
6987	Royster, F. S., Guano Co., Norfolk, Va.	do	New Bern	R						12.70	12.70
6926	Va.-Car. Chemical Co., Richmond, Va.	do	Goldsboro	S						12.78	12.78
7057	do	do	Burgaw	S						13.20	13.20
	Brand claiming									48.00	48.00
6924	Va.-Car. Chemical Co., Richmond, Va.	Muriate of Potash	Goldsboro	B						50.08	50.08
	Brand claiming									**50.00**	**50.00**
6925	Va.-Car. Chemical Co., Richmond, Va.	Sulphate of Potash	Goldsboro	N						50.40	50.40

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

II. REGISTRATION OF FERTILIZERS.

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
The Atlantic Chemical Corporation, Norfolk, Va.—			
Nitrate of Soda	----	15.22	----
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Atlantic High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Atlantic 14 Per Cent Acid Phosphate	14.00	----	----
Atlantic Dissolved Bone	13.00	----	----
Atlantic Acid Phosphate	12.00	----	----
Atlantic 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Atlantic Bone and Potash for Grain	10.00	----	3.00
Atlantic Bone and Potash Mixture	10.00	----	2.00
Atlantic 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Atlantic 7 Per Cent Truck Guano	7.00	5.77	7.00
Atlantic Potato Guano	7.00	4.12	5.00
Atlantic Special Truck Guano	8.00	3.30	4.00
Atlantic High Grade Tobacco Guano	8.00	2.47	3.00
Atlantic Tobacco Grower	8.00	2.06	3.00
Atlantic Tobacco Compound	8.00	2.06	2.00
Atlantic Special Guano	9.00	1.65	1.00
Atlantic Special Wheat Fertilizer	8.00	1.65	2.00
Atlantic Meal Compound	9.00	2.27	2.00
Atlantic High Grade Cotton Guano	8.00	2.47	3.00
Atlantic Soluble Guano	8.00	1.65	2.00
Apex Peanut Grower	8.00	1.02	4.00
Perfection Peanut Grower	7.00	----	5.00
Oriental High Grade Guano	8.00	3.30	4.00
Paloma Tobacco Guano	8.00	3.30	4.00
Pure Raw Bone Meal Total	21.50	3.71	----
Corona Cotton Compound	9.00	1.65	3.00
Atlantic 10 and 5 Bone and Potash Mixture	10.00	----	5.00
Geo. L. Arps & Co., Norfolk, Va.—			
Arps' Potato Guano	6.00	5.76	5.00
Arps' Standard Truck Guano	7.00	4.12	5.00
Arps' Scuppernong Guano for Trucks	6.00	4.12	7.00
Geo. L. Arps & Co.'s Big Yield Guano	8.00	1.65	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Arps' Premium Guano for Cotton, Tobacco and All Spring Crops	8.00	1.65	2.00
Arps' Tobacco Guano	8.00	2.47	3.00
Arps' H. G. 16 Per Cent Acid Phosphate	16.00	----	----
Acme Manufacturing Co., Wilmington, N. C.—			
Acme Acid Phosphate	12.00	----	----
Acme Bone and Potash	10.00	----	2.00
Acme Bone and Potash	10.00	----	3.00
Acme Bone and Potash	10.00	----	4.00
Acme Bone and Potash	8.00	----	4.00
Acme Bone and Potash	11.00	----	2.00
Acme High Grade Acid Phosphate	14.00	----	----
Acme Acid Phosphate	16.00	----	----
Acme Standard Guano	8.00	2.06	2.00
Acme High Grade Guano	6.00	4.95	8.00
Acme Strawberry Top Dresser	8.00	1.65	4.00
Acme Truck Grower	6.00	3.30	8.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Acme Cotton Grower	9.00	2.27	2.00
Acme Special Grain	8.00	1.65	2.00
Acme Fertilizer for Tobacco	8.00	2.47	2.50
Acme Fertilizer	8.00	2.47	2.50
Acme Acid Phosphate	13.00	----	----
Gibson's Melon Grower	10.00	3.30	5.00
Acme Corn Guano	6.00	2.47	3.00
Clark's Corn Guano	1.00	6.60	10.00
P. D. Special	8.00	2.47	3.00
Quickstep	8.00	3.30	4.00
Gem Fertilizer	8.00	1.65	2.00
Cotton Seed Meal Guano	8.00	1.65	2.00
Lattimer's Complete Fertilizer	8.00	2.06	2.00
Tiptop Crop Grower	8.00	2.06	3.00
Tiptop Tobacco Grower	8.00	2.06	3.00
Sulphate of Ammonia	----	20.62	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	48.00
Acme Bone and Potash	10.00	----	5.00
Acme Top Dresser	----	7.42	3.00
Gem Tobacco Fertilizer	8.00	1.65	2.00
Acme 6-3-6 Guano	6.00	2.47	6.00
Cottonseed Meal Tobacco Guano	8.00	1.65	2.00
Ashepoo Fertilizer Co., Charleston, S. C.—			
High Grade Eutaw Acid Phosphate	14.00	----	----
High Grade Ashepoo Acid Phosphate	14.00	----	----
High Grade Ashepoo Dissolved Phosphate	16.00	----	----
High Grade Ashepoo Superpotash Acid Phosphate	10.00	----	4.00
High Grade Ashepoo Vegetable Guano	5.00	4.12	5.00
High Grade Ashepoo Truck Guano	7.00	4.12	5.00
High Grade Ashepoo Farmers' Special	8.00	2.06	3.00
High Grade Ashepoo Special Cotton Seed Meal Guano	8.00	2.46	2.00
High Grade Ashepoo Ammoniated Superphosphate	8.00	2.46	2.00
High Grade Ashepoo Bird and Fish Guano	8.00	2.46	3.00
High Grade Ashepoo Meal Mixture	8.00	2.46	3.00
High Grade Ashepoo X Tobacco Fertilizer	8.00	2.46	3.00
High Grade Ashepoo Golden Tobacco Producer	8.00	2.46	3.00
High Grade Ashepoo Guano	8.00	3.29	4.00
High Grade Ashepoo Perfection Guano	8.00	3.29	6.00
High Grade Ashepoo Fruit Grower	8.00	3.91	2.75
High Grade Ashepoo Watermelon Guano	10.00	3.29	5.00
High Grade Eutaw X Golden Fertilizer	8.00	2.46	4.00
High Grade Eutaw Special Cotton-seed Meal Guano	8.00	2.46	4.00
High Grade Carolina XXX Guano	8.00	2.46	3.00
High Grade Taylor's Circle Guano	9.00	1.65	4.00
Standard Eutaw XX Acid Phosphate	12.00	----	----
Standard Eutaw XXX Acid Phosphate	13.00	----	----
Standard Eutaw Potash Acid Phosphate	11.00	----	1.00
Standard Eutaw Acid Phosphate and Potash	12.00	----	1.00
Standard Eutaw Circle Guano	8.00	2.06	2.00
Standard Eutaw XX Guano	8.50	1.65	2.00
Standard Eutaw XXX Guano	9.00	1.65	2.00
Standard Eutaw Fertilizer	9.00	1.85	1.00
Standard Ashepoo Fertilizer	9.00	1.85	1.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Standard Ashepoo Harrow Brand Raw Bone Superphosphate	9.00	1.65	2.00
Muriate of Potash	----	----	45.00
Nitrate of Soda	----	14.81	----
H. G. Ashepoo Bone and Potash	12.00	----	----
H. G. Eutaw Superpotash Acid Phosphate	10.00	----	4.00
Standard Ashepoo Wheat and Oats Special	9.50	1.65	1.00
Standard Ashepoo XXX Guano	8.65	1.65	2.00
Standard Ashepoo XX Guano	8.50	1.65	2.00
Standard Ashepoo Circle Guano	8.00	2.06	2.00
Standard Ashepoo Guano	8.50	2.06	1.00
Standard Ashepoo Special Fertilizer	8.00	1.65	2.00
Standard Ashepoo Acid Phosphate and Potash	12.00	----	1.00
Standard Ashepoo Potash and Acid Phosphate	11.00	----	1.00
Standard Ashepoo Potash Compound	10.00	----	3.00
Standard Ashepoo XXX Acid Phosphate	13.00	----	----
Standard Ashepoo Dissolved Bone	12.00	----	----
Standard Ashepoo XX Acid Phosphate	12.00	----	----
Standard Coomassie Acid Phosphate	12.00	----	----
Standard Coomassie Circle Fertilizer	8.00	1.65	2.00
Standard Carolina Guano	8.00	1.65	2.00
Standard Carolina Acid Phosphate	13.00	----	----
Standard Circle Bone	13.00	----	----
Standard Palmetto Potash Acid Phosphate	11.00	----	1.00
Standard Brownwood Acid Phosphate	8.00	----	4.00
Standard P. D. Fertilizer	8.00	1.65	2.00
German Kainit	----	----	12.00
Standard Enoree Acid Phosphate and Potash	10.00	----	2.00
High Grade Ashepoo XXXX Acid Phosphate	14.00	----	----
Taylor's XX Ammoniated Dissolved Fertilizer	10.00	.82	1.00
High Grade Ashepoo Nitrogenous Top Dressing	3.00	7.00	2.00
H. G. Ashepoo Canteloupe Guano	10.00	2.47	10.00
The Armour Fertilizer Works, Atlanta, Chicago and Wilmington—			
Top Dresser	5.00	8.24	2.00
10 Per Cent Trucker	5.00	8.25	3.00
Manure Substitute	6.00	3.30	4.00
7 Per Cent Trucker	6.00	5.78	5.00
General	8.00	1.65	2.00
Fruit and Root Crop Special	8.00	1.65	5.00
High Grade Potato	8.00	1.65	10.00
King Cotton No. 2	8.00	2.06	2.00
Champion	8.00	2.06	2.50
Gold Medal for Tobacco	8.00	2.06	3.00
Berry King	8.00	2.06	4.00
Cotton Special	8.00	2.47	3.00
Tobacco Special	8.00	2.47	3.00
Truck and Berry Special	8.00	2.47	10.00
All Soluble	8.00	2.88	4.00
Special Trucker	8.00	3.30	4.00
Bone, Blood and Potash	8.00	4.12	7.00
Bone and Dissolved Bone with Potash	9.00	1.65	3.00
African Cotton Grower	9.00	2.47	3.00
10 Per Cent Trucker	5.00	8.24	3.00
Dried Blood	----	13.18	----
Phosphoric Acid with Potash	10.00	----	5.00
Superphosphate and Potash	10.00	----	4.00
M. H. White & Co.'s Special Corn Mixture	10.00	----	2.00
Phosphate and Potash No. 2	8.00	----	5.00
Phosphate and Potash No. 1	10.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
17 Per Cent Acid Phosphate	17.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
13 Per Cent Acid Phosphate	13.00	----	----
12 Per Cent Acid Phosphate	12.00	----	----
Star Phosphate	14.00	----	----
Nitrate of Soda	----	14.83	----
Harvey's Special	4.00	3.30	4.00
10 Per Cent Tankage	2.00	8.24	----
Manure Substitute	6.00	3.30	4.00
Carolina Cotton Grower	8.00	2.47	2.00
Carolina Cotton Special	8.00	1.65	3.00
Kainit	----	----	12.00
King Cotton	8.00	2.06	2.00
Ammoniated Dissolved Bone and Potash	10.00	1.65	2.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Van Lindley's Special	8.00	4.12	2.00
Standard Cotton Grower	8.50	1.65	2.00
Armour's Slaughterhouse Fertilizer	8.00	1.65	2.00
Special Formula for Tobacco	4.00	3.30	4.00
Sweet Potato Special	8.00	2.06	3.00
Armour's Raw Bone Meal Total	22.00	3.70	----
Fertilizer No. 836	8.00	2.47	6.00
American Fertilizer Co., Norfolk, Va.—			
10 Per Cent Ammoniated Guano	7.00	8.24	2.50
Standard 7 Per Cent Ammonia Guano	7.00	5.76	5.00
American Irish Potato Grower	7.00	4.12	5.00
American 7-7-7 for Irish Potatoes	7.00	5.76	7.00
American Fish Scrap Guano	7.00	3.29	4.00
American Eagle Guano	8.00	2.47	3.00
American No. 1 Fertilizer	8.00	2.06	3.00
American No. 2 Fertilizer	8.00	1.65	2.00
American Cotton Compound	8.00	1.65	2.00
American Standard Cotton Grower	10.00	1.65	2.00
American Special Potash Mixture for Wheat	8.00	----	4.00
American High Grade Acid Phosphate	16.00	----	----
Special Formula Guano for Yellow Leaf Tobacco	9.00	2.88	5.00
Special Potato Guano	7.00	4.12	7.00
Special Potato Manure	6.00	4.12	7.00
Bone and Peruvian Guano	8.00	1.65	2.00
Bone and Peruvian Guano	8.75	1.65	2.00
A. L. Hanna's Special	8.00	1.65	2.00
Peruvian Mixture	8.50	1.65	1.50
Blood and Bone Compound	8.50	2.06	1.00
Bob White Fertilizer for Tobacco	8.00	2.06	1.50
J. G. Miller & Co.'s Yellow Leaf Fertilizer	8.00	2.47	3.00
Pitt County Special Fertilizer	9.00	2.88	5.00
N. C. and S. C. Cotton Grower	8.00	3.29	4.00
Peruvian Mixture Guano Especially Prepared for Sweet Potatoes	8.00	3.29	5.00
Kale, Spinach and Cabbage Guano	7.00	4.12	4.00
Stable Manure Substitute	7.00	2.47	4.00
Strawberry and Asparagus Guano	9.00	2.88	9.00
Ground Fish Scraps	----	8.24	----
Nitrate of Soda	----	14.83	----
Raw Bone Meal Total	22.50	3.71	----
Muriate of Potash	----	----	49.00
Sulphate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Eagle Brand Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
High Grade Acid Phosphate	14.00	----	----
Dissolved Bone and Potash for Corn and Wheat	10.00	----	2.00
Double Dissolved Bone and Potash	10.00	----	4.00
Cooper's Genuine Eagle Island	8.00	1.65	2.00
Atlantic Fertilizer Co., Baltimore, Md.—			
Farmers' Alkaline Bone	10.00	----	2.00
Big 4, Blood, Bone, Fish and Potash for Early Truck	6.00	2.47	6.00
American Agricultural Chemical Co., New York—			
Holmes & Dawson Productive Cotton and Peanut Grower	9.00	2.26	2.00
Pure Ground Bone Total	20.60	3.70	----
Pure Ground Bone Total	20.60	3.70	----
Fine Ground Bone Total	22.80	2.47	----
Holmes & Dawson Triumph Soluble	8.00	1.65	2.00
Holmes & Dawson Gold Dust Guano	9.00	1.65	2.00
Savage Sons & Co. Purity Guano	8.00	1.65	2.00
Lazaretto Truckers' Favorite	6.00	5.76	5.00
Lazaretto Early Trucker	7.00	4.11	5.00
Lazaretto Challenge Fertilizer	8.00	2.47	3.00
Lazaretto Special for Tobacco and Potatoes	8.00	2.47	3.00
Lazaretto Climax Plant Food	8.00	2.06	3.00
Lazaretto Universal Compound	8.00	2.06	2.00
Lazaretto Crop Grower	8.00	1.65	2.00
Lazaretto High Grade Dissolved Bone and Potash	12.00	----	5.00
Lazaretto Alkaline Bone Phosphate	12.00	----	3.00
Lazaretto Dissolved Bone and Potash	10.00	----	2.00
Lazaretto Acid Phosphate	14.00	----	----
Reese Pacific Guano	8.00	1.65	2.00
Reese Pacific Guano for Tobacco	8.50	2.47	2.50
Canton Chemical Truckers' Special 7 Per Cent	6.00	5.76	5.00
Canton Chemical Excelsior Trucker	7.00	4.11	5.00
Canton Chemical Baker's Tobacco Fertilizer	8.00	2.47	3.00
Canton Chemical Baker's Fish Guano	8.00	1.65	2.00
Canton Chemical Baker's Dissolved S. C. Bone	14.00	----	----
Canton Chemical Baker's Standard High Grade Guano	8.00	2.06	3.00
Canton Chemical Gem Phosphate	12.00	----	----
Canton Chemical Soluble Bone and Potash	10.00	----	2.00
Canton Chemical Soluble Alkaline Bone	12.00	----	3.00
Canton Chemical Game Guano	8.00	1.65	2.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Canton Chemical CCC Special Compound	8.00	2.06	6.00
Canton Chemical Superior High Grade Fertilizer	8.00	2.47	3.00
Detrick's Gold Basis	6.00	5.76	5.00
Detrick's Special Trucker	7.00	4.11	5.00
Detrick's Gold Eagle	6.00	2.47	6.00
Detrick's Quickstep Bone and Potash	8.00	2.47	4.00
Detrick's Special Tobacco Fertilizer	8.00	2.47	3.00
Detrick's Vegetator Ammoniated Superphosphate	8.00	2.06	3.00
Detrick's Kangaroo Komplete Kompound	8.00	1.65	3.00
Detrick's Royal Crop Grower	8.00	1.65	2.00
Detrick's Fish Mixture	8.00	1.65	2.00
Detrick's Victory Alkaline Bone	12.00	----	5.00
Detrick's P. & B. Special	12.00	----	3.00
Detrick's Soluble Bone and Potash Phosphate	10.00	----	2.00
Detrick's XXtra Acid Phosphate	14.00	----	----
Zell's 10 Per Cent Trucker	5.00	8.23	3.00
Zell's 7 Per Cent Potato and Vegetable Manure	6.00	5.76	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Zell's Truck Grower	7.00	4.11	5.00
Zell's Special Compound for Potatoes and Vegetables	8.00	2.47	4.00
Zell's Tobacco Fertilizer	8.00	2.47	4.00
Zell's Bright Tobacco Grower	8.00	2.47	3.00
Zell's Royal High Grade Fertilizer	9.00	2.06	2.00
Zell's Special Compound for Tobacco	8.00	1.65	2.00
Zell's Calvert Guano	8.00	1.65	2.00
Zell's Ammonia Bone Superphosphate	8.00	1.65	2.00
Zell's High Grade Potash Fertilizer	10.00	----	4.00
Zell's Reliance High Grade Manure	8.00	2.47	3.00
Sulphate of Potash	----	----	48.00
Zell's Fish Guano	8.00	1.65	2.00
Zell's Dissolved Bone Phosphate	14.00	----	----
Holmes & Dawson's Crop Worker	8.00	1.65	2.00
Fidelity Crop Grower	8.00	.82	3.00
16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	.12
Nitrate of Soda	----	15.00	----
Zell's Electric Phosphate	10.00	----	2.00
Bull Head Potato and Vegetable Manure	6.00	4.11	7.00
Enterprise Alkaline Phosphate	8.00	----	5.00
Royal Alkaline Bone	10.00	----	4.00
Palmetto Alkaline Phosphate	8.00	----	4.00
Slingluff's Bright Mixture	8.00	2.06	2.50
Pure Ground Bone Total	20.61	3.29	----
Muriate of Potash	----	----	50.00
A. A. C. Co.'s 16 Per Cent Superphosphate	16.00	----	----
Detrick's Superior Animal Bone Fertilizer	9.00	1.85	4.00
Lazaretto Retriever Animal Bone Fertilizer	9.00	1.85	4.00
Zell's Victoria Animal Bone Compound	9.00	1.85	4.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Purity Guano—2-8-2—for S. S. & Co.	8.00	1.65	2.00
Lazaretto Peanut Grower	9.00	.82	3.00
Sulphate of Potash	----	----	48.00
A. D. Adair & McCarty Bros., Atlanta, Ga.—			
Adair's Wheat and Grass Grower	10.00	----	4.00
Adair's Dissolved Bone	12.00	----	----
Adair's High Grade Dissolved Bone	14.00	----	----
Adair's High Grade Dissolved Bone, No. 16	16.00	----	----
Adair's Special Potash Mixture	8.00	----	4.00
Adair's Ammoniated Dissolved Bone	8.00	1.65	2.00
Adair's Soluble Pacific Guano	10.00	1.65	2.00
McCarty's Wheat Special	10.00	.82	3.00
McCarty's Corn Special	10.00	.82	3.00
McCarty's Soluble Bone	10.00	.82	1.00
McCarty's High Grade Corn Grower	10.00	1.65	2.00
McCarty's High Grade Cotton Grower	10.00	1.65	2.00
Planters' Soluble Fertilizer	8.00	1.65	2.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
High Grade Potash Compound	10.00	----	4.00
Golden Grain Compound	8.00	.82	3.00
A. & M. 13-4	13.00	----	4.00
David Harum High Grade Guano	10.00	3.30	4.00
Adair's H. G. Blood and Bone	10.00	2.47	3.00
Special Wheat Compound	10.00	1.65	4.00
Special Corn Compound	10.00	1.65	4.00
Special Vegetable Compound	10.00	1.65	4.00
Special Potato Compound	10.00	1.65	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Special Tomato Compound	10.00	1.65	4.00
Old Time Fish Scrap Guano	10.00	1.65	2.00
Adair's Wheat and Grass Grower, No. 8	10.00	----	8.00
Adair's Wheat and Grass Grower, No. 6	10.00	----	6.00
Adair's Wheat and Grass Grower, No. 5	10.00	----	5.00
H. G. Potash Compound, No. 8	10.00	----	8.00
H. G. Potash Compound, No. 6	10.00	----	6.00
H. G. Potash Compound, No. 5	10.00	----	5.00
Adair's Special Potash Mixture, No. 5	8.00	----	5.00
Adair's Special Potash Mixture, No. 6	8.00	----	6.00
Adair's Special Potash Mixture, No. 8	8.00	----	8.00
McCarty's Potash Formula	12.00	----	2.00
McCarty's Potash Formula, No. 4	12.00	----	4.00
McCarty's Potash Formula, No. 5	12.00	----	5.00
A & M. 13—2	13.00	----	2.00
Asheville Packing Co., Asheville, N. C.—			
Asheville Packing Co.'s Extra H. G. Fruit and Potato Special	8.00	1.65	6.00
Asheville Packing Co.'s Special Tobacco and Vegetable Fertilizer	8.00	2.47	3.00
Asheville Packing Co.'s Extra H. G. Vegetable Special	8.00	4.12	5.00
Asheville Packing Co.'s H. G. Muriate of Potash	----	----	52.00
Asheville Packing Co.'s Standard Grade Acid Phosphate	12.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	13.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	14.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	15.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	16.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	17.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	18.00	----	----
Asheville Packing Co.'s Pure Bone Meal—Total	18.00	2.47	----
Asheville Packing Co.'s Standard Potato	9.00	.82	2.00
Asheville Packing Co.'s Extra H. G. Potash Mixture	13.00	----	4.00
Asheville Packing Co.'s Celebrated Tankage	10.00	4.12	----
Asheville Packing Co.'s Extra H. G. Fertilizer	10.00	3.30	4.00
Asheville Packing Co.'s Extra H. G. Blood and Bone	10.00	2.47	3.00
Asheville Packing Co.'s H. G. Wheat, Corn and Oat Special	10.00	1.65	2.00
Asheville Packing Co.'s Extra H. G. Cotton Special	10.00	1.65	2.00
Asheville Packing Co.'s Standard Bone and Potash	10.00	.82	1.00
Asheville Packing Co.'s H. G. Special Potash Mixture	10.00	----	4.00
Asheville Packing Co.'s Standard Wheat Grower	10.00	----	2.00
Asheville Packing Co.'s Complete Fertilizer	8.00	1.65	2.00
Asheville Packing Co.'s Corn and Wheat	8.00	.82	3.00
Asheville Packing Co.'s Bone and Potash	8.00	----	4.00
Asheville Packing Co.'s Superior Potato Fertilizer	10.00	----	6.00
Asheville Packing Co.'s XX Acid Phosphate	12.00	----	----
Asheville Packing Co.'s Champion Potato Fertilizer	8.00	1.65	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Baugh & Sons Co., Phila., Pa., and Norfolk, Va.—			
Baugh's 16 Per Cent Acid Phosphate	16.00	----	----
Baugh's 5-6-5 Guano	6.00	4.12	5.00
Baugh's New Process 10 Per Cent Guano	5.00	8.23	2.50
Baugh's Fish Mixture	8.00	1.65	2.00
Baugh's Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Fish, Bone and Potash	8.00	3.30	4.00
Baugh's Animal Bone and Potash Compound for All Crops	8.00	1.65	2.00
Baugh's Complete Animal Bone Fertilizer	8.00	1 65	5.00
Baugh's Peruvian Guano Substitute for Potatoes and All Vegetables	6.00	4.12	7.00
Baugh's Grand Rapids High Grade Truck Guano	8.00	2.47	3.00
Baugh's Special Tobacco Guano	8.00	2.47	5.00
Baugh's Fruit and Berry Guano	8.00	2.47	10.00
Baugh's 7 Per Cent Potato Guano	6.00	5 76	5.00
Baugh's Soluble Alkaline Superphosphate	10.00	----	2.00
Baugh's Special Manure for Melons	10.00	3.30	4.00
Baugh's Sweet Potato Guano for Sweet Potatoes, Peas and Melons	8.00	2.47	3.00
Baugh's Potato and Truck Special	7.00	2.88	7.00
Baugh's Special Potato Manure	5.00	1.65	10.00
Baugh's Fine Ground Fish	6.87	8.23	----
Baugh's Raw Bone Meal, Warranted Pure, Total	21.50	3.70	----
Baugh's High Grade Acid Phosphate	14.00	----	----
Baugh's High Grade Tobacco Guano	8.00	2.47	3.00
Baugh's High Grade Potash Mixture	10.00	----	4.00
Baugh's High Grade Cotton and Truck Guano	10.00	1.65	2.00
Baugh's Pure Animal Bone and Muriate of Potash Mixture	15.00	2.47	5.00
Baugh's Pure Dissolved Animal Bones	13.00	2.06	----
Glover's Special Potato Guano	7.00	3.30	8.00
Fine Ground Blood	----	13.00	----
Genuine German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	48.00
High Grade Sulphate of Potash	----	----	48.00
Baugh's Excelsior Guano	8.00	1.00	3.00
Randolph's Bone and Potash Mixture for All Crops	10.00	----	3.00
Nitrate of Soda	----	15.28	----
Lobos Peruvian Guano ---- Total	14.00	1.65	1.70
Baugh's Cabbage Guano	6.00	5.76	5.00
Baugh's Wheat Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Animal Bone and Potash Compound for All Crops	8.00	1.65	2.00
Baugh's Special Guano	8.00	3.30	6.00
Hassell's Tobacco Guano	9.00	2.26	2.00
Benthall's Special Guano	8.00	1.65	2.00
Wilson's Special for Tobacco	6.00	2.47	6.00
J. A. Benton, Ruffin, N. C.—			
Benton's North Carolina Bright Fertilizer	9.00	1.65	2.00
Best & Thompson, Goldsboro, N. C.—			
Pure German Kainit	----	----	12.00
Baltimore Fertilizer Co., Baltimore, Md.			
Honest Ammoniated Bone	8.00	1.60	2.00
Honest Sweet Potato Grower	8.00	2.40	4.00
Honest Dixie Trucker	6.00	4.00	7.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Honest Trucker	6.00	4.00	5.00
Honest Revenue	7.00	2.40	6.00
Honest Bone and Potash	10.00	----	2.00
Honest Acid Phosphate	14.00	----	----
Blackstone Guano Co., Inc., Blackstone, Va.—			
Special Mixture	----	9.88	----
Dissolved Bone	10.00	1.03	1.00
Red Letter for Tobacco	8.00	1.65	2.00
Jim Crow for Tobacco	8.00	2.47	3.00
Alliance for Tobacco	8.00	1.65	2.00
Alliance Guano	8.00	1.65	2.00
B. G. Co., Inc., Acid Phosphate	14.00	----	----
B. G. Co., Inc., Bone and Potash	10.00	----	2.00
Old Bellefonte	8.00	3.30	2.00
Blackstone Special for Tobacco	9.00	2.47	3.00
Bellefonte for Tobacco	8.00	2.47	2.00
Hard Cash for Tobacco	8.00	2.06	2.00
Carolina Special for Tobacco	8.00	1.65	4.00
Peanut Special	8.00	1.03	6.00
Pure Bone and Potash	8.00	----	6.00
B. G. Co., Inc., Bone and Potash	10.00	----	4.00
Tobacco Special	8.00	2.47	3.00
King of Corn Fertilizer	10.00	1.03	2.00
Leader of Tobacco	8.00	1.65	2.00
Prize Winner	8.00	2.47	3.00
King of Tobacco Fertilizer	8.00	3.30	2.00
Wrapper Brand	8.00	2.47	3.00
John L. Bailey Co., Elm City, N. C.—			
Fairmont Guano	8.00	2.47	3.00
Stag Brand Fertilizer	8.00	1.65	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.47	3.00
Bradley Fertilizer Co., Charleston, S. C.—			
High Grade Bradley's Dissolved Phosphate	16.00	----	----
Standard Bradley's Palmetto Acid Phosphate	12.00	----	----
Standard Bradley's XXX Acid Phosphate	13.00	----	----
Standard Bradley's Wheat Grower	10.00	----	2.00
Standard Bradley's Bone and Potash	10.00	----	2.00
Standard Bradley's Cereal Guano	8.00	1.65	2.00
Standard Bradley's X Guano	8.00	1.65	2.00
High Grade Bradley's Guano	8.00	2.46	3.00
High Grade Bradley's Circle Guano	8.00	3.29	4.00
High Grade Bradley's Acid Phosphate	14.00	----	----
Standard Bradley's Acid Phosphate	12.00	----	----
Standard Bradley's Ammoniated Dissolved Bone,	9.00	1 85	1.00
Standard Bradley's Patent Superphosphate	9.00	1.85	1.00
Standard B. D. Sea Fowl Guano	9.00	1.85	1.00
Standard Eagle Ammoniated Bone Superphosphate	9.00	1.85	1.00
German Kainit	----	----	12.00
High Grade Bradley's Potash and Phosphate	10.00	----	4.00
The Berkley Chemical Co., Norfolk, Va.—			
Royal Truck Grower	6.00	5.76	5.00
Mascot Truck Guano	7.00	4.12	5.00
Victory Special Crop Grower	7.00	3.30	4.00
Advance Crop Grower	8.00	2.47	3.00
Berkley Tobacco Guano	8.00	2.47	3.00
Monitor Animal Bone Fertilizer	9.00	1.85	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Select Crop Grower	8.50	2.06	2.50
Brandon Superphosphate	8.00	1.65	2.00
Berkley Plant Food	10.00	----	4.00
Berkley Bone and Potash Mixture	11.00	----	2.00
Berkley Acid Phosphate	14.00	----	----
Superior Bone and Potash	8.00	----	4.00
Laurel Potash Mixture	10.00	----	2.00
Resolute Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Long Leaf Tobacco Grower	8.00	1.65	2.00
Berkley Peanut and Grain Grower	8.00	1.00	4.00
The Leader of the World	5.00	3.30	5.00
Bragaw Fertilizer Co., Washington, N. C.—			
Chocowinity Special Tobacco Guano	5.00	3.29	6.00
Tuckahoe Tobacco Guano	8.00	2.06	3.00
Beaufort County Guano	8.00	2.47	3.00
Old Reliable Premium Guano	8.00	1.65	2.00
Havana Tobacco Guano	8.00	2.47	3.00
Palmetto Acid Phosphate	14.00	----	----
Tar Heel Guano	8.00	1.65	2.00
Long Acre Bone Phosphate	14.00	----	----
Pamlico Trucker	7.00	4.12	8.00
Riverview Potato Grower	6.00	5.76	5.00
Genuine German Kainit	----	----	12.00
Farmers' Union Meal Mixture	9.00	2.26	2.00
Sunrise Tobacco Guano	4.00	2.47	5.00
The W. G. Buie Co., Fontcol, N. C.—			
Nitrate of Soda	----	14.76	----
Columbia Guano Co., Norfolk, Va.—			
Pure Raw Bone Meal—Total	21.50	3.71	----
Columbia High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Columbia 14 Per Cent Acid Phosphate	14.00	----	----
Columbia Dissolved Bone	13.00	----	--
Columbia Acid Phosphate	12.00	----	----
Columbia 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Columbia 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Columbia Bone and Potash for Grain	10.00	----	3.00
Columbia Bone and Potash Mixture	10.00	----	2.00
Columbia Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Columbia Special Truck Guano	8.00	3.30	4.00
Columbia Potato Guano	7.00	4.12	5.00
Columbia C. S. M. Special	9.00	2.27	2.00
Columbia Special 4-8-3	8.00	3.30	3.00
Columbia Special Wheat Fertilizer	8.00	1.65	2.00
Columbia Special Tobacco Guano	8.00	2.06	2.00
Olympia Cotton Guano	8.00	2.47	3.00
Columbia Soluble Guano	8.00	1.65	2.00
Crown Brand Peanut Guano	7.00	----	5.00
Our Best Meal Guano	8.00	2.47	3.00
Spinola Peanut Grower	8.00	1.02	4.00
Crew's Special	5.85	4.49	10.00
Hayes' Special	8.00	3.30	3.00
McRae's Special	9.00	4.12	7.00
McRae's High Grade Guano	8.00	3.30	7.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Hyco Tobacco Guano	8.00	2.47	3.00
Carolina Soluble Guano	9.00	1.65	1.00
Pelican Ammoniated Guano	9.00	3.30	4.00
Sulphate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Nitrate of Soda	----	15.22	----
Trojan Tobacco Guano	8.00	3.30	4.00
Columbia 10-5 Bone and Potash Mixture	10.00	----	5.00
Columbia Top Dresser	----	7.42	3.00
Roanoke Ammoniated Guano	9.00	1.65	3.00
Cumberland Bone and Phosphate Co., Portland, Me., and Charleston, S. C.—			
Standard Cumberland Bone and Superphosphate of Lime	9.00	1.85	1.00
The Coe-Mortimer Co., Charleston, S. C.—			
Thomas Phosphate (Big Slag) Ex. "Zeeburg" Total	14.75	----	----
Nitrate of Soda	----	14.76	----
Genuine Peruvian Guano Ex. S.S. Cela Chincha Island Total	9.00	5.53	2.25
Kainit	----	----	12.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Dried Fish No. 1 Total	6.86	8.64	----
Calder Bros., Wilmington, N. C.—			
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.80	----
Craven Chemical Co., New Bern, N. C.—			
C. E. Foy High Grade Guano (Trade Mark)	8.00	2.47	3.00
Jewel Acid Phosphate	14.00	----	----
Neuse Truck Grower	6.00	4.94	6.00
Pantego Potato Guano	7.00	4.12	7.00
Hanover Standard Guano	8.00	3.29	4.00
Elite Cotton Guano	8.00	1.65	2.00
Marvel Great Truck Grower	8.00	2.06	3.00
Duplin Tobacco Guano	8.00	2.47	3.00
Gaston High Grade Fertilizer	8.00	2.47	3.00
Trent Bone and Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Craven Chemical Co.'s Truck Guano, 5-10-2½	5.00	8.24	2.50
Panama 16 Per Cent Acid Phosphate	16.00	----	----
William H. Camp, Petersburg, Va.—			
Lion and Monkey Bone and Potash	10.00	----	4.00
Camp's Red Head Chemicals	8.00	2.25	2.00
Camp's Green Head Chemicals, Irish Potato	7.00	6.15	10.00
Camp's Yellow Head Chemicals	8.00	2.87	7.50
Lion and Monkey for Tobacco	8.00	2.46	3.00
Lion and Monkey Brand, 8-2-2	8.00	1.65	2.00
Clayton Oil Mill, Clayton, N. C.—			
Clayton Guano	8.00	2.47	3.00
Cotton Queen	8.00	1.65	2.00
Summer Queen	8.00	1.65	2.00
Clayton Special Tobacco Grower	8.00	2.46	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Cowell, Swan & McCotter Co., Bayboro, N. C.—			
Cowell, Swan & McCotter Co.'s Cabbage Guano	5.00	8.25	2.50
Crop Guano	8.00	1.65	2.00
Rust Proof Cotton Guano	8.00	1.65	3.00
Standard Cotton Grower	8.00	3.30	3.00
Quick Grower Guano	8.00	2.06	3.00
Great Cabbage and Potato Guano	7.00	5.77	7.00
Aurora Trucker	7.00	4.12	7.00
Oriental Trucker	7.00	4.12	8.00
High Grade Truck Guano	7.00	4.12	5.00
Potato Favorite Guano	7.00	3.30	7.00
Champion Guano	8.00	2.47	3.00
Bone Phosphate	14.00	----	----
German Kainit	----	----	12.00
Cowell's Great Tobacco Grower	8.00	2.47	3.00
Chickamauga Fertilizer Works, Atlanta, Ga.—			
Chickamauga Complete Fertilizer	8.00	1.65	2.00
Chickamauga High Grade Fertilizer	10.00	1.65	2.00
Chickamauga High Grade Plant Food	10.00	1.65	2.00
Chickamauga Wheat Special	10.00	.82	3.00
Chickamauga Corn Special	10.00	.82	3.00
Chickamauga Standard Corn Grower	8.00	1.65	2.00
Chickamauga Dissolved Bone	12.00	----	----
Chickamauga High Grade Dissolved Bone	14.00	----	----
Chickamauga High Grade Dissolved Bone, No. 16,	16.00	----	----
Chickamauga Bone and Potash	10.00	----	2.00
Chickamauga Alkaline Bone	10.00	----	4.00
Georgia Home Guano	8.00	1.65	2.00
Special Corn Compound	10.00	1.65	4.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
Old Glory Mixture	10.00	.82	1.00
Chickamauga Wheat and Corn Grower	10.00	----	4.00
Cumbahee Fertilizer Co., Charleston, S. C.			
Melon Fertilizer	10.00	3.30	5.00
Canteloupe Fertilizer	10.00	2.46	10.00
Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.—			
Horne & Son's High Grade Bone and Potash	11.00	----	5.00
Buncombe Wheat Grower	8.00	----	4.00
Buncombe Corn Grower	8.00	----	4.00
Morris & Scarboro's Special Bone and Potash	10.00	----	3.00
Electric Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Climax Dissolved Bone	14.00	----	----
Sterling Acid Phosphate	13.00	----	----
Staple Acid Phosphate	12.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Bone Meal Total	20.00	3.91	----
Bone Meal Total	26.00	2.14	----
Crown Ammoniated Guano	8.00	1.65	2.00
Ely Ammoniated Fertilizer	8.00	1.65	2.00
Eclipse Ammoniated Guano	8.00	2.06	2.00
Planters' Pride	8.00	2.06	3.00
Caraleigh Special Tobacco Guano	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Pacific Tobacco and Cotton Grower	9.00	2.26	2.00
Horne's Best	8.00	2.47	3.00
Caraleigh Top Dresser	3.00	8.24	4.00
Rhamkatte Special Tobacco	8.00	3.29	6.00
Special 8-4-4	8.00	3.29	4.00
Comet Guano	8.00	.82	3.00
W. S. Clark & Son, Tarboro, N. C.—			
Genuine German Kainit	----	----	12.00
W. B. Cooper, Wilmington, N. C.—			
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.00	----
Nitrate of Soda	----	15.00	----
Contentnea Guano Co., Wilson, N. C.—			
Contentnea 16 Per Cent Acid	16.00	----	----
Special Tobacco Formula	8.00	2.06	6.00
Special Formula for Cotton	7.00	2.47	3.25
Contentnea Corn Special	5.00	1.65	5.00
Davis' Best Fertilizer	8.00	3.29	6.00
Special Formula for Tobacco	8.00	2.88	5.00
Special Formula Fertilizer	9.00	2.06	5.00
Special Formula for Tobacco	8.00	3.28	7.00
High Grade 14 Per Cent Acid	14.00	----	----
Nitrate of Soda	----	14.81	----
Pick Leaf	8.00	2.47	3.00
Top Notch	8 00	2.47	3.00
Blood and Bone Cotton Compound	8.00	1.65	2.00
Contentnea Top Dresser	3.00	8.23	5.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone and Potash Mixture	10.00	----	4.00
8-4½-7 for Tobacco	8.00	3.70	7.00
8-4½-7 for Cotton	8.00	3.70	7.00
Contentnea Cotton Grower	8.00	2.47	2.50
German Kainit	----	----	12.00
Special Formula Fertilizer	8.00	3.29	4.00
Woodard's Special Tobacco Fertilizer	7.00	3.90	5.00
Whitehead's Farm Cotton Grower	6.00	2.47	5.00
Howard & Williams' Cotton Special	8.00	2.47	5.00
Howard & Williams' Tobacco Special	6.00	2.47	6.00
C. P. Dey, Beaufort, N. C.—			
Ground Fish Scrap	----	8.24	----
Dixie Guano Co., Durham, N. C.—			
Niagara Soluble Bone	8.00	2.05	2.00
Old Plantation Superphosphate	8.00	1.65	2.00
Dixie Champion for Wheat and Corn	10.50	----	1.50
Dixie 16 Per Cent Acid Phosphate	16.00	----	----
Dixie 14 Per Cent Acid Phosphate	14.00	----	----
Dixie Star Ammoniated	9.00	1.65	1.00
Jeff Davis Special	9.00	2.26	2.00
Radium Brand Guano	8.00	3.28	5.00
Carolina Special Ammoniated	8.00	2.46	3.00
Sulky Plow Brand Guano	8.00	2.46	2.00
Battle's Blood and Bone Fertilizer	8.00	2.05	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Etiwan Fertilizer Co., Charleston, S. C.—			
Plow Brand Ammoniated Fertilizer	8.00	1.65	2.00
Plow Brand Special Tobacco Fertilizer	8.00	3.30	4.00
Plow Brand Acid Phosphate with Potash	11.00	----	1.00
Etiwan Potash Bone	10.00	----	4.00
Etiwan Special Potash Mixture	8.00	----	4.00
Etiwan Soluble Bone with Potash	10.00	----	3.00
Etiwan Acid Phosphate with Potash	11.00	----	1.00
Etiwan Dissolved Bone	13.00	----	----
Etiwan High Grade Acid Phosphate	14.00	----	----
Etiwan Superior Cotton Fertilizer	8.00	3.30	6.00
Etiwan Special Cotton Fertilizer	8.00	3.30	4.00
Etiwan Cotton Compound	8.00	2.47	3.00
Etiwan Ammoniated Fertilizer	8.00	1.65	2.00
Etiwan High Grade Cotton Fertilizer	8.00	2.47	2.00
Diamond Soluble Bone	13.00	----	----
Diamond Soluble Bone with Potash	10.00	----	2.00
XX Acid Phosphate with Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Etiwan Blood and Bone Guano	9.00	2.06	1.00
Plow Brand Raw Bone Superphosphate	9.00	2.06	1.00
Farmers Guano Co., Raleigh, N. C.—			
Farmers' Formula	7.00	2.47	3.25
Special Bone and Potash Mixture	10.00	----	4.00
Century Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
14 Per Cent Acid Phosphate	14.00	----	----
Farmers' Acid Phosphate	13.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone Meal—Total	20.00	3.91	----
Nitrate of Soda	----	15.65	----
Special Bone and Potash	8.00	----	4.00
State Standard Guano	8.00	1.64	2.00
Big Crop Guano	8.00	2.06	3.00
Toco Tobacco Guano	8.00	2.06	3.00
Golden Grade Guano	8.00	2.47	3.00
Farmers' Top Dresser	3.00	8.24	4.00
Floradora Guano Co., Laurinburg, N. C.—			
Floradora	8.00	3.29	4.00
Ocelo	8.00	2.47	3.00
Rocky Ford	10.00	2.47	7.00
Scotland Special	6.40	2.13	3.00
North Roberson Special	9.00	1.64	4.00
Fremont Oil Mills, Fremont, N. C.—			
Up-to-date	8.00	1.65	2.00
Nahunta Special	8.00	2.47	3.00
Fremont Prolific Fertilizer	9.00	2.26	2.00
Yelverton Bros.' Plant Food	8.00	2.47	3.00
Fremont Standard Fertilizer	8.00	2.47	3.00
Home Run Guano	8.00	1.65	2.00
Fremont Oil Mill Co.'s Special for Tobacco	8.00	2.47	5.00
Fomco	8.00	3.29	4.00
Nitrate of Soda	----	15.63	----
Kainit	----	----	12.00
Acid Phosphate	16.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Barnes & Flower's Cotton Grower	8.00	1.65	2.00
Wayne County Standard	8.00	2.47	3.00
Carolina C. S. M. Compound	9.00	2.26	2.00
Square Deal	8.00	2.47	3.00
Fremont H. G. Guano	8.00	2.29	4.00
Fremont Tobacco Guano	8.00	2.47	5.00
Acid Phosphate	14.00	----	----
Best Bros. Tobacco Special	8.00	2.47	8.00
Farmers Cotton Oil Co., Wilson, N C.—			
German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Contentnea Acid Phosphate	13.00	----	----
Bonum Acid Phosphate	14.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
Xtra Good Bone and Potash	10.00	----	2.00
Crop King Guano	8 00	1.65	2.00
Farmers' Special Guano	8.00	1.65	2.00
Planters' Friend Guano	8.00	2.06	3.00
Carolina Choice Tobacco Guano	8.00	2.06	3.00
Wilson High Grade Guano	8.00	2.27	2.00
J. D. Farrior's Special Guano	8.00	2.47	3.00
Graves' Cotton Grower Guano	8.00	2.47	3.00
Golden Gem Guano	8.00	2.47	3.00
Regal Tobacco Guano	8.00	2.88	5.00
Dean's Special Guano	8.00	3.70	7.00
Perfect Top Dresser	2.00	8.23	5.00
Wilson Top Dresser	2.00	9.05	4.00
Washington's Corn Mixture Guano	10.00	.82	5.00
Newsome's Tobacco Special	8.00	2.47	4.00
Farmers Fertilizer Co., Spartanburg, S. C.—			
Best of All Standard Grade 9-2-2	9.00	1.64	2.00
H. G. Fertilizer 8-3-3	8.00	2.47	3.00
H. G. Fertilizer 8-4-4	8.00	3.29	4.00
W. R. Grace & Co., New York—			
Nitrate of Soda	----	14.85	----
James Garland & Co., Richmond, Va.—			
Bonebase Standard Fertilizer	9.00	1.65	2.00
Griffith & Boyd Co., Baltimore, Md.—			
High Grade Acid Phosphate	14.00	----	----
Spring Crop Grower	6.50	1.65	4.50
Genuine German Kainit	----	----	12.00
Ammoniated Bone Phosphate	8.00	1.65	2.00
7 Per Cent Potash Guano	5.00	5.77	5.00
Early Trucker	7.00	4.12	8.00
Special Grain Grower	10.00	----	2.00
Germofert Manufacturing Co., Charleston, S. C.—			
Germofert Patented Special Cotton Grower	6.00	2.47	3.00
Germofert Patented Tobacco Grower	2.00	3.29	6.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Home Fertilizer and Chemical Co., Baltimore, Md.—			
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
German Kainit	----	----	12.00
Home High Grade Acid Phosphate	14.00	----	----
Home Alkaline Bone	10.00	----	2.00
Home Cereal Fertilizer	8.00	1.65	2.00
Home Dissolved Animal Bone	12.00	1.65	2.00
Home Vegetable Fertilizer	6.00	4.12	6.00
Home Potato Grower	6.00	3.30	4.00
Home Bone and Potash	10.00	----	5.00
Phœnix Crop Grower	8.00	2.48	2.00
Matchless Guano	8.00	1.65	4.00
Home Fertilizer	----	5.77	7.00
Cerealite Top Dressing	----	7.68	3.00
Zancey's Formula for Yellow Leaf Tobacco	8.00	2.48	2.00
Hadley, Harriss & Co., Wilson, N. C.—			
Hadley Boss Guano	8.00	2.26	2.50
German Kainit	----	----	12.00
Daisy Fish Mixture	8.00	1.05	2.00
John Hadley Special High Grade Plant Food	8.00	1.64	2.00
Top Dressing	----	7.38	6.00
Golden Weed Tobacco Grower	8.00	2.47	3.00
S. B. Harrell & Co., Norfolk, Va.—			
Harrell's Acid Phosphate	14.00	----	----
Harrell's Champion Cotton and Peanut Grower	8.00	1.65	2.00
Harrell's Truck Guano	6.00	5.76	5.00
Hampton Guano Co., Norfolk, Va.—			
Virginia Truck Grower	6.00	5.76	5.00
Reliance Truck Guano	7.00	4.12	5.00
Little's Favorite Crop Grower	7.00	3.30	4.00
P. P. P. (Princess Prolific Producer)	8.00	2.47	3.00
Hampton Tobacco Guano	8.00	2.47	3.00
Arlington Animal Bone Fertilizer	9.00	1.85	4.00
Alpha Crop Grower	8.50	2.06	2.50
Shirley's Superphosphate	8.00	1.65	2.00
Hampton Crop Grower	10.00	----	4.00
Hampton Bone and Potash Mixture	11.00	----	2.00
Dauntless Potash Mixture	10.00	----	2.00
Hampton Acid Phosphate	14.00	----	----
Supreme Acid Phosphate	16.00	----	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Genuine German Kainit	----	----	12.00
Excelsior Bone and Potash	8.00	----	4.00
Extra Tobacco Guano	8.00	1.65	2.00
Hampton Special Grain and Peanut Fertilizer	8.00	1.00	4.00
M. P. Hubbard & Co., Baltimore, Md.—			
Hubbard's Bermuda Guano	7.00	5.78	4.00
Hubbard's Special Cotton and Corn Fertilizer	7.00	5.78	4.00
Hubbard's Maryland Special	7.00	4.13	5.00
Hubbard's Gold Leaf Guano	8.00	2.48	3.00
Hubbard's Celebrated Bone Phosphate	8.00	1.66	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Hubbard's S. C. Phosphate	16.00	----	----
Ground Fish	----	8.25	----
Muriate of Potash	----	----	50.00
Hubbard Fertilizer Co., Baltimore, Md.—			
Hubbard's Special Potato	6.00	3.29	10.00
Hubbard's 7 Per Cent Royal Seal	6.00	5.76	5.00
Hubbard's 10 Per Cent Trucker Guano	4.00	8.23	4.00
Hubbard's 5 Per Cent Royal Seal	6.00	4.11	5.00
Hubbard's Blood, Bone and Potash	8.00	3.29	7.00
Hubbard's Jersey Trucker	8.00	1.65	10.00
Hubbard's Royal Ensign	8.00	2.47	4.00
Hubbard's Yellow Wrapper	8.00	2.47	3.00
Hubbard's Fish Compound	8.00	1.65	3.00
Hubbard's Exchange Guano	8.00	1.65	2.00
Hubbard's Special Mixture	10.00	----	4.00
Hubbard's Bone and Potash	10.00	----	2.00
Hubbard's Heavy Long Leaf Guano for Tobacco	4.00	3.32	6.00
Hubbard's New Process Top Dresser	----	7.66	3.00
L. Harvey & Son Co., Kinston, N. C.—			
Nitrate of Soda	----	15.50	----
The Imperial Co., Norfolk, Va.—			
Imperial F. and B. Cotton Guano	8.00	2.06	3.00
Imperial Bright Tobacco Guano	8.00	2.06	3.00
Imperial 5-6-7 Potato Guano	6.00	4.11	7.00
Imperial Snowflake Cotton Grower	8.00	3.29	4.00
Imperial Peanut and Corn Guano	8.00	1.65	2.00
Imperial Champion Guano	8.00	1.65	2.00
Imperial X. L. O. Cotton Guano	8.00	2.47	3.00
Imperial Cisco Soluble Guano	8.00	1.65	2.00
Imperial Tobacco Guano	8.00	2.47	3.00
Imperial Laughinghouse Special Tobacco Guano	4.00	3.29	6.00
Imperial Standard Premium	8.00	1.65	2.00
Imperial Cubanola Tobacco Guano	4.00	2.47	5.00
Imperial Martin County Special Crop Grower	9.00	2.26	2.00
Imperial High Grade Acid Phosphate	14.00	----	----
Imperial Genuine German Kainit	----	----	12.00
Imperial Special 7 Per Cent for Potatoes	5.00	5.76	5.00
Imperial 10 Per Cent Guano	5.00	8.23	2.50
Imperial Sweet Potato Guano	6.00	1.65	6.00
Imperial Williams' Special Potato Guano	6.00	4.11	5.00
Imperial Fish and Bone	6.00	3.29	4.00
Imperial 7-7-7 Potash Guano	7.00	5.76	7.00
Imperial Bone and Potash	10.00	----	2.00
Imperial High Grade Irish Potato Guano	7.00	4.11	8.00
Imperial Tennessee Acid Phosphate	16.00	----	----
Imperial Muriate of Potash	----	----	50.00
Imperial Nitrate of Soda	----	15.63	----
Imperial Roanoke Crop Grower	7.00	2.47	2.00
Imperial 17 Per Cent Acid Phosphate	17.00	----	----
Imperial Asparagus Mixture	6.00	4.11	7.00
Imperial Yellow Bark Sweet Potato Guano	8.00	2.47	3.00
Dawson's Cotton Grower	7.00	2.67	2.75
Imperial Top Dresser for Cotton	2.00	8.32	----
Imperial 4-8-4 Tobacco Grower	8.00	3.29	4.00
Conetoe Cotton Grower	4.00	3.29	4.00
Imperial Fish and Bone Grain Guano	8.00	.82	4.00
Special Tobacco Guano	5.00	3.29	9.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
J. T. John, Jr., John's Station, N. C.—			
Nitrate of Soda	----	14.82	----
Lister's Agricultural Chemical Works, Newark, N. J.—			
Lister's Ammoniated Dissolved Bone Phosphate	8.00	2.06	2.00
Lister's Success Fertilizer	8.00	1.65	2.00
Lister's Standard Pure Bone Superphosphate of Lime	9.00	1.65	2.00
American Agricultural Chemical Co.'s Buyers' Choice Acid Phosphate	14.00	----	----
Lister's Bone Meal Total	20.60	3.30	----
A. S. Lee & Sons Co. (Inc.), Richmond, Va.—			
Lee's Bone and Potash	9.00	----	4.00
Lee's Corn Fertilizer	10.00	----	2.00
Lee's Wheat Fertilizer	10.00	----	2.00
E. H. & J. A. Meadows Co., New Bern, N. C.—			
Hookerton Cotton Guano	8.00	1.64	2.00
Meadows' Cotton Guano	8.00	1.64	2.00
Meadows' All Crop Guano	8.00	2.05	2.50
Meadows' Roanoke Guano	8.00	2.05	3.00
Meadows' Gold Leaf Tobacco Guano	8.00	2.47	3.00
Meadows' Lobos Guano	8.00	4.11	5.00
Meadows' Great Potato Guano	7.00	4.11	8.00
Meadows' Great Cabbage Guano	7.00	5.76	7.00
Meadows' 10 Per Cent Guano	6.00	8.23	2.50
Meadows' Sea Bird Guano	9.00	3.29	2.50
Meadows' Dissolved Bone and Potash Compound	10.00	----	2.00
Meadows' German Kainit	----	----	12.00
Meadows' Diamond Acid Phosphate	14.00	----	----
Dixon's High Grade Tobacco Guano	8.00	2.47	3.00
Parker's Special Tobacco Guano	8.00	2.47	4.00
Brooks' Special Tobacco Grower	8.00	2.47	5.00
Meadows' Ideal Tobacco Guano	8.00	3.29	4.00
The Miller Fertilizer Co., Baltimore, Md.—			
Special Tobacco Grower	8.00	1.65	4.00
Standard Phosphate	8.00	2.47	3.00
Ammoniated Dissolved Bone	8.00	1.65	2.00
High Grade Potato	6.00	4.12	7.00
Tobacco King	8.00	2.47	3.00
Profit	8.00	1.65	2.00
Standard Potato	8.00	2.47	3.00
Potato and Vegetable Guano	8.00	1.65	4.00
Trucker	8.00	4.12	5.00
Farmers' Profit	8.00	1.65	2.00
Harmony	8.00	2.06	3.00
Corn and Peanut Grower	10.50	----	2.25
No. 1 Potato and Vegetable Grower	9.00	3.71	7.00
Clinch	10.00	----	2.00
4 Per Cent Tobacco	8.00	3.29	4.00
Miller's 7 Per Cent	7.00	5.77	7.00
Miller's Irish Potato	8.00	3.29	4.00
Miller's 16 Per Cent Acid Phosphate	16.00	----	----
Kainit	----	----	12.00
Acid Phosphate	14.00	----	----
The Miller Fertilizer Co.'s 10 and 4 Per Cent	10.00	----	4.00
Muriate of Potash	----	----	50.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Nitrate of Soda	----	15.05	----
Ground Bone—Total	14.00	2.47	----
Dried Blood	----	11.53	----
The Mapes Formula and Peruvian Guano Co, 143 *Liberty Street, New York*—			
Mapes' Economical Potato Manure	4.00	3.29	8.00
Mapes' Vegetable or Complete Manure for Light Soils	6.00	4.94	6.00
Mapes' Corn Manure	8.00	2.47	6.00
Mapes' Complete Manure, "A" Brand	10.00	2.47	2.50
John F. McNair, Laurinburg, N. C.—			
Nitrate of Soda	----	15.58	----
D. B. Martin Co., Richmond, Va.—			
Martin's 7 Per Cent Guano	6.00	5.74	5.00
Martin's Early Truck and Vegetable Grower	6.00	3.28	8.00
Martin's Claremount Vegetable Grower	7.00	2.46	5.00
Martin's Red Star Brand	8.00	3.28	4.00
Martin's Bull Head Fertilizer	8.00	2.46	3.00
Martin's Tobacco Special	8.00	2.46	3.00
Martin's Carolina Cotton Fertilizer	8.00	1.65	2.00
Martin's Old Virginia Favorite	8.00	1.65	2.00
Martin's Corn and Cereal Special	8.00	1.65	2.00
Martin's Gilt Edge Potato Manure	7.00	2.46	10.00
Martin's Animal Bone Potato Guano	6.00	4.10	7.00
Martin's Animal Bone Potato Compound	16.00	1.65	2.50
Martin's Pure Dissolved Animal Bone	12.00	1.65	2.00
Martin's Pure Ground Bone—Total	22.90	1.65	2.00
Martin's Raw Bone Meal—Total	21.00	3.69	----
Martin's Animal Tankage, Ground—Total	16.00	4.92	----
Martin's Acid Phosphate	16.00	----	----
Martin's Potash and Soluble Bone	12.00	----	5.00
Martin's High Grade Blood	----	13.94	----
Martin's Blood	----	12.30	----
Acid Phosphate	14.00	----	----
Potash and Soluble Bone	12.00	----	3.00
Potash and Soluble Bone	10.00	----	5.00
Potash and Soluble Bone	10.00	----	2.00
Nitrate of Soda	----	15.52	----
Sulphate of Ammonia	----	20.50	----
Blood	----	10.66	----
Blood	----	9.84	----
Blood	----	12.30	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Pure Ground Bone—Total	22.90	2.46	----
Martin's Carolina Special	8.00	1.65	2.00
Martin's Special Potato Guano	8.00	.82	5.00
Marietta Fertilizer Co., Atlanta, Ga.—			
Lion Power Guano	10.00	1.65	2.00
Royal Seal Guano	10.00	1.65	2.00
Cooper's High Grade Guano	10.00	1.65	2.00
Lion H. G. Guano	10.00	1.65	2.00
Lion H. G. Acid Phosphate	16.00	----	----
Lion Special Guano	10.00	.82	3.00
Lion Favorite Guano	8.00	1.65	2.00
Lion Blood and Bone Compound	9.00	.82	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Lion H. G. Dissolved Bone	14.00	----	----
Farmers Special No. 3	7.00	1.65	6.00
Langford's Special	10.00	1.65	4.00
Marsh-Lee & Co., Marshville, N. C.—			
Marsh's High Grade Acid	14.00	----	----
Marsh's Cotton Fertilizer	8.00	1.65	2.00
Marsh's Guano for Corn	8.00	1.65	2.00
Marsh's Special	8.00	2.50	3.00
The MacMurphy Co., Charleston, S. C.—			
Special 8-3-3 Guano	8.00	2.47	3.00
Special 8-2-2 Cotton and Corn Guano	8.00	1.65	2.00
Cotton and Corn Guano, 9-2-2	9.00	1.65	2.00
Wilcox & Gibbs Co.'s Manipulated Guano	9.00	2.26	2.00
Cotton and Corn Guano, 9-3-3	9.00	2.47	3.00
High Grade Acid Phosphate, 14 Per Cent	14.00	----	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.82	----
Muriate of Potash	----	----	48.00
Acid Phosphate, 13 Per Cent	13.00	----	----
8-4-6 Guano	8.00	3.29	6.00
North Carolina Cotton Oil Co., Wilmington, N. C.—			
Wilmington Tobacco Grower	8.00	2.06	3.00
Wilmington High Grade	8.00	2.47	3.00
Wilmington Cotton Grower	8.00	1.65	2.00
Wilmington Standard	8.00	2.47	2.50
Wilmington Truck Grower	8.00	3.30	4.00
Wilmington Special	8.00	1.65	2.00
Carter's Lifter	8.00	2.47	3.00
Clark's Special	8.00	1.65	3.00
Wilmington Banner	8.00	1.65	3.00
John's Special	8.00	2.47	3.00
McEacheva's Special	7.00	5.77	7.00
North Carolina Cotton Oil Co., Raleigh, N. C.—			
Raleigh Standard Guano	8.00	2.26	2.00
North Carolina Cotton Oil Co., Charlotte, N. C.—			
Majestic	8.00	1.65	2.00
Dixie Standard	8.00	2.48	3.00
North Carolina Cotton Oil Co., Henderson, N. C.—			
Uneedit Cotton Grower	8.00	1.65	2.00
Uneedit Tobacco Fertilizer	9.00	2.47	3.00
Vance Cotton Grower	8.00	1.65	2.00
Pride of Vance	9.00	2.47	3.00
Henderson Cotton Grower	8.00	1.65	2.00
Henderson Tobacco Fertilizer	9.00	2.47	3.00
Franklin Cotton Grower	8.00	1.65	2.00
Franklin Tobacco Fertilizer	9.00	2.47	3.00
New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.—			
Oriole Tobacco Grower	8.00	3.30	4.00
Greene County Standard Fertilizer	8.00	1.65	2.00
Jones County Premium Crop Grower	8.00	2.06	3.00
Onslow Farmers' Reliance Guano	8.00	2.06	3.00
High Grade Fertilizer	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Foy's High Grade Fertilizer	8.00	2.47	3.00
Pitt's Prolific Golden Tobacco Grower	8.00	2.47	3.00
Craven Cotton Guano	8.00	1.65	2.00
Lenoir Bright Leaf Tobacco Grower	8.00	2.47	3.00
Ives' Irish Potato Guano	7.00	4.13	7.00
Dunn's Standard Truck Grower	7.00	5.77	7.00
Pamlico Electric Top Dresser	5.00	8.25	2.50
Special Corn and Peanut Grower	11.00	----	2.00
Carteret Bone and Potash	10.00	----	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Bogue Fish Scrap	----	7.42	----
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
Favorite Cotton Grower C. S. M.	8.00	2.27	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Norfolk Fertilizer Co., Norfolk, Va.—			
Oriana Cotton Guano	8.00	1.65	2.00
Oriana C. S. M. Special	9.00	2.26	2.00
Oriana Tobacco Guano	8.00	2.47	3.00
Oriana 3-8-3 for Cotton	8.00	2.47	3.00
Oriana Crop Grower	8.00	1.65	3.00
Oriana Bone and Potash	10.00	----	2.00
Oriana 14 Per Cent Acid Phosphate	14.00	----	----
Oriana 16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Iola Acid Phosphate	13.00	----	----
Oriana First Step Tobacco Guano	8.00	3.29	4.00
Oriana 4-4-6 High Grade Tobacco Guano	4.00	3.29	6.00
Pine Top Special Crop Grower	5.00	1.65	6.00
Nitrate of Soda Mixture for Top Dressing Cotton	2.00	8 23	----
Habana Special Tobacco Guano	8.00	2.62	3.00
Navassa Guano Co., Wilmington, N. C.—			
Ammoniated Soluble Navassa Guano	8.00	2.06	2.00
Clarendon Tobacco Guano	8.00	2.47	3.00
Occoneechee Tobacco Guano	8.00	1.65	2.00
Coree Tobacco Guano	8.00	3.29	4.00
Harvest King Guano	8.00	1.65	3.00
Mogul Guano	8.00	2.06	3.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda	----	14.82	----
Sulphate of Ammonia	----	20.59	----
Orton Guano	8.00	2.47	4.00
Navassa Universal Fertilizer	8.50	2.06	1.00
Navassa Wheat Mixture	10.00	----	2.25
Navassa Wheat and Grass Grower	10.00	----	4.00
Navassa Special Wheat Mixture	12.00	----	4.00
Navassa Gray Land Mixture	12.00	----	4.00
Navassa Dissolved Bone with Potash	10.00	----	2.00
Navassa Acid Phosphate	12.00	----	----
Navassa Dissolved Bone	13.00	----	----
Navassa 14 Per Cent Acid Phosphate	14.00	----	----
Navassa Acid Phosphate	16.00	----	----
Navassa Special Trucker	8.00	3.30	4.00
Navassa Strawberry Top Dressing	8.00	2.06	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Navassa Blood and Meal Mixture	8.00	2.47	5.00
Navassa Creole Guano	6.00	4.12	7.00
Maxim Guano	10.00	2.47	2.00
Navassa Manipulated Guano	9.00	2.26	2.00
Osceola Guano	9.00	1.65	3.00
Corona Guano	10.00	1.65	2.00
Clark's Special Cotton Seed Meal Guano	8.00	1.65	3.00
Navassa Root Crop Fertilizer	7.00	4.12	7.00
Navassa Carib Guano	8.00	2.47	10.00
Navassa Guano for Tobacco	8.00	2.06	2.00
Navassa Grain Fertilizer	8.00	1.65	2.00
Navassa Fruit Growers' Fertilizer	8.00	1.65	6.00
Navassa Cotton Seed Meal Special 3 Per Cent Guano	8.00	2.47	2.00
Navassa Cotton Seed Meal Guano	8.00	1.65	2.00
Navassa Cotton Fertilizer	8.00	1.65	2.00
Navassa Complete Fertilizer	9.00	1.65	1.00
Navassa High Grade Guano	8.00	2.47	3.00
Navassa Dissolved Bone with Potash	8.00	----	4.00
Harvest Queen Fertilizer	9.00	1.65	2.00
Navassa High Grade Tobacco Guano	8.00	2.47	10.00
Navassa Fish Guano	9.00	2.47	3.00
The Nitrate Agencies Co., Savannah, Ga.—			
Nitrate of Soda	----	14.85	----
Ocean Fisheries Co., Wilmington, N. C.—			
Fish Scrap	3.47	5.30	----
G. Ober & Sons Co., Baltimore, Md.—			
Ober's Acid Phosphate with Potash	8.00	----	4.00
Ober's Stag Guano	8.00	.82	4.00
Ober's Complete Fertilizer	6.00	4.12	6.00
Special High Grade Fertilizer	9.00	2.47	3.00
Ober's Special Compound for Tobacco	8.00	2.47	3.00
Ober's Standard Tobacco Fertilizer	8.00	1.65	2.00
Ober's Special Ammoniated Dissolved Bone	9.00	1.65	2.00
Ober's Special Cotton Compound	8.00	1.65	2.00
Ober's Soluble Ammoniated Superphosphate of Lime	8.00	1.65	2.00
Ober's Farmers' Mixture	9.00	.82	2.00
Ober's Dissolved Bone, Phosphate and Potash	10.00	----	2.00
Ober's Acid Phosphate with Potash	8.00	----	2.00
Ober's Standard Potash Compound	12.00	----	5.00
Ober's High Grade Acid Phosphate	16.00	----	----
Ober's Dissolved Bone Phosphate	14.00	----	----
Nitrate of Soda	----	15.50	----
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Pure Raw Bone Meal Total	21.00	3.71	----
Ober's Dissolved Animal Bone	10.00	2.47	----
Ober's Special Potash Compound for Tobacco	6.00	2.47	7.00
Cooper's Pungo Guano	8.00	2.06	2.00
The Pocomoke Guano Co., Norfolk, Va.—			
Garrett's Grape Grower	8.00	3.29	10.00
Coast Line Truck Guano	5.00	8.23	3.00
Freeman's 7 Per Cent Irish Potato Grower	6.00	5.76	5.00
Seaboard Popular Trucker	6.00	5.76	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Standard Truck Guano	7.00	4.12	5.00
Faultless Ammoniated Superphosphate	7.00	3.30	4.00
Harvest High Grade Monarch	8.00	2.47	3.00
Monarch Tobacco Grower	8.00	2.47	3.00
Monticello Animal Bone Fertilizer	9.00	1.85	4.00
Cinco Tobacco Guano	8.50	2.06	2.50
Crescent Complete Compound	8.00	1.65	3.00
Hornthal's Tobacco Guano	8.00	1.65	3.00
L. P. H. Premium	8.00	1.65	2.00
Electric Crop Grower	8.50	1.65	2.00
Pamlico Superphosphate	8.00	1.65	2.00
Pocomoke Superphosphate	8.50	1.65	2.00
Pocomoke Bone and Potash Mixture	10.00	----	4.00
Pure Ground Bone Total	20.00	3.70	----
10-2 Potash Mixture	10.00	----	2.00
Alkali Bone	11.00	----	2.00
Peerless Acid Phosphate	14.00	----	----
Pocomoke Wheat, Corn and Peanut Manure	8.00	1.00	4.00
Smith's Special Formula	4.00	3.30	6.00
Superb Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Pocomoke Defiance Bone and Potash	8.00	----	4.00
Pamlico Chemical Co., Washington, N. C.—			
Pamlico Special Irish Potato Guano	7.00	4.12	7.00
Bull's Eye Tobacco Grower	8.00	3.30	4.00
Pamlico Ground Fish	----	7.42	----
Muriate of Potash	----	----	48.00
Pamlico Special Sweet Potato Guano	7.00	4.12	5.00
Pamlico Cereal Side Dresser	2.50	7.42	2.50
Pamlico Favorite Potato Guano	7.00	4.12	5.00
Pamlico Bone and Fish Guano	8.00	1.65	2.00
Pamlico Potato Guano	7.00	4.12	7.00
Pamlico Cotton Guano	8.00	1.65	2.00
Pamlico 7-7-7 Guano	7.00	5.77	7.00
Pamlico 16 Per Cent Acid Phosphate	16.00	----	----
Pamlico Bone Phosphate	14.00	----	----
Cowell's Great Potato Grower	8.00	4.12	7.00
Cowell's Great Cabbage Grower	5.00	8.25	2.50
Tobacco Growers' Friend	8.00	2.47	3.00
German Kainit	----	----	12.00
Farmers' Best Guano	8.00	2.06	3.00
Pamlico Success Guano	8.00	2.47	3.00
Staton, Taylor & Mayo's Special Cotton Grower	8.00	2.26	2.00
Prosperity Cotton Grower	9.00	2.26	2.00
Pamlico High Grade Tobacco Grower	8.00	2.47	5.00
Pamlico 8-4-4 Guano	8.00	3.30	4.00
Pamlico 6-3-6	6.00	2.47	6.00
Nitrate of Soda	----	14.85	----
Falkland H. G. Tobacco Guano	6.00	2.47	6.00
Dissolved Bone and Potash Compound	10.00	----	2.00
Planters Fertilizer and Phosphate Co., Charleston, S. C.—			
Planters' Bright Tobacco Fertilizer	8.00	3.29	4.00
Planters' Fertilizer	8.00	2.06	2.00
Planters' Soluble Guano	8.00	2.47	3.00
Planters' Standard Fertilizer	8.75	1.65	2.00
Nitrate of Soda	----	14.83	----
Planters' High Grade Acid Phosphate	14.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Planters' Standard Fertilizer	8.00	1.65	2.00
Planters' Soluble Bone	13.00	----	----
Sulphate of Potash	----	----	48.00
Planters' Kainit	----	----	12.00
Planters' Blood, Bone and Potash	8.00	2.06	2.00
Planters' H. G. Top Dresser	4.00	6.18	4.50
Planters H. G. Tobacco Fertilizer	8.00	2.47	3.00
Planters' Cotton and Truck Fertilizer	8.00	2.47	4.00
Planters' Special Cotton Fertilizer	8.00	3.29	4.00
Planters' Muriate of Potash	----	----	48.00
Planters' Acid and Potash	10.00	----	4.00
Planters' 16 Per Cent Acid Phosphate	16.00	----	----
Planters' Bone and Potash	10.00	----	2.00
Planters' Bone and Potash	12.00	----	1.00
Special Mixture	8.00	4.12	5.00
Peruvian Guano Corporation, Charleston, S. C.—			
Peruvian Guano, Ex. S S. Celia, No. 1 ----Total	17.00	2.80	3.25
Peruvian Guano, Ex. S.S. Delblair	10.00	2.15	2.25
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 1	9.50	2.40	1.50
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 2	9.00	2.56	2.25
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 3	9.00	2.69	2.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	15.50	----
Sulphate of Ammonia	----	19.00	----
Dried Blood	----	14.00	----
Peruvian Guano, Ex. S.S. Celia----Total	15.00	2.80	3.00
Peruvian Guano, S.S. Delblair----Total	15.50	2.13	2.00
Peruvian Guano, S.S. Chincha----Total	10.00	4.13	2.00
Peruvian Guano, S.S. Belle of Scotland. No. 2, Total	14.50	2.47	2.00
Peruvian Guano, S.S. Belle of Scotland, No. 3, Total	14.00	2.56	2.00
Peruvian Guano, Ex. S.S. Delblair----Total	13.00	3.31	3.25
Peruvian Guano, Ex. S.S. Celia, No. 1----Total	18.00	2.88	3.25
Peruvian Guano, Ex. S.S. Argo Chincha, No. 1----Total	11.00	5.76	2.75
Peruvian Guano, Chincha Ex. S.S. Argo, No. 2----Total	13.00	4.55	2.75
Pearsall & Co., Wilmington, N. C.—			
Kainit	----	----	12.00
Pearsall's Uzit	8.00	2.46	3.00
Pearsall's H. G. F. F. F. G.	8.00	2.46	3.00
Pearsall's Fish and Potash Mixture	8.00	3.24	4.00
Eagle	8.00	1.70	2.00
Pearsall & Co.'s Fish and Potash Compound	8.00	3.40	4.00
Pearsall & Co.'s 6-6-6 Guano	6.00	4.90	6.00
Pacific Guano Co., Charleston, S. C.—			
Standard Soluble Pacific Guano	8.50	1.65	2.00
Standard Pacific Acid Phosphate	12.00	----	----
High Grade Pacific Fertilizer	8.00	2.46	3.00
Powhatan Chemical Co., Richmond, Va.—			
Powhatan Trucker	7.00	4.94	5.00
Powhatan Bone and Potash Mixture	8.00	----	4.00
Powhatan Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Magic Dissolved Bone Phosphate	16.00	----	----
Magic Peanut Grower	8.00	----	4.00
Magic Grain and Grass Grower	8.00	----	4.00
Magic Bone and Potash Mixture	10.00	----	4.00
Magic Mixture	9.00	1.65	1.00
Magic Cotton Grower	8.00	1.65	2.00
Magic Special Fertilizer	8.00	1.65	2.00
Magic Tobacco Grower	8.00	1.65	2.00
King Brand Fertilizer	8.00	2.06	3.00
White Leaf Tobacco Fertilizer	8.00	2.06	3.00
Economic Cotton Grower	9.00	2.26	2.00
North State Special	8.00	3.29	4.00
Guilford Special Tobacco Fertilizer	9.00	2.47	6.00
Pure Raw Bone Meal—Total	20.00	3.29	----
Bone and Potash Mixture	10.00	----	2.00
Pure Animal Bone—Total	25.00	2.47	----
Nitrate of Soda	----	15.63	----
Sulphate of Ammonia	----	19.75	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Pure German Kainit	----	----	12.00
Virginia Dissolved Bone	12.00	----	----
High Grade Acid Phosphate	14.00	----	----
P. C. Co.'s Hustle	8.00	2.47	3.00
Magic Corn Grower	10.00	.82	1.00
Magic Wheat Grower	9.00	.82	2.00
Johnson's Best Fertilizer	9.00	2.06	5.00
Holt's Magic Fertilizer	9.00	2.06	5.00
Magic Peanut Special	8.00	.82	4.00
Magic Crop Grower	10.00	.82	1.00
Magic Fertilizer	8.00	2.47	4.00
Pine Level Oil Mill Co., Pine Level, N. C.—			
Cotton Grower for All Crops	8.00	1.65	2.00
Pine Level High Grade	8.00	2.47	3.00
Hale's Special for Tobacco	8.00	2.47	4.00
H. G. Top Dresser	3.00	6.03	6.00
Patapsco Guano Co., Baltimore, Md.—			
Patapsco Plant Food for Tobacco, Potatoes and Truck	8.00	2.47	5.00
Patapsco Soluble Bone and Potash	10.00	----	2.00
Patapsco High Grade Bone and Potash	11.00	----	5.00
Patapsco 10 and 4 Potash Mixture	10.00	----	4.00
Patapsco 7-7-7 Truck Guano	7.00	5.76	7.00
Patapsco Potato Guano	6.00	4.11	7.00
Patapsco Crop Dresser	4.00	3.30	4.00
Patapsco Trucker for Early Vegetables	7.00	4.11	5.00
Patapsco Tobacco Fertilizer	9.00	2.47	3.00
Patapsco Guano for Tobacco	9.25	2.06	2.00
Patapsco Guano	9.25	2.06	2.00
Patapsco Special Tobacco Mixture	8.00	2.06	3.00
Patapsco Fine Ground Bone—Total	20.61	3.29	----
Patapsco Pure Dissolved S. C. Phosphate	14.00	----	----
Coon Brand Guano	9.00	.82	3.00
Choctaw Guano	8.00	2.47	3.00
Planters' Favorite	8.00	1.65	2.00
Seagull Ammoniated Guano	8.00	1.65	2.00
Money Maker Guano	7.00	3.70	6.00
Unicorn Guano	8.00	2.06	3.00
Baltimore Soluble Phosphate	11.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Florida Soluble Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Grange Mixture	8.00	1.65	2.00
Patapsco Crop Dresser	4.00	3.29	4.00
Nitrate of Soda	----	15.00	----
Muriate of Potash	----	----	49.00
Ground Fish	----	8.23	----
Swanson's Gold Leaf Special	8.00	2.06	2.00
Sulphate of Potash	----	----	48.00
Patapsco Cotton and Tobacco Special	8.00	3.29	4.00
Sulphate of Ammonia	----	19.75	----
Parsons & Hardison, Wadesboro, N. C.—			
High Grade Ground Tankage	----	9.10	----
Pocahontas Guano Co., Lynchburg, Va.—			
Imperial Dissolved S. C. Phosphate	14.00	----	----
Carrington's Superior Grain Compound	10.00	----	2.00
Wabash Wheat Mixture	10.00	----	4.00
Cherokee Grain Special	8.00	----	4.00
Farmers' Favorite Apex Brand	8.00	2.47	3.00
Spot Cash Tobacco Compound	8.00	2.06	3.00
Yellow Tobacco Special	9.00	1.65	2.00
High Grade 4 Per Cent Tobacco Compound, Mohawk King Brand	9.00	1.85	4.00
Standard Tobacco Guano, Old Chief Brand	9.00	1.66	2.00
Pocahontas Special Tobacco Fertilizer	9.00	2.47	3.00
A. A. Complete Champion Brand	8.00	1.03	3.00
Carrington's Special Truck Grower, Eagle Mount Brand	8.00	2.06	6.00
Pure Raw Bone Meal—Total	20.60	3.69	----
Carrington's S. C. Phosphate, Waukesha Brand	16.00	----	----
Carrington's Banner Brand Guano	8.00	1.65	2.00
Indian Tobacco Grower	8.00	2.47	4.00
Bone Meal—Total	22.80	2.46	----
Planters Cotton Seed Oil Co., Rocky Mount, N. C.—			
Tar River Special	8.00	2.47	3.00
Eagle Guano	8.00	1.65	2.00
Royal Cotton Grower	9.00	2.26	2.00
Piedmont-Mt. Airy Guano Co., Baltimore, Md.—			
Piedmont Cultivator Brand	8.00	1.65	2.00
Piedmont Bone and Peruvian Mixture	8.00	1.65	2.00
Piedmont Special Truck	6.00	5.76	5.00
Piedmont Early Vegetable Manure	6.00	4.12	7.00
Piedmont Vegetable Compound	6.00	3.29	8.00
Piedmont Essential Tobacco Compound	9.00	1.65	2.00
Piedmont Guano for Tobacco	8.00	2.09	3.00
Piedmont High Grade Ammoniated Bone and Potash	8.00	2.47	3.00
Piedmont High Grade S. C. Bone Phosphate	14.00	----	----
Levering's Potashed Bone	10.00	----	4.00
Levering's Reliable Tobacco Guano	8.00	2.47	3.00
Piedmont Special Potato Guano	6.00	4.94	7.00
Piedmont Red Leaf Tobacco Guano	8.00	1.65	2.00
Piedmont Early Trucker	6.00	4.12	5.00
Piedmont Potato Producer	5.00	2.47	6.00
Piedmont Farmers' Standard	9.00	1.65	2.00
Piedmont Special for Cotton, Corn and Peanuts	8.00	1.65	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Piedmont Special Farmers' Tobacco Guano	8.40	2.47	4.00
Piedmont Farmers' Bone and Potash	10.00	----	2.00
Piedmont High Grade Guano for Cotton	8.00	2.47	3.00
Haynes' Cultivator Guano	8.00	1.65	2.00
Piedmont Farmers' Favorite	8.00	.82	4.00
Piedmont Farmers' Cotton Grower	9.00	.82	3.00
Piedmont Star Bone and Potash	8.00	----	5.00
Piedmont Unexcelled Guano	8.00	3.29	4.00
Piedmont Bone Meal Total	21.00	3.29	----
Piedmont Special Potash Mixture	10.00	----	5.00
Boykin's Top Dresser	----	7.41	3.00
Levering's Ammoniated Bone	9.00	.82	3.00
Nitrate of Soda	----	15.23	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Sulphate of Ammonia	----	20.58	----
Piedmont 16 Per Cent Acid Phosphate	16.00	----	----
Privott's Gilt Edge Guano	7.00	2.47	10.00
The Quinnepiac Co., Charleston, S. C.—			
Standard Quinnepiac Pine Island Ammoniated Superphosphate	9.00	1.85	1.00
Standard Quinnepiac Acid Phosphate	13.00	----	----
The Robertson Fertilizer Co., Norfolk, Va.—			
Robertson's X-Ray Tobacco Grower	8.00	2.06	2.00
Genuine German Kainit	----	----	12.00
Skyscraper Bone and Potash Compound	10.00	----	4.00
Double Dollar Soluble Guano	8.00	1.65	2.00
Double Dollar Soluble Cotton Grower	8.00	1.65	2.00
Double Dollar Soluble Tobacco Guano	8.00	1.65	2.00
Beaver Brand Soluble Guano	9.00	1.85	4.00
Beaver Brand Soluble Tobacco Guano	9.00	1.85	4.00
Beaver Brand Bright Tobacco Special	9.00	1.85	4.00
Big Cropper High Grade Guano	8.00	2.47	3.00
Robertson's Special Formula for Tobacco	8.00	3.30	4.00
Scepter Brand Acid Phosphate	14.00	----	----
High Peak Acid Phosphate	16.00	----	----
Level Run Dissolved Bone and Potash	10.00	----	2.00
Wood's Winner H. G. Guano	8.00	3.36	4.00
Dried Blood	----	13.20	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.85	----
Robertson's Soluble H. G. Guano	8.00	2.47	4.00
Ten Strike Soluble Producer	8.00	.99	4.00
Davidson's Choice H. G. Complete Manure	9.00	2.47	3.00
Robertson's Raw Bone Meal Total	21.00	3.70	----
P. M. C. High Grade Soluble Guano	8.00	4.10	7.00
F. S. Royster Guano Co., Norfolk, Va.—			
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Farmers' Bone Fertilizer	8.00	1.65	2.00
Bonanza Tobacco Guano	8.00	2.47	3.00
Orinoco Tobacco Guano	8.00	2.06	3.00
Special Tobacco Compound	8.00	2.06	2.00
Cobb's High Grade for Tobacco	8.00	3.30	5.00
Humphrey's Special for Tobacco	6.00	2.55	3.20
Eagle's Special Tobacco Guano	8.00	2.47	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Royal Potato Guano	7.00	4.12	5.00
Royal Special Potato Guano	7.00	4.12	7.00
Ballentine's Potato Guano	6.00	5.77	7.00
Trucker's Delight	8.00	3.30	4.00
Special Compound	9.00	1.65	1.00
Tomlinson's Special	9.00	2.47	5.00
Williams' Special Guano	8.00	2.06	5.00
Magic Top Dresser	----	7.42	3.00
Royster's Special Sweet Potato Guano	8.00	2.47	3.00
Royster's Potato Guano	5.00	4.94	7.00
Royster's Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Royster's Early Truck Guano	7.00	4.12	8.00
Royster's Special 10 Per Cent Truck Guano	5.00	8.24	3.00
Royster's Special 4-8-3	8.00	3.30	3.00
Royster's 4-9-5 Special	9.00	3.30	5.00
Royster's Special 1-9-2 Guano	9.00	.82	2.00
Royster's 2-6-5 Special	6.00	1.65	5.00
Royster's Meal Mixture	9.00	2.26	2.00
Royster's Special Wheat Fertilizer	8.00	1.65	2.00
Royster's H. G. 16 Per Cent Acid Phosphate	16.00	----	----
Royster's 14 Per Cent Acid Phosphate	14.00	----	----
Royster's Dissolved Bone	13.00	----	----
Royster's XX Acid Phosphate	12.00	----	----
Royster's Bone and Potash Mixture	11.00	----	5.00
Royster's Bone and Potash Mixture	10.00	----	2.00
Royster's Bone and Potash for Grain	10.00	----	3.00
Royster's 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Royster's Peanut Special	7.00	----	5.00
Royster's Complete Guano	8.00	1.65	2.00
Royster's 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Jupiter High Grade Guano	8.00	3.30	4.00
Viking Ammoniated Guano	9.00	1.65	3.00
Royster's Best Guano	8.00	3.71	7.00
Harvey's Cabbage Guano	5.00	6.59	3.00
Marlborough High Grade Cotton Guano	8.00	2.47	3.00
Nitrate of Soda	----	15.22	----
Jumbo Peanut Grower	8.00	1.02	4.00
Watkins' Special	9.00	2.06	5.00
Haynes' Special	9.00	2.06	3.00
Pure Raw Bone Meal Total	21.50	3.71	----
Milo Tobacco Guano	8.00	3.30	4.00
Royster's Soluble Guano	10.00	1.65	2.00
McDowell's Cotton Grower	6.00	3.30	2.00
Royster's 4-6-4 Special	4.00	4.94	4.00
Webb's Korn King	8.00	1.65	2.00
Royster's 10-5 Bone and Potash Mixture	10.00	----	5.00
Corbett & Moore's Special	8.00	1.65	3.50
Oakley's Special Tobacco Guano	6.00	3.30	4.00
Royster's Irish Potato Guano	6.00	4.12	7.00
Royster's Cabbage Guano	5.00	8.23	2.50
Phillips' Special	5.00	1.65	6.00
Royster's H. G. 17 Per Cent Acid Phosphate	17.00	----	----
Royster's Irish Potato Guano	6.00	4.12	7.00
Oakley's Special Tobacco Guano	6.00	3.30	4.00
Sylvanite	----	----	18.00
J. H. Roberson & Co., Robersonville, N. C.—			
Roberson's Potato Guano	6.00	5.77	5.00
Roberson's Cotton Grower	9.00	2.26	2.00
Roberson's Special Potato Grower	7.00	5.77	7.00
Roberson's Special for Bright Tobacco	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Richmond Guano Co., Richmond, Va.—			
10 Per Cent Cabbage Guano	6.00	8.23	2.00
Special High Grade for Truck	7.00	4.94	5.00
Southern Trucker	8.00	4.11	5.00
Perfection Special	8.00	3.29	4.00
Gilt Edge Fertilizer	8.00	2.47	3.00
Carolina Cotton Grower	9.00	2.26	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.26	2.50
Tip Top Fertilizer	8.00	2.06	3.00
Special Premium Brand for Tobacco	8.00	1.85	2.25
Special Premium Brand for Plants	8.00	1.85	2.25
Carolina Bright for Cotton	8.00	2.06	1.50
Benson's Special Fertilizer	8.00	1.65	6.00
Parker & Hunter's Special Fertilizer	8.00	1.65	2.00
Premium Tobacco Fertilizer	8.00	1.65	2.00
Premium Brand Fertilizer	8.00	1.65	2.00
Bone Mixture	9.00	1.65	1.00
Clark's Special Formula	7.00	4.94	6.00
Carter's Special for Tobacco	4.00	2.47	6.00
Saunders' Special Formula for Bright Tobacco	9.00	2.88	5.00
Burton's Special Tobacco Fertilizer	9.00	2.06	3.00
Hunter & Dunn's Special Ammoniated Fertilizer,	9.00	2.47	2.25
Hunter & Dunn's Ammoniated Fertilizer	8.00	1.65	2.00
Edgecombe Cotton Grower	8.00	1.65	2.00
Premium Bone and Potash Mixture	13.00	----	3.00
Rex Bone and Potash Mixture	10.00	----	4.00
Tip Top Bone and Potash Mixture	8.00	----	4.00
Winter Grain and Grass Grower	8.00	----	4.00
Premium Peanut Grower	8.00	----	4.00
Bone and Potash Mixture	10.00	----	2.00
Rex Dissolved Bone Phosphate	16.00	----	----
High Grade Acid Phosphate	14.00	----	----
High Grade Wheat and Grass Fertilizer	14.00	----	----
Premium Dissolved Bone	13.00	----	----
Bone Mixture	10.00	.82	1.00
Dissolved S. C. Phosphate	12.00	----	----
Hunter & Dunn's Dissolved Bone	12.00	----	----
Pure German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	19.75	----
Nitrate of Soda	----	15.63	----
Pure Raw Bone Meal—Total	20.00	3.29	----
Pure Animal Bone—Total	25.00	2.47	----
Premium Corn Grower	10.00	.82	1.00
Premium Wheat Grower	9.00	.82	2.00
Cracker Jack Fertilizer	9.00	1.65	2.00
Premium Peanut Special	8.00	.82	4.00
Premium Cotton Grower	9.00	.82	3.00
Old Homestead Dissolved Bone	12.00	----	----
Carolina Bright Special Tobacco Fertilizer	8.00	2.47	3.00
Rex Tobacco Fertilizer	8.00	1.65	4.00
Carolina Bright Tobacco Fertilizer	8.00	2.47	3.00
Read Phosphate Co., Charleston, S. C.—			
Genuine German Kainit	----	----	12.00
Read's High Grade Acid Phosphate	14.00	----	----
Read's Bone and Potash	10.00	----	4.00
Read's Alkaline Bone	10.00	----	2.00
Read's Special Potash Mixture	8.90	----	4.00
Read's High Grade Tobacco Leaf	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Read's Blood and Bone Fertilizer, No. 1	8.00	1.65	2.00
Read's Soluble Fish Guano	8.00	1.65	2.00
Read's High Grade Cotton Grower	8.00	2.47	3.00
Read's High Grade Dissolved Bone	16.00	----	----
Raisin-Monumental Co., Baltimore, Md.—			
Dixie Guano	9.00	1.65	2.00
Empire Guano	8.00	1.65	2.00
Raisin Gold Standard	8.00	2.47	3.00
Raisin Special Bone and Potash	10.00	----	5.00
Raisin Bone and Potash	10.00	----	2.00
Raisin 13 Per Cent Acid Phosphate	13.00	----	----
Raisin 16 Per Cent Acid Phosphate	16.00	----	----
Raisin 14 Per Cent Acid Phosphate	14.00	----	----
Baltimore Special Mixture	9.00	.82	2.00
Raisin's Indian Brand for Tobacco	8.00	2.47	3.00
Reidsville Fertilizer Co., Reidsville, N. C.—			
Banner Fertilizer	8.00	1.65	2.00
Champion Guano	8.00	1.65	2.00
Broad Leaf Tobacco Guano	8.00	1.85	2.50
Royal Fertilizer	8.00	2.47	3.00
Lion Brand Fertilizer	9.00	2.47	6.00
Bone and Potash	10.00	----	4.00
Reidsville Hustler	9.00	.82	2.00
Reidsville Acid Phosphate	14.00	----	----
Bone and Potash	10.00	----	2.00
Swift Fertilizer Works, Atlanta, Ga., and Wilmington, N. C.—			
High Grade Swift's Strawberry Grower	8.00	2.47	10.00
High Grade Swift's Special Trucker	6.00	5.76	5.00
High Grade Swift's Special 10 Per Cent Blood and Bone Trucker	5.00	8.23	3.00
High Grade Swift's Carolina 7 Per Cent Special Trucker	7.00	5.76	7.00
High Grade Swift's Favorite Truck Guano	6.00	4.94	6.00
High Grade Swift's Special Irish Potato Grower	7.00	4.12	8.00
High Grade Swift's Special Potato Grower	6.00	4.12	7.00
Swift's Carolina Tobacco Grower H. G. Guano	8.00	2.47	3.00
Swift's Cape Fear Truck Guano, H. G.	8.00	4.12	2.00
Swift's Red Steer Standard Grade Guano	8.00	1.65	2.00
Swift's Plow Boy Guano	10.00	.82	1.00
Swift's Cotton Plant Standard Grade Guano	9.00	1.65	1.00
Swift's Golden Harvest Standard Grade Guano	8.00	1.65	2.00
Swift's Farmers' Favorite High Grade	9.00	1.65	3.00
Swift's Pioneer High Grade Guano Tobacco Grower	8.00	1.65	4.00
High Grade Swift's Early Trucker	7.00	4.12	5.00
Swift's Blood, Bone and Potash High Grade Guano	9.50	3.29	7.00
Swift's Corn and Cotton Grower	10.00	2.47	3.00
Swift's Cotton King High Grade	9.00	2.47	2.00
Swift's Ruralist High Grade Guano	8.00	2.47	3.00
Swift's Special High Grade Guano	9.50	4.12	3.00
Swift's Monarch H. G. Vegetable Grower	8.00	3.29	4.00
Swift's Special High Grade Phosphate and Potash	12.00	----	6.00
Swift's Plantation Standard Grade Phosphate and Potash	8.00	----	4.00
Swift's Farmers' Home High Grade Phosphate and Potash	10.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Swift's Field and Farm Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Wheat Grower Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Harrow Standard Grade Acid Phosphate	13.00	----	----
High Grade Swift's No. 1 Ground Tankage	6.00	8.24	----
Swift's Pure Bone Meal—Total	25.00	2.47	----
Swift's Cultivator High Grade Acid Phosphate	14.00	----	----
Swift's Special High Grade Acid Phosphate	16.00	----	----
Swift's Chattahoochee Standard Grade Acid Phosphate	12.00	----	----
Swift's Ground Dried Blood	----	13.18	----
Swift's Pure Nitrate of Soda	----	14.82	----
Swift's Pure Raw Bone Meal—Total	23.00	3.71	----
Swift's Muriate of Potash	----	----	50.00
Swift's German Kainit	----	----	12.00
Swift's Eagle High Grade Guano	10.00	1.65	2.00
Swift's Atlanta High Grade Phosphate and Potash	12.00	----	4.00
Swift's Special Peanut Grower Standard Grade Guano	8.00	.82	4.00
Southern Chemical Co., Inc., Roanoke, Va.—			
Our Favorite	8.00	1.65	2.00
Farmers' Joy	8.00	1.65	4.00
Our Leader	9.00	.82	2.00
Harvest King	8.00	.82	3.00
Southern Queen	8.00	2.47	10.00
Valley Chief	8.50	1.65	2.00
Spartanburg Fertilizer Co., Spartanburg, S. C.—			
Corn Formula	10.50	1.65	5.00
Gosnell's Plant Food	10.50	2.46	2.00
West's Potash Acid	13.00	----	3.00
Bold Buster	9.00	1.65	2.00
Potato Guano	7.00	2.46	7.00
Tiger Brand Acidulated Phosphate	14.00	----	----
Dana's Best	10.00	----	4.00
Glencove	8.00	2.46	3.00
Zirconia	10.00	----	2.00
Cotton Compound	8.75	1.65	2.00
Melrose	10.00	----	2.00
Nitrate of Soda	----	14.81	----
Muriate of Potash	----	----	50.00
Scotland Neck Guano Co., Scotland Neck, N. C.—			
Josey's Cotton Seed Meal Tobacco Guano	8.00	2.47	3.00
Josey's High Grade Acid Phosphate	16.00	----	----
Josey's Cotton Seed Meal Cotton Grower	8.00	1.65	2.00
Scotland Neck's Favorite Cotton Seed-meal Guano,	8.00	1.65	2.00
Our Best Peanut Guano	5.00	1.23	5.50
The Southern Exchange Co., Maxton, N. C.—			
Southern Exchange Co.'s Special Tobacco Fertilizer	8.00	1.65	3.00
Bright Tobacco Formula	8.00	2.47	4.00
Melon Grower	8.00	4.12	7.00
McKimmon's Special Truck Formula	8.00	4.12	7.00
Two Fours Guano	7.00	3.30	4.00
That Big Stick Guano	8.00	2.47	4.00
Bull of the Woods Fertilizer	8.00	2.47	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Jack's Best Fertilizer	8.00	2.47	3.00
Correct Cotton Compound	8.00	2.47	3.00
Juicy Fruit Fertilizer	9.00	1.85	4.00
The Walnut Fertilizer	8.50	2.06	2.50
The Racer Guano	8.00	1.65	3.00
The Coon Guano	8.00	1.65	2.00
R. M. C. Special Crop Grower	8.00	2.47	3.00
S. E. C. Bone and Potash Mixture	10.00	----	4.00
S. E. C. Bone and Potash Mixture	10.00	----	2.00
S. E. C. Acid Phosphate	16.00	----	----
S. E. C. Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Currie's Crop Lifter	8.00	1.65	3.00
The Southern Cotton Oil Co., Charlotte District, Concord, Charlotte, Davidson, Madison, Shelby, Gibson and Gastonia.—			
Dandy Top Dresser	4.00	9.07	2.50
Conqueror	8.00	3.30	4.00
Gloria	8.00	1.65	2.00
Peacock	8.00	2.47	3.00
Red Bull	8.00	2.06	2.00
Noon	8.00	2.47	3.00
King Bee	8.65	1.65	2.00
Gold Seal	14.00	----	----
Silver King	13.00	----	----
Genuine German Kainit	----	----	12.00
Magnolia Bone and Potash	10.00	----	2.00
Conqueror Bone and Potash	10.00	----	4.00
Cotton Seed Meal	2.30	6.18	1.50
Choice	8.00	3.30	6.00
Conqueror Bone and Potash	12.00	----	4.00
Southern Cotton Oil Co.'s 16 Per Cent Acid Phosphate	16.00	----	----
Razem	9.00	1.65	3.00
Nitrate of Soda, 19 Per Cent	----	15.65	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda, 16 Per Cent	----	13.20	----
Home Made	9.00	2.05	3.00
Uncle Sam	9.00	2.47	3.00
Double Two	8.00	1.65	2.00
All-to-Good	8.00	2.05	3.00
Melonite	8.00	3.29	4.00
Canto	8.00	3.29	6.00
Southern Cotton Oil Co., Goldsboro, Fayetteville, Rocky Mount and Wilson.—			
Goldsboro Cotton Grower	9.00	2.26	2.00
Rocky Mount Oil Mill Standard	8.00	1.65	2.00
Fayetteville Oil Mill Standard	8.00	1.65	2.00
Goldsboro Oil Mill Standard	8.00	1.65	2.00
Wilson Oil Mill Standard	8.00	1.65	2.00
The Southern Cotton Oil Company Standard	8.00	1.65	2.00
Fayetteville Oil Mill Special Cotton Grower	8.00	2.47	3.00
Wilson Oil Mill Special Cotton Grower	8.00	2.47	3.00
Rocky Mount Oil Mill Special Cotton Grower	8.00	2.47	3.00
Goldsboro Oil Mill Special Cotton Grower	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Goldsboro Oil Mill High Grade	8.00	2.26	2.50
Rocky Mount Oil Mill High Grade	8.00	2.26	2.50
Fayetteville Oil Mill High Grade	8.00	2.26	2.50
Wilson Oil Mill High Grade	8.00	2.26	2.50
The Southern Cotton Oil Co. High Grade	8.00	2.26	2.50
Edgerton's Old Reliable	8.00	2.47	3.00
Best & Thompson's Special	9.00	2.26	2.00
The Southern Cotton Oil Co.'s Special Tobacco Grower	8.00	2.47	3.00
Echo	8.00	2.06	3.00
Morning Glory	8.00	2.47	3.00
Southern Cotton Oil Co.'s Special Mixture	8.00	3.30	4.00
Best & Thompson's High Grade Cotton and Tobacco Guano	8.00	2.47	3.00
Statesville Oil and Fertilizer Co., Statesville, N. C.—			
King Cotton Soluble Guano	8.00	2.47	3.00
8-3-3 Soluble Guano	8.00	2.47	3.00
10-2 Bone and Potash	10.00	----	2.00
8-2-2 Manipulated Guano	8.00	1.65	2.00
10-4 Bone and Potash	10.00	----	4.00
16 Per Cent Acid Phosphate	16.00	----	----
Tuscarora Fertilizer Co., Atlanta, Ga., and Wilmington, N. C.—			
Acid Phosphate	14.00	----	----
Acid Phosphate	13.00	----	----
Tuscarora Alkaline Bone	10.00	----	5.00
Tuscarora Bone Potash	10.00	----	2.00
Champion	8.00	2.06	2.50
Manure Substitute	6.00	3.30	4.00
Tuscarora Trucker	8.00	4.12	7.00
Berry King	8.00	2.06	4.00
Tobacco Special	8.00	2.47	3.00
Tuscarora Fruit and Potato	8.00	1.65	10.00
Cotton Special	8.00	2.47	3.00
King Cotton	8.00	2.06	2.00
Big (4) Four	7.00	1.65	4.00
Tuscarora Standard	8.00	1.65	2.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Acid Phosphate	16.00	----	----
Tuscarora Bone and Potash	8.00	----	4.00
Tuscarora Bone and Potash	10.00	----	4.00
Union Guano Co., Winston-Salem, N. C.—			
Union 12-6 Bone and Potash	12.00	----	6.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Genuine German Kainit	----	----	12.00
Union 12 Per Cent Acid Phosphate	12.00	----	----
Union Dissolved Bone	13.00	----	----
Union High Grade Acid Phosphate	14.00	----	----
Union 16 Per Cent Acid Phosphate	16.00	----	----
Union 12-3 Bone and Potash	12.00	----	3.00
Union 10-6 Bone and Potash	10.00	----	6.00
Union 10-5 Bone and Potash	10.00	----	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Union 10-4 Bone and Potash	10.00	----	4.00
Union 8-5 Bone and Potash	8.00	----	5.00
Union 12-4 Bone and Potash	12.00	----	4.00
Union 12-5 Bone and Potash	12.00	----	5.00
Union Wheat Mixture	8.00	----	4.00
Union Bone and Potash	10.00	----	2.00
Quakers' Grain Mixture	10.00	----	4.00
Giant Phosphate and Potash	10.00	----	3.00
Liberty Bell Crop Grower	10.50	----	1.50
Roseboro's Special Potash Mixture	12.00	----	6.00
Union Potato Mixture	8.00	1.65	10.00
Union Dissolved Animal Bone----Total	13.00	2.06	----
Union Vegetable Compound	7.00	4.12	8.00
Union Truck Guano	7.00	3.29	5.00
Union Premium Guano	8.00	3.29	4.00
Union Perfect Cotton Grower	9.00	2.26	2.00
Union Standard Tobacco Grower	8.00	2.06	2.00
Union Mule Brand Guano	10.00	1.65	2.00
Union Water Fowl Guano	8.00	2.06	3.00
Union Homestead Guano	8.00	2.47	3.00
Union Superlative Guano	8.00	.82	4.00
Union Special Formula for Cotton	10.00	2.47	3.00
Union Complete Cotton Mixture	9.00	1.65	3.00
Old Honesty Guano	8.00	1.65	2.00
Victoria High Grade Tobacco Guano	8.00	2.47	3.00
Sparger's Special Tobacco Grower	8.00	1.65	3.00
Old Honesty Tobacco Guano	8.00	1.65	2.00
Pure Animal Bone Meal----Total	22.50	3.71	----
Nitrate of Soda	----	14.82	----
Q and Q Quality and Quantity Guano	9.00	1.65	1.00
Pure Animal Bone Meal----Total	22.50	2.47	----
Sunrise Ammoniated Guano	8.00	.82	3.00
Union Approved Crop Grower	8.75	1.65	2.00
Fish Brand Ammoniated Guano	8.00	1.65	2.00
Farmers' Blood and Bone Guano	9.00	1.65	3.00
Union Prolific Cotton Compound	10.00	3.29	4.00
Sparga's Special Tobacco Grower	8.00	1.65	3.00
Union Guano for Tobacco and Cotton	8.00	3.29	6.00
Union Abattoir Co., Baltimore, Md., and Richmond, Va.			
German Kainit	----	----	12.00
Potash and Soluble Bone	12.00	----	5.00
Potash and Soluble Bone	12.00	----	3.00
Potash and Soluble Bone	10.00	----	5.00
Potash and Soluble Bone	10.00	----	2.00
Parker & Hunter's Corn Fertilizer	8.00	.82	3.00
Cotton Guano	8.00	1.65	2.00
Cotton and Tobacco Guano	8.00	2.47	3.00
Early Truck and Tobacco Guano	8.00	3.28	4.00
Early Potato and Truck Guano	6.00	5.14	5.00
Peanut Guano	8.00	1.00	4.00
Early Potato and Truck Guano	6.00	4.10	7.00
Acid Phosphate	14.00	----	----
Acid Phosphate	16.00	----	----
Tobacco Fertilizer	9.00	2.26	2.00
R. L. Upshur, Norfolk, Va.—			
Cotton Seed Meal Mixture	9.00	2.26	2.00
Nitrate of Soda	----	15.22	----
Muriate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Upshur's High Grade Acid Phosphate	14.00	----	----
Upshur's Peanut Guano	8.00	1.65	2.00
Upshur's G., G. & C. Guano	8.00	1.65	2.00
Upshur's Wheat Compound	12.00	----	5.00
Upshur's F. F. V. (Favorite Fertilizer of Virginia)	8.00	1.65	2.00
Upshur's Bone and Potash	10.00	----	2.00
Upshur's O. P. (Old Plantation)	9.00	1.65	2.00
Upshur's Norfolk Special 10 Per Cent	5.00	8.23	2.00
Upshur's 7 Per Cent Irish Potato	6.00	5.76	5.00
Upshur's F. C. (Farmers' Challenge)	6.00	5.76	6.00
Upshur's 7 Per Cent Special Potato Guano	5.00	5.76	5.00
Upshur's Special Truck	7.00	4.11	8.00
Upshur's F. F. (Farmers' Favorite)	7.00	4.11	6.00
Upshur's 5 Per Cent	5.00	4.11	5.00
Upshur's Fish, Bone and Potash	8.00	1.64	4.00
Upshur's 8-3-3 Cotton	8.00	2.47	3.00
Upshur's High Grade Tobacco Guano	8.00	2.47	3.00
Upshur's Premo Cotton Guano	8.00	1.65	2.00
Upshur's Special 2½-8-3	8.00	2.05	3.00
Upshur's 16 Per Cent Acid Phosphate	16.00	----	----
Upshur's 4-6-4	6.00	3.69	4.00
Venable Fertilizer Co., Richmond, Va.—			
Venable's 10 Per Cent Trucker	6.00	8.23	2.00
Venable's 6-6-6 Manure	6.00	4.94	6.00
Venable's 5 Per Cent Trucker	8.00	4.11	5.00
Venable's 4 Per Cent Trucker	8.00	3.29	5.00
Venable's Ideal Manure	8.00	1.65	5.00
Venable's Alliance Tobacco Manure, No. 1	8.00	2.06	3.00
Venable's Alliance Tobacco Manure, No. 2	8.00	1.65	2.00
Venable's B. B. P. Manure	9.00	1.65	1.00
Venable's Cotton Grower	8.00	2.06	3.00
Venable's Roanoke Special	8.00	2.06	3.00
Venable's Alliance Bone and Potash Mixture	8.00	----	4.00
Venable's Peanut Grower	8.00	----	4.00
Venable's Best Acid Phosphate	16.00	----	----
Venable's Alliance Acid Phosphate	14.00	----	----
Venable's Dissolved Bone	13.00	----	----
Venable's Standard Acid Phosphate	12.00	----	----
Bone and Potash Mixture	10.00	----	2.00
High Grade Bone and Potash Mixture	10.00	----	4.00
Planters' Bone Fertilizer	8.00	1.65	2.00
Ballard's Choice Fertilizer	8.00	2.47	3.00
Roanoke Mixture	9.00	2.26	2.00
Roanoke Meal Mixture	9.00	2.26	2.00
Pure Animal Bone—Total	25.00	2.47	----
Pure Raw Bone—Total	20.00	3.29	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Sulphate of Potash	----	----	48.00
Pure German Kainit	----	----	12.00
Venable's Corn, Wheat and Grass Fertilizer	9.00	1.65	1.00
Venable's Peanut Special	8.00	.82	4.00
Special Top Dresser	----	7.30	3.00
Our Union Special Fertilizer	8.00	1.65	2.00
Virginia-Carolina Chemical Co., Richmond, Va.—			
V.-C. C. Co.'s Special High Grade Potash Mixture	12.00	----	6.00
V.-C. C. Co.'s 14 Per Cent Acid Phosphate	14.00	----	----
V.-C. C. Co.'s 16 Per Cent Acid Phosphate	16.00	----	----

Name and Address of Manufacturer and Name of Brand	Avail. Phos. Acid.	Nitrogen.	Potash.
V.-C. C. Co.'s Standard Bone and Potash	10.00	----	5.00
V.-C. C. Co.'s Special Crop Grower	12.00	----	3.00
V.-C. C. Co.'s Formula 4-4	7.00	2.55	3.20
V.-C. C. Co.'s Special Truck Guano	6.00	4.12	7.00
V.-C. C. Co.'s Special	8.00	3.29	4.00
V.-C. C. Co.'s Special Potash Mixture	10.00	----	4.00
Genuine Peruvian Mixture Pelican	8.00	4.15	5.00
Jumbo Peruvian Guano Crop Grower	8.00	2.48	3.00
Yellow Leaf Tobacco Guano	8.00	2.47	3.00
Royal High Grade Fertilizer	8.00	2.47	3.00
V.-C. C. Co.'s Southern Cotton Grower	9.00	2.26	2.00
Burnhardt's Grain and Crop Guano	9.00	.82	3.00
Pure Animal Bone Meal Total	22.50	2.47	----
McCormick's Wheat and Grain Guano	9.00	.82	3.00
Smith's Irish Potato Guano	8.00	1.65	10.00
Lion's High Grade Tobacco Fertilizer	8.00	2.47	4.00
Invincible High Grade Fertilizer	6.00	4.12	7.00
V.-C C. Co.'s High Grade Tobacco Fertilizer	8.00	2.47	10.00
Great Texas Cotton Grower Soluble Guano	9.00	2.47	4.00
Cock's Soluble Guano High Grade Animal Bone	9.00	1.85	3.00
V.-C. C. Co.'s Truck Crop Fertilizer	7.00	4.12	7.00
Prolific Cotton Grower	9.00	2.26	2.00
Battle's Crop Grower	12.00	----	3.00
3 Per Cent Special C. S. M. Guano, No. 3	8.00	2.47	2.00
Delta C. S. M.	8.00	2.26	2.50
Winston Special for Cotton C. S. M.	8.00	1.65	2.00
Diamond Dust C. S. M.	8.00	1.65	2.00
Admiral	8.00	2.47	2.50
Blue Star C. S. M.	8.00	2.06	3.00
Good Luck C. S. M.	8.00	2.47	2.50
North State Guano C. S. M.	9.00	1.65	1.00
Plant Food C. S. M.	8.00	1.65	2.00
Split Silk C. S. M.	8.00	2.47	2.50
Superlative C. S. M. Guano	8.00	2.06	3.00
Farmers' Friend Favorite Fertilizer Special	8.50	1.65	2.00
White Stem C. S. M.	9.00	2.26	2.00
Special High Grade Tobacco Fertilizer C. S. M.	8.00	2.47	3.00
Wilson's Standard C. S. M.	8.00	1.65	2.00
Adams' Special	8.00	2.47	3.00
Ajax C. S. M. Guano	8.00	1.65	2.00
Royal Crown	8.00	2.26	2.00
Farmers' Favorite Fertilizer C. S. M.	8.00	1.65	2.00
Atlas Guano C. S. M.	8.00	2.47	2.50
Blake's Best	8.00	2.47	3.00
Orange Grove Guano	8.00	2.26	2.50
Carr's 8-4-4 Crop Grower	8.00	3.29	4.00
Ford's Wheat and Corn Guano	10.00	.82	2.50
Konqueror High Grade Truck Fertilizer	7.00	4.12	5.00
Goodman's Special Potash Mixture	12.00	----	5.00
Jones' Grain Special	8.00	----	4.00
V.-C. C. Co.'s Pure Raw Bone Meal Total	22.50	3.71	----
V.-C. C. Co.'s Dissolved Animal Bone	10.00	2.06	----
Sludge Acid Phosphate	14.00	----	----
Manure Salts	----	----	20.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	20.59	----
Fish Scrap	----	8.24	----
Nitrate of Soda	----	14.82	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	49.00
V.-C. C. Co.'s Grain Special	10.00	----	6.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
V.-C. C. Co.'s Dissolved Bone and Potash	10.00	----	2.00
Diamond Cotton Seed Meal Guano	8.00	2.47	3.00
Bold Buster Guano	10.00	1.65	2.00
Bigelow's Crop Guano	9.00	.82	3.00
V.-C. C. Co.'s 12-4 Grain Grower	12.00	----	4.00
Jeffreys' High Grade Guano	9.00	2.47	3.00
V.-C. C. Co.'s High Grade Top Dresser	4.00	6.18	2.50
Parker & Hunter's Special	8.00	1.65	2.00
Allison & Addison's Star Brand Vegetable Guano	8.00	3.71	4.00
Farmers' Success	8.00	2.46	4.00
Pace's Special 5 Per Cent Potato Guano	8.00	2.06	5.00
Virginia 11-5 Bone and Potash	11.00	----	5.00
Pasquotank Trucker	7.00	3.30	8.00
Myatt's Special High Grade	8.00	2.47	3.00
Allison & Addison's Star Special Tobacco Manure	9.00	2.26	2.00
Allison & Addison's Anchor Brand Tobacco Fertilizer	8.50	2.26	2.00
Allison & Addison's Anchor Brand Fertilizer	8.00	1.65	2.00
Allison & Addison's A. A. Guano	8.00	2.47	3.00
Allison & Addison's Old Hickory Guano	8.00	1.65	2.00
Allison & Addison's Star Brand Guano	9.00	1.65	1.00
Allison & Addison's B. P. Potash Mixture	10.00	----	2.00
Allison & Addison's McGavock's Special Potash Mixture	10.00	----	2.00
Allison & Addison's Fulton Acid Phosphate	14.00	----	----
Allison & Addison's I. X. L. Acid Phosphate	13.00	----	----
Allison & Addison's Standard Acid Phosphate	12.00	----	----
Allison & Addison's Rocket Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Acid Phosphate	16.00	----	----
Atlantic and Virginia Fertilizer Co.'s Crenshaw Acid Phosphate	13.00	----	----
Atlantic and Virginia Fertilizer Co.'s Valley of Virginia Acid Phosphate	14.00	----	----
Atlantic and Virginia Fertilizer Co.'s Our Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Bone and Potash Compound	10.00	----	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone Special for Tobacco	9.00	2.06	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone	8.00	1.65	3.00
Atlantic and Virginia Fertilizer Co.'s Carolina Truckers	7.00	5.76	7.00
Atlantic and Virginia Fertilizer Co.'s Virginia Truckers	8.00	4.12	5.00
Atlantic and Virginia Fertilizer Co.'s Orient Special for Tobacco	8.00	1.65	2.00
Atlantic and Virginia Fertilizer Co.'s Orient Complete Manure	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s King Cotton Grower	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s The Leader B. G.	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Groom's Special Tobacco Fertilizer	8.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Charlotte Dissolved Bone	12.00	----	----
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano B. G.	8.00	2.06	1.50
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano C. S. M.	8.00	2.06	1.50

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Charlotte Oil and Fertilizer Co.'s Charlotte Acid Phosphate	13.00	----	----
Charlotte Oil and Fertilizer Co.'s Catawba Guano B. G.	8.00	2.47	3.00
Charlotte Oil and Fertilizer Co.'s Catawba Acid Phosphate	14.00	----	----
Charlotte Oil and Fertilizer Co.'s Queen of the Harvest C. S. M.	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Oliver's Perfect Wheat Grower	11.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Dayvault's Special	12.00	----	6.00
Charlotte Oil and Fertilizer Co.'s 10-2 Bone and Potash	10.00	----	2.00
Charlotte Oil and Fertilizer Co.'s 15 Per Cent Acid Phosphate	15.00	----	----
Charlotte Oil and Fertilizer Co.'s McCrary's Diamond Bone and Potash	9.00	----	3.00
Charlotte Oil and Fertilizer Co.'s Special 3 Per Cent Guano C. S. M.	8.00	2.47	2.00
Charlotte Oil and Fertilizer Co.'s High Grade Special Tobacco Fertilizer	9.00	2.06	2.00
Davie & Whittle's Owl Brand Guano for Tobacco	8.00	2.47	3.00
Davie & Whittle's Owl Brand Special Tobacco Guano	9.00	2.06	2.00
Davie & Whittle's Owl Brand Truck Guano	8.00	4.94	5.00
Davie & Whittle's Owl Brand Guano	8.00	1.65	2.00
Davie & Whittle's Owl Brand Acid Phosphate with Potash	10.00	----	2.00
Davie & Whittle's Owl Brand High Grade Dissolved Bone	14.00	----	----
Davie & Whittle's Owl Brand Dissolved Bone	12.00	----	----
Davie & Whittle's Owl Brand High Grade Acid Phosphate	16.00	----	----
Davie & Whittle's Owl Brand High Grade 3 Per Cent Soluble Guano	9.00	2.06	3.00
Davie & Whittle's Owl Brand Acid Phosphate	13.00	----	----
Davie & Whittle's Vinco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Dissolved Bone	13.00	----	----
Durham Fertilizer Co.'s Diamond Wheat Mixture	10.00	----	3.00
Durham Fertilizer Co.'s Standard Wheat and Corn Grower	10.00	----	2.00
Durham Fertilizer Co.'s Excelsior Dissolved Bone Phosphate	14.00	----	----
Durham Fertilizer Co.'s Double Bone Phosphate	13.00	----	----
Durham Fertilizer Co 's Blue Ridge Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Carr's Special Wheat Grower	8.00	----	4.00
Durham Fertilizer Co.'s Standard Guano	9.00	1.65	2.00
Durham Fertilizer Co 's Best Potato Manure	7.00	5.76	7.00
Durham Fertilizer Co.'s L. & N. Special	9.00	2.47	2.00
Durham Fertilizer Co 's Special Plant and Truck Fertilizer	8.00	4.12	3.00
Durham Fertilizer Co.'s Gold Medal Brand Guano	8.00	2.47	3.00
Durham Fertilizer Co.'s Durham Bone and Potash Mixture	10.00	----	2.00
Durham Fertilizer Co.'s Genuine Bone and Peruvian Guano	8.00	1.65	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Durham Fertilizer Co.'s Genuine Bone and Peruvian Tobacco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Raw Bone Superphosphate	8.00	2.06	1.50
Durham Fertilizer Co.'s Standard Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	
Durham Fertilizer Co.'s Superphosphate for Tobacco	8.00	2.06	2.00
Durham Fertilizer Co.'s N. C. Farmers' Alliance Official Guano	8 00	2.06	3.00
Durham Fertilizer Co.'s N. C. Farmers' Alliance Official Acid Phosphate	13.00	----	----
Durham Fertilizer Co.'s Standard High Grade Acid Phosphate	14.00	----	----
Durham Fertilizer Co.'s Great Wheat and Corn Grower	10.50	----	1.50
Durham Fertilizer Co.'s Progressive Farmer Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Durham Ammoniated Fertilizer	9.00	1.65	1.00
Durham Fertilizer Co.'s Durham Best Acid Phosphate	16.00	----	----
Durham Fertilizer Co.'s Durham Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s New Era	8.00	1.65	3.00
Lynchburg Guano Co.'s Ironside Acid Phosphate	16.00	----	----
Lynchburg Guano Co.'s Spartan Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s Arvonia Acid Phosphate	13.00	----	----
Lynchburg Guano Co.'s S. W. Special Bone and Potash Mixture	10.00	----	4.00
Lynchburg Guano Co.'s Alpine Mixture	10.00	----	5.00
Lynchburg Guano Co.'s Dissolved Bone and Potash	10.00	----	2.00
Lynchburg Guano Co.'s Independent Standard	8.60	1.65	2.00
Lynchburg Guano Co.'s Solid Gold Tobacco	8.00	2.26	4.00
Lynchburg Guano Co.'s Lynchburg High Grade Acid Phosphate	14.00	----	----
Lynchburg Guano Co.'s Lynchburg Soluble	8.00	1.65	2.00
Lynchburg Guano Co.'s Lynchburg Soluble for Tobacco	8.00	1.65	2.00
Lynchburg Guano Co.'s Bright Belt Guano	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Crescent Brand Ammoniated Fertilizer	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Cooper's Bright Tobacco	8.00	2.06	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Trucker and Tomato Grower	8.00	4.12	5.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughter House Bone	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughter House Bone, Made Especially for Tobacco	8.00	2.06	2.00
Norfolk and Carolina Chemical Co.'s Amazon High Grade Manure	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Bright Leaf Tobacco Grower	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Bone and Potash	10.00	----	2.00
Norfolk and Carolina Chemical Co.'s Norfolk Soluble Bone	12.00	----	----
Norfolk and Carolina Chemical Co.'s Norfolk Best Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Norfolk and Carolina Chemical Co.'s Norfolk Reliable Acid Phosphate	14.00	----	----
Norfolk and Carolina Chemical Co.'s Amazon H. G. Tobacco Manure	8.00	2.47	3.00
Old Dominion Guano Co.'s Standard Raw Bone Soluble Guano	9.00	1.65	1.00
Old Dominion Guano Co.'s Farmers' Friend High Grade Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Farmers' Friend Fertilizer	8.00	1.65	2.00
Old Dominion Guano Co.'s Farmers' Friend Special Tobacco Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Old Dominion Special Wheat Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Special Sweet Potato Guano	6.00	1.65	6.00
Old Dominion Guano Co.'s Old Dominion Soluble Tobacco Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Soluble Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Potato Manure	7.00	4.12	8.00
Old Dominion Guano Co.'s Old Dominion Raw Bone Soluble Guano	9.00	2.05	3.00
Old Dominion Guano Co.'s Old Dominion 6-7-5 Truck Guano	6.00	5.75	5.00
Old Dominion Guano Co.'s Old Dominion 7-7-7 Truck Guano	7.00	5.75	7.00
Old Dominion Guano Co.'s Old Dominion Alkaline Bone and Potash	10.00	----	2.00
Old Dominion Guano Co.'s Bullock's Cotton Grower	8.00	1.65	2.00
Old Dominion Guano Co.'s Osceola Tobacco Guano	8.00	2.06	3.00
Old Dominion Guano Co.'s Millers' Special Wheat Mixture	8.00	----	4.00
Old Dominion Guano Co.'s Planters' Bone and Potash Mixture	10.00	----	3.00
Old Dominion Guano Co.'s Bone Phosphate	13.00	----	----
Old Dominion Guano Co.'s Royster's Acid Phosphate	12.00	----	----
Old Dominion Guano Co.'s High Grade Acid Phosphate	14.00	----	----
Old Dominion Guano Co.'s Obelisk Brand Bone and Potash	10.00	----	4.00
Old Dominion Guano Co.'s Horne's Cotton Fertilizer	9.00	2.06	3.00
Old Dominion Guano Co.'s 7 Per Cent Truck Fertilizer	6.00	5.76	6.00
Old Dominion Guano Co.'s 10 Per Cent Truck Fertilizer	5.00	8.24	2.50
Powers, Gibb & Co.'s Almont Acid Phosphate	12.00	----	----
Powers, Gibb & Co.'s Cotton Brand Best Acid Phosphate	13.00	----	----
Powers, Gibb & Co.'s Almont High Grade Acid Phosphate	14.00	----	----
Powers, Gibb & Co.'s Fulp's Acid Phosphate	13.00	----	----
Powers, Gibb & Co.'s Cotton Brand Acid Phosphate	12.00	----	----
Powers, Gibb & Co.'s Acid Phosphate and Potash	10.50	----	1.50
Powers, Gibb & Co.'s Almont Wheat Mixture	10.00	----	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Powers, Gibb & Co.'s Dissolved Bone and Potash	10.00	----	2.00
Powers, Gibb & Co.'s Almont Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibb & Co.'s Carolina Golden Belt Ammoniated Guano for Tobacco	8.00	2.06	3.00
Powers, Gibb & Co.'s Truck Farmers' Special Ammoniated Guano	8.00	3.29	5.00
Powers, Gibb & Co.'s Old Kentucky High Grade Manure	8.00	2.47	3.00
Powers, Gibb & Co.'s Cotton-seed Meal Standard Guano	9.00	2.47	2.00
Powers, Gibb & Co.'s Cotton-seed Meal Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibb & Co.'s Cotton Belt Ammoniated Guano	8.00	2.47	2.00
Powers, Gibb & Co 's Eagle Island Ammoniated	8.00	1.65	2.00
Powers, Gibb & Co.'s Cotton Brand Ammoniated Dissolved Bone	8.00	3.29	4.00
Powers, Gibb & Co.'s Gibb's Ammoniated Guano	8.00	2.06	1.50
Powers, Gibb & Co.'s Powers' Ammoniated Guano	8.00	2.06	2.00
Southern Chemical Co.'s Electric Tobacco Guano	8.00	1.65	2.00
Southern Chemical Co.'s Electric Standard Guano	8.00	1.65	2.00
Southern Chemical Co.'s Pilot Ammoniated Guano Special for Tobacco	8.00	2.06	3.00
Southern Chemical Co.'s George Washington Plant Bed Fertilizer for Tobacco	8.00	2.47	2.50
Southern Chemical Co.'s Sun Brand Guano	9.00	2.06	5.00
Southern Chemical Co.'s Yadkin Complete Fertilizer	8.00	1.65	2.00
Southern Chemical Co.'s Solid South	10.00	----	6.00
Southern Chemical Co.'s Chick's Special Wheat Compound	8.00	----	4.00
Southern Chemical Co.'s Mammoth Wheat and Grass Grower	10.00	----	2.00
Southern Chemical Co.'s Winston Bone and Potash Compound	10.00	----	2.00
Southern Chemical Co.'s Winner Grain Mixture	10.00	----	4.00
Southern Chemical Co.'s Mammoth Corn Grower	10.00	----	2.00
Southern Chemical Co.'s Farmers' Pride Bone and Potash	10.00	----	3.00
Southern Chemical Co.'s Reaper Grain Application	12.00	----	3.00
Southern Chemical Co.'s Quickstep Bone and Potash	11.00	----	5.00
Southern Chemical Co.'s Tar Heel Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Red Cross 14 Per Cent Acid Phosphate	14.00	----	----
Southern Chemical Co.'s Comet 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chick's 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chatham Acid Phosphate	13.00	----	----
Southern Chemical Co.'s Horseshoe Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Victor Acid Phosphate	13.00	----	----
J. G. Tinsley & Co.'s Dissolved S. C. Bone	13.00	----	----
J. G. Tinsley & Co.'s Powhatan Acid Phosphate	14.00	----	----
J. G. Tinsley & Co.'s Richmond Brand Guano	8.00	2.47	3.00
J. G. Tinsley & Co.'s Lee Brand Guano	8.00	1.65	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
J. G. Tinsley & Co.'s Killickinick Tobacco Mixture	8.00	2.06	3.00
J. G. Tinsley & Co.'s Stonewall Brand Acid Phosphate	12.00	----	----
J. G. Tinsley & Co.'s Stonewall Brand Guano	8.00	1.65	2.00
J. G. Tinsley & Co.'s Stonewall Tobacco Guano	8.00	1.65	2.00
J. G Tinsley & Co.'s Tinsley's Special Irish Potato Guano	6.00	5.76	6.00
J. G. Tinsley & Co.'s Tinsley's Bone and Potash Mixture	10.00	----	2.00
J. G. Tinsley & Co.'s Tinsley's Strawberry Grower	6.00	3.29	4.00
J. G. Tinsley & Co.'s Tinsley's 10 Per Cent Truck Guano	5.00	8.25	2.50
J. G. Tinsley & Co.'s Tinsley's Irish Potato Guano	6.00	4.94	6.00
J. G. Tinsley & Co.'s Tinsley's Tobacco Fertilizer	8.00	3.29	2.50
J. G. Tinsley & Co.'s Tinsley's 7 Per Cent Ammoniated Guano for Beans, Peas, Cabbage, Strawberries, etc.	6.00	5.76	6.00
S. W. Travers & Co.'s National Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s National Special Tobacco Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Beef, Blood and Bone Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Standard Dissolved S. C. Bone	13.00	----	----
S. W. Travers & Co.'s Travers' Dissolved Bone Phosphate	14.00	----	----
S. W. Travers & Co.'s Capital Dissolved Bone	12.00	----	----
S. W. Travers & Co.'s Capital Cotton Fertilizer	8.00	2.06	2.00
S. W. Travers & Co.'s Capital Bone and Potash Compound	10.00	----	2.00
S. W. Travers & Co.'s Capital Truck Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Capital Tobacco Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Travers' Special Wheat Compound	8.00	----	4.00
S. W. Travers & Co.'s Travers 7 Per Cent Truck Fertilizer	6.00	5.76	5.00
S. W. Travers & Co.'s Champion Acid Phosphate	16.00	----	----
Virginia State Fertilizer Co.'s Virginia State Dissolved Bone and Potash	10.00	----	2.00
Virginia State Fertilizer Co.'s Virginia State Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Virginia State High Grade Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Number One Soluble Guano	9.00	1.65	2.00
Virginia State Fertilizer Co.'s XX Potash Mixture	10.00	----	4.00
Virginia State Fertilizer Co.'s Mountain Top Bone and Potash	10.00	----	5.00
Virginia State Fertilizer Co.'s Peerless Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Battle Axe Tobacco Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Dunnington's Special Formula for Tobacco	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Austrian Tobacco Grower	8.00	2.06	2.00
Virginia State Fertilizer Co.'s Buffalo Guano	8.00	2.06	3.00
Virginia State Fertilizer Co.'s Gamecock Special for Tobacco	8.50	1.65	.00
Virginia State Fertilizer Co.'s Gilt Edge Special Tobacco Guano	8.00	2.06	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Virginia State Fertilizer Co.'s Bull Dog Soluble Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Clipper Brand Acid Phosphate	13.00	----	----
Virginia State Fertilizer Co.'s Highland King	9.00	1.65	1.00
Virginia State Fertilizer Co.'s Alps Brand Acid Phosphate	12.00	----	----
Virginia State Fertilizer Co.'s Bull Run Acid Phosphate	16.00	----	----
Virginia State Fertilizer Co.'s Lurich Acid Phosphate	12.00	----	----
Virginia State Fertilizer Co.'s Gilt Edge Brand Acid Phosphate	14.00	----	----
Virginia State Fertilizer Co.'s Gilt Edge Brand Dissolved Bone and Potash	8.00	----	4.00
V.-C. C. Co.'s Vecesco Cotton Grower	9.00	2.26	2.00
V.-C. C. Co.'s Corn and Peanut Special	8.00	1.65	4.00
V.-C. C. Co.'s Long Leaf Tobacco Guano	8.00	3.29	5.00
Reliable Cotton Brand Fertilizer	9.00	1.65	3.00
V.-C. C. Co.'s Potash Potato Producer	7.00	3.29	8.00
Powhatan Crop Mixture	8.50	1.65	1.50
Thomas Wakefield, Friendship, N. C.—			
Bone Meal----Total	21.73	4.12	----
Williams & Clark Fertilizer Co., Charleston, S. C.—			
Standard American Ammoniated Bone Superphosphate	9.00	1.85	1.00
Winborne Guano Co., Tyner, N. C.—			
King Taminy Guano	8.00	2.47	3.00
Farmers' Select Guano	8.00	2.06	3.00
Winborne's 7 Per Cent Guano	5.00	5.75	5.00
Winborne's Excelsior Guano	8.00	1.65	2.00
Winborne's Tobacco Guano	8.00	2.47	3.00
Winborne's Eureka Guano	8.00	1.65	2.00
Winborne's 3-8-4 Guano	8.00	2.47	4.00
Winborne's Triumph Guano	8.00	1.65	2.00
High Grade Acid Phosphate	14.00	----	----
Standard 16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Soluble Bone and Potash	10.00	----	2.00
Nitrate of Soda	----	15.63	----
Muriate of Potash	----	----	50.00
T. W. Wood & Sons, Richmond, Va.—			
Standard Grain and Grass Fertilizer	8.00	1.65	2.00
Standard High Grade Trucker Fertilizer	8.00	4.94	6.00
Standard Vegetable Fertilizer	8.00	2.47	3.00
Standard High Grade Acid Phosphate	14.00	----	----
Standard Bone and Potash Mixture	10.00	----	2.00
Wood's Lawn Enricher	6.00	2.47	3.00
Nitrate of Soda	----	15.64	----
Acid Phosphate Fertilizer	16.00	----	----
Acid Phosphate Fertilizer	14.00	----	----
Standard H. G. Acid Phosphate	16.00	----	----
Wessel, Duval & Co., New York—			
Nitrate of Soda	----	14.85	----

LEAF TOBACCO SALES FOR MARCH, 1909.

Pounds sold for producers, first hand	2,897,602
Pounds sold for dealers	263,255
Pounds resold for warehouse	258,035
Pounds resold for other warehouses	7,891
Total	3,426,783

THE BULLETIN

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THE PREPARATION OF FRUIT AND VEGETABLES FOR MARKET.

By S. B. SHAW.

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THE PREPARATION OF FRUIT AND VEGETABLES FOR MARKET.

S. B. SHAW.

Practically half the profits in fruit and vegetable growing depends upon the condition in which these products reach the consumer. An observation of the markets in any of our cities will show that there is room for great improvement in the preparation of fruit and vegetables for market. On every side can be seen farm produce selling at reduced prices or else cast aside by the dealers as not worth handling, owing to the damaged or unattractive condition in which it has arrived. The average buyer is attracted by the appearance rather than by the quality of the goods. This is true in all mercantile branches of trade, and particularly so where the products of the garden, farm and orchard are involved. The man who would dispose of his commodities profitably must study the demands of his market and cater to the whims and fancies of the trade.

There are two kinds of markets on which the grower can dispose of his produce: the local or home market, and the distant or wholesale market. Those who can sell on the former have advantages over those selling on the latter. The local market affords the grower an opportunity of coming face to face with the consumers and learning their preferences. These preferences create a demand for a greater variety of good fresh fruits and vegetables.

The grower is also enabled to place his produce on this market in a more attractive condition than he can when shipping some distance. Another advantage is the chance the grower has of using his packages an indefinite number of times. With the probable exception of small fruits and berries, "gift packages" are not required. There are also no transportation or commission charges to be paid. These charges frequently absorb all revenue derived from the sale of produce sent to distant markets, thus leaving the grower nothing for his seed, labor and packages. However, this seldom, if ever, happens unless brought about by careless and indifferent preparation.

Every fruit and vegetable grower is not so fortunately located as to have the advantages of a good local market. His produce must go to some distant market, there competing with the products from other sections and sometimes foreign countries. This competition is gradually increasing, and only the better grades of produce pay for packages, transportation and commissions and leave a margin of profit for the grower. In order to furnish the better grades of produce for this competition, growers must be particularly careful in the preparation of their goods for market. The more care given a crop at the home end results in greater profits at the market end.

Each of the various products of the garden and orchard has, to a certain extent, its own particular characteristics, necessitating a different method of handling for different markets. There are, however, sev-

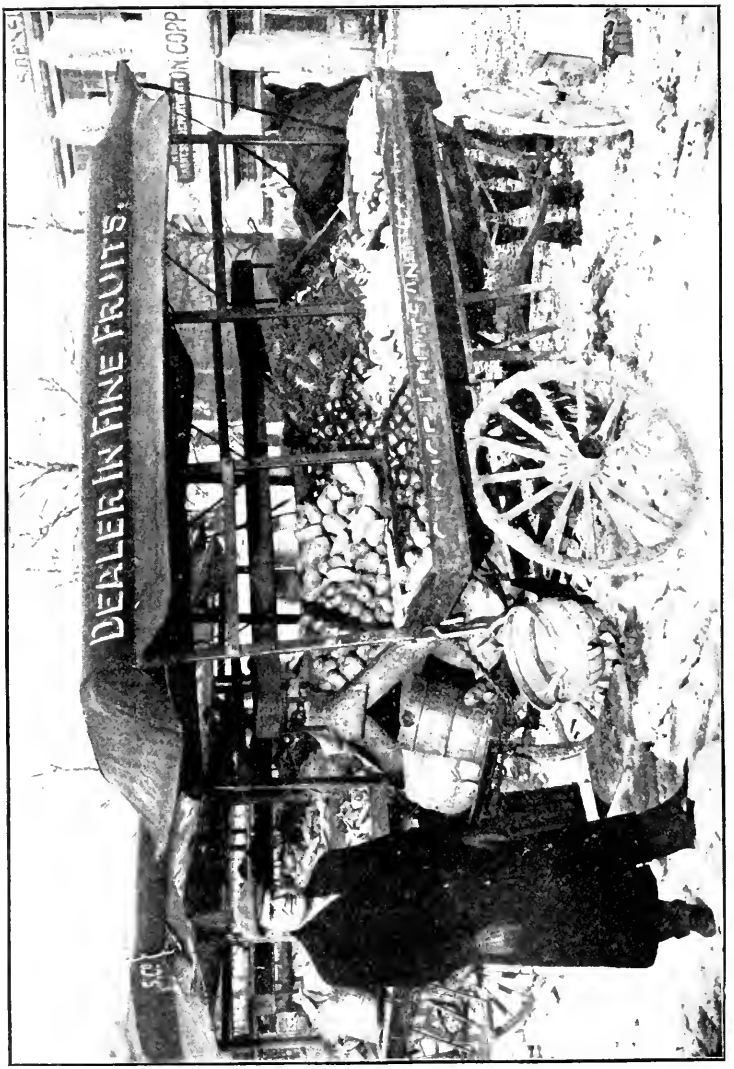


FIG. 1.—SELLING ON THE HOME MARKET. (Photo by C. A. Reid.)

eral important rules that apply to the handling of every kind of produce regardless of market. Cleanliness, neatness and uniformity are three qualities required in the preparation of all kinds of farm produce for securing and holding a select trade that will be profitable. In order to bring about these qualities, it is necessary to give some attention to several points frequently neglected on the farm. One of the most important of these is the method of growing the crop.

CULTIVATION.

The preparation of fruits and vegetables for market really begins with their production. A suitable location should be secured, the land properly prepared, good seed planted, and the resulting crop carefully cultivated. A great deal depends upon this cultivation, for it includes not only the tillage of the soil, but the protection of the growing trees and plants from the attacks of numerous insect and fungous enemies.

Plants grow, develop and mature their fruit in proportion to the amount of available food at their disposal. The greater part of this food is in the soil, occurring naturally, or supplied by artificial means. It cannot, however, be made use of by the plants until rendered available. This condition is brought about by the combined action of several agencies, most important of which are light, air and moisture. Tillage promotes the work of these agencies and as a result influences the growth of the plants, thereby affecting the development and quality of the fruits. Poorly fed, badly neglected trees and plants cannot produce marketable fruits.

Twenty years ago there was little need to fight garden and orchard pests, as the injury caused by them was scarcely appreciable. At the present time, particularly in older sections of the country, it has become necessary to combat these pests in order to grow marketable crops. This marked change, coming in so short a time, and in many instances causing serious loss, has naturally been discouraging, and as a result many growers have been slow to adapt themselves to these new conditions. Although the combating of insect and fungous enemies has without doubt slightly increased the cost of production, the growers who have persistently used proper efforts for their control have been uniformly successful in raising profitable crops of high-grade fruit and vegetables.

An examination of any market will show that the well-developed, finely colored, clean and attractive products of the farm bring the highest prices. Care and attention on the part of the grower and the demands of the consumer are responsible for this condition. Careless, indifferent cultivation and the unchecked ravages of different insects and fungi are principally the cause of undersized, poorly colored, diseased and unattractive specimens of orchard and garden products. Produce of this kind is usually a glut in the market, for buyers do not want it at any price.

PICKING.

Another point frequently receiving too little attention on the farm is the method of harvesting the produce. The proper stage of maturity at which the various fruits and vegetables should be picked depends upon the time required to place the products upon the market. Generally they should be left on the tree or vine no longer than will permit of their

becoming fully ripe by the time they reach their destination and are exposed for sale. It would be impossible to give exact rules for determining the best time to harvest any farm produce. This can best be learned by personal experience, guided by the ripening habit of the different crops grown. These habits vary somewhat in different localities and with different varieties. Produce for the nearby market need not be picked until almost ripe, but for long-distance shipment it must be harvested earlier. A great many growers make the mistake of allowing their fruit and vegetables to become too ripe before picking, and as a result the products that look so fresh and attractive when starting reach their destination in a state of overripeness and of probable decay. For this reason it pays the grower, when the harvesting season draws near, to carefully consider the distance to his market.

Fruits and vegetables intended for sale in fresh condition, either on the home or distant market, should be picked by hand, thus eliminating to a great extent the bruises that result from careless and rapid gathering. Bruised fruits soon become decayed and start decay in other fruits with which they come in contact in the package. When this condition develops, the attractiveness, cleanliness and uniformity of the products are destroyed and their value decreased accordingly. Various mechanical devices have been invented for the harvesting of fruits and vegetables, but for the most part they have not been found very desirable or satisfactory except where the produce is used for canning or preserving purposes.

Ordinarily, vegetables are first picked into baskets or other easily handled receptacles, holding from one-half to a bushel, and are then carried from the field to the packing shed where they are graded and packed ready for marketing. Small fruits and berries are usually picked into pint or quart baskets or boxes and are carried to the packers on trays holding from six to twelve baskets. Tree fruits are either picked into baskets or medium-size sacks arranged to suit the convenience of the picker and at the same time providing against probable damage from bruising. The fruit is picked either from the ground or from step-ladders or other light ladders that can be carefully laid against the limbs or branches of the trees. In some localities the common practice in harvesting this kind of fruit is to either shake it onto the ground or onto beds of straw placed around the trees, or else to beat and knock it off with poles and clubs. Fruits handled in this manner had best be kept at home, for if sent to market it is very doubtful if they would sell for enough to pay for packages and the cost of transportation. The one main point to be observed in the picking of any fruit or vegetable, whether for home or distant market, is to avoid as far as possible the making of any bruise or injury to the skin.

GRADING.

Probably the most important operation in preparing fruit and vegetables for market is the grading. This work can best be started in the field with the growing of the crops. Careful cultivation means fewer culls and less expense for sorting and grading. Uniformity is the chief requirement to be considered in this operation. Growers should attempt to handle and market their crops so that they will be uniform in quality,

condition and general appearance. Produce put up in this shape will appear to best advantage at the time of sale. Markets are seldom overstocked with good fruit and vegetables; it is the poorly developed, unevenly ripened, badly selected products that injure the sale of better articles. Produce of all kinds should be sorted so that in each package each specimen is as nearly like the others as is practicable. The efficient grader has in mind the appearance of the whole package, and not the individual specimens. This work can seldom be overdone, for the more rigid the grading the greater the profits at the time of sale.

Under ordinary conditions, grading can best be done in the packing shed or in the shade of convenient trees where the produce will be protected from the direct rays of the sun and have an opportunity of becoming cool before being packed. Usually, fruits and vegetables are divided into three grades, "Firsts" or "Primes," "Seconds" and "Culls." "First" grade or "Prime" produce must be uniform in size, color and shape, of an even degree of ripeness, and free from insect injuries, bruises and all other defects. "Seconds" must be good, fairly uniform specimens, not noticeably marked by insect, fungus or other damage. "Culls" are those specimens which will not fill all requirements of either of the other two grades. Produce is generally graded as it is packed.

PACKING.

Packing is equally as important as any of the other operations involved in the preparation of fruits and vegetables for market. There are several important points in connection with this work worthy of consideration, probably the most important of which is honesty. "Every grower's pack should be as good as his bond." Customers want honestly packed goods and they are usually willing to pay good prices for them. A grower never loses by placing honestly packed produce on any market, be it at home or abroad.

Each package should be filled with the same grade throughout. If this is done the top may be "faced." "Facing" is the arranging of from one to three layers of fruit on the top, thus increasing the attractiveness of the package. This is an honest and perfectly legitimate practice provided the entire contents are fruits of the same grade as those placed on top. "Seconds" and inferior grades should never be "faced" with "prime" specimens. "There is neither cash nor character in this practice." A few "seconds" or "culls" scattered in with a lot of fancy or prime specimens gives the buyer an opportunity to discriminate against the whole package and ruins the reputation of the grower as an honest packer.

Produce should be cool and dry before being packed. Heat and moisture promote decay. Conditions of this kind should be guarded against, for decay means loss. Allow all fruits and vegetables to cool in the packing house, and have them dry before packing. They will keep longer and present a better appearance at the time of sale if handled in this way. So much of the success in marketing farm products depends upon the packing, that growers cannot be too particular in seeing that this work is done in such a way as to show their produce to best advantage when put on sale. While it is of the utmost importance that each package be filled with the same grade throughout, it is equally as impor-

tant that it be done carefully. With the softer varieties of fruit and vegetables, such as peaches, plums, tomatoes and eggplant, that are usually put in small packages, each specimen should be placed by hand. This not only makes the pack more attractive, but it lessens the liability to damage resulting from bruises. Produce of a firm nature, as apples, potatoes, etc., will not bruise so readily, and as a result it is not necessary to handle each individual specimen in packing.

Each package should be well filled, with the contents placed firmly and snugly. Every day consignments are placed on the market showing evidences of careless packing. Consider for a moment the average route traveled by a barrel of apples, or potatoes, or, it may be, a basket of cucumbers, or "snap" beans. The package is taken from the packing shed or from the field and loaded into a wagon. It is then hauled, say from one to six miles over the average country road to the railroad station or steamboat wharf, where it is again transferred to either a car or boat. After traveling from twenty to two hundred miles, and possibly more, it is again unloaded and placed in a wagon and this time hauled for several squares over the usual city street, until it finally reaches its destination and is ready to be opened for the inspection of the general public and the criticism of the possible buyer. Unless this package has been well filled and packed before starting, it will reach the market in what is commonly called a "slack" condition. The numer-

FIG. 2 A.—POORLY-PACKED POTATOES.

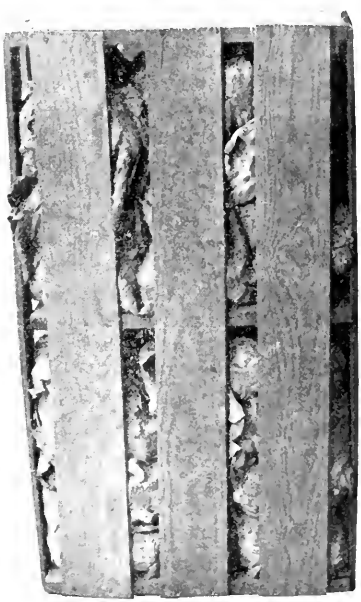


FIG. 2 B.—LOOSELY-PACKED CABBAGE.

ous handlings and jarrings received en route will have caused the contents to settle and shrink and as a result the package will be only partially full. Fig. 2 A shows a barrel of potatoes as it reached market.

It would take half a bushel of potatoes to fill it as it now stands. Fig. 2 B shows a crate of cabbage in the same condition. Buyers cannot be expected to pay the price of full packages for those only filled in part. Not only is the sale of produce affected in this way, but loose packing invariably causes bruises and the general defacement of each specimen. Too tight packing should also be guarded against, as this frequently results in bruising. There is a "happy medium" in packing that can be learned only by experience.

In some localities growers have found it profitable to wrap certain kinds of their fruit and vegetables before packing. Suitable paper of a light grade is used for this purpose, and if the stock is "fancy," each wrapper has printed on it an attractive label bearing the name of the brand, where and by whom grown. The cost of these wrappers is very slight, and they not only serve as a means of advertising fancy produce, but they improve the appearance of the whole package. Further than this, the use of wrappers has a tendency to prolong the keeping qualities of the fruit or vegetables. One or more peaches or tomatoes in a package may begin to rot. This condition causes a liberation of moisture that, unless checked, will spread and cause decay to develop in other specimens. When each fruit or vegetable is wrapped the paper absorbs a certain per cent of this moisture, thus checking for a time the spread of decay. Wrappers are also an aid in keeping produce firm and snug in the packages.

When produce is packed, ready for shipment, see that each package has the cover securely fastened in place. Complaints are frequently made regarding the condition of fruits and vegetables upon reaching market, owing to the careless and insecure way in which covers have been fastened. No matter how carefully the packing has been done, products will not reach their destination in good condition unless properly covered. One often sees produce of excellent quality reach the market in a badly damaged condition on account of an insufficient number of nails or fasteners used at the time of shipment. Thoughtfulness in matters of this kind usually means greater profits to the shipper.

LABELS.

The practice of labeling or branding fruit and vegetable packages is a point worthy of some consideration. A great many growers fail to grasp the importance of this feature, particularly with reference to the sale of their produce each successive year. They seem to hesitate about the small additional expense incurred by this operation, and do not consider that the money spent in this way will result in a quicker and more profitable sale of their products during coming seasons. It has been only within recent years that growers have made any attempt at marking their fruits and vegetables before placing them on the market. In practically every other branch of industry producers have marked their goods with some label, brand or trade-mark, to distinguish them from the productions of others. The sale of these products is greatly influenced by this distinction.

The man who puts up an honest pack of first-class fruits or vegetables in uniform, well-constructed packages need never fear that the money spent for attractive labels will be wasted. For instance, a grower, after carefully grading and packing his produce, puts his label on each pack-

age; they go to market, are exposed for sale, a buyer purchases them and upon examining the contents finds he has received full value for his money. He immediately looks to see where the product came from and by whom packed. The next time he has to purchase this same product, whether the same season or the next, he looks for this brand. Thus the label has accomplished two purposes: it has been a guarantee and has served as a means of advertising.

There are two styles of labels used in marking fruit and vegetable packages, the ordinary stencil or stamp, and the one printed on paper to be pasted on the package. The former usually has the name of the variety contained, where, and by whom grown. The latter, in addition to this, may be made up in colors and have a picture of the kind of produce for which it is to be used. Either style is good, but with conditions as they exist to-day, the neater and more attractive the label, the quicker it catches the eye of the public, and as a result the more ready the sale, particularly when the produce is in first-class condition. The one thing to be avoided in labeling any fruit or vegetable package is the placing of a label for first-class or "fancy" grade produce on a package containing second-class or inferior grades. Practices of this kind will invariably result in a loss of both money and reputation.

PACKAGES.

The fruit and vegetable package of to-day is an influential factor in the produce business. Many growers do not consider the relation the package bears to the selling value of their products. In fact, few people realize the full significance of the American package as used in all branches of trade, particularly those engaged in the handling of farm, garden and orchard products. It has only been within recent years that the individual consumer could carry fruits and vegetables home in the packages in which they originally reached market. The small package is gaining favor every day. Its development has been brought about by brisk competition resulting from the ever increasing demands of the public. Fig. 3 shows packages of this type as they reached market.

Modern packages are characterized by neatness, lightness, cheapness and uniformity. The sale of products largely depends upon the appearance of the packages in which they are contained. Attract the attention of the buyer and the bargain is half made. It is always advisable to have a sufficient supply of new packages on hand at the beginning of the shipping season. Never use packages in which fruit or vegetables have previously been marketed. Their general appearance is most often decidedly unattractive and the wood is usually impregnated with spores of numerous moulds and rots from the produce formerly packed in them. Rapid decay almost always develops in fresh produce coming in contact with this infected wood. If, at the close of the season, a number of unused packages remain, they should be stored in a clean, dry place where they will be protected and their general attractiveness retained until the next season. Fruits and vegetables may be of the best quality, but if put into dirty, unattractive packages they seldom, if ever, find a ready sale.

On account of the perishable nature of fruit and truck crops, they must be handled and transported as rapidly as possible. This and the

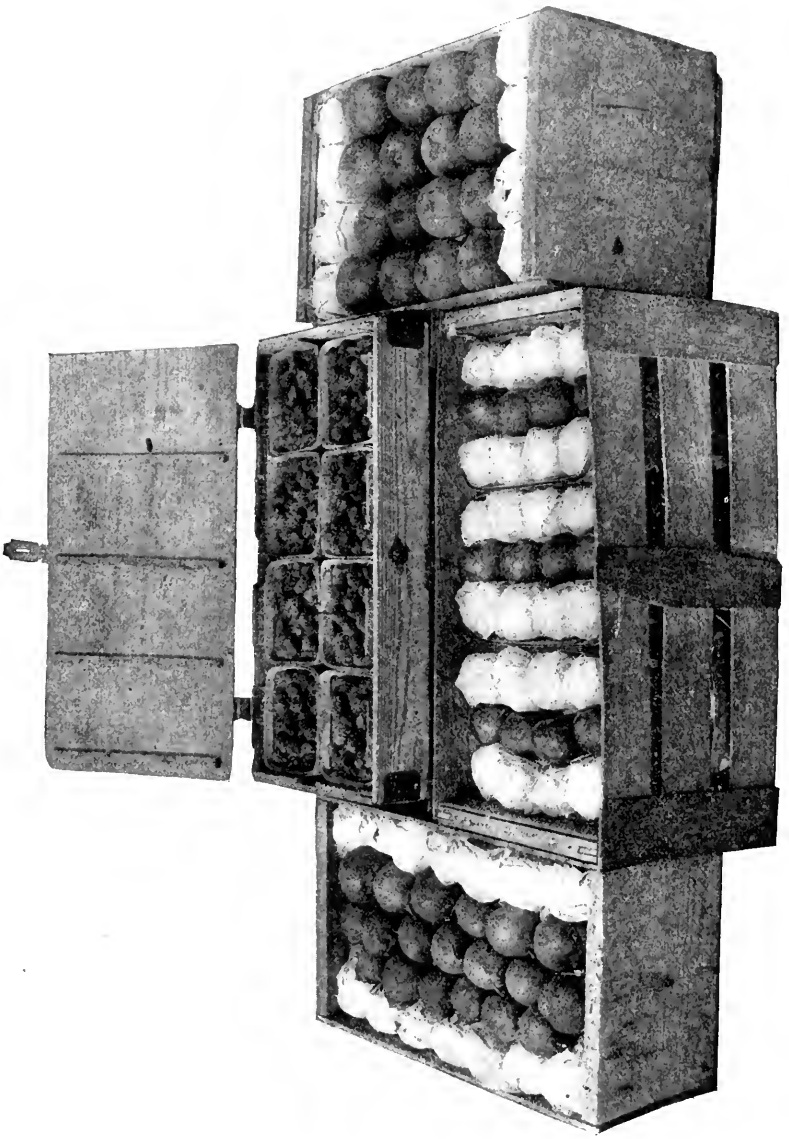
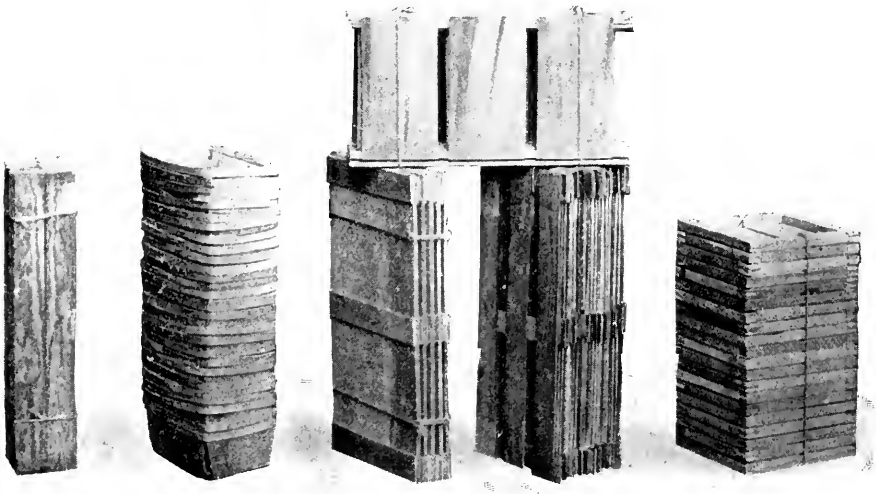
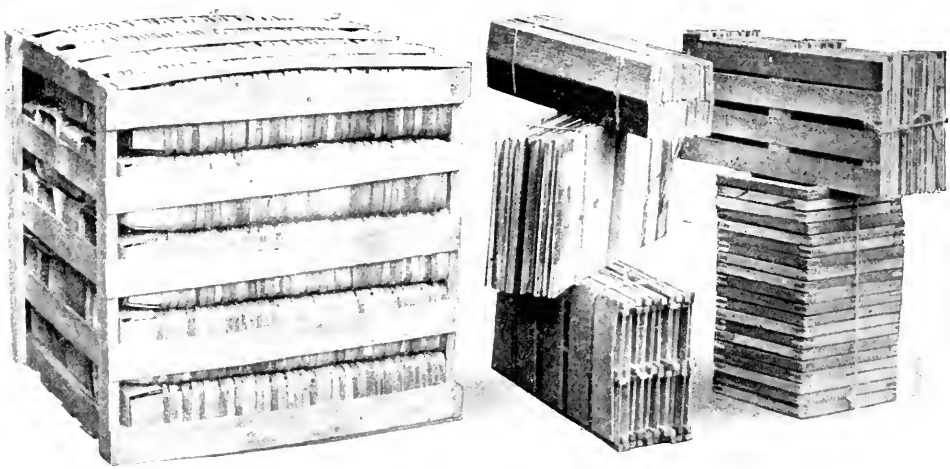


FIG. 3.—MODERN "GIFT PACKAGES."

cost of transportation makes it necessary to have the lightest, most durable packages procurable. The actual cost of certain packages is influenced by their weight. While transportation charges are sometimes based on bulk, they are more frequently based on actual or approximate weight. Take, for example, the berry crate, the six-basket carrier, and the cantaloupe crate; packages of this kind are usually shipped in a "knocked down" condition, as shown in Figs. 4 and 5. The greater their weight when leaving the manufacturer the greater will be their cost upon reaching the grower. The same influencing factor of weight





FIGS. 4 AND 5.—PACKAGES "KNOCKED DOWN" READY FOR SHIPMENT.
(Courtesy of the Bridgeport Woodenware Mfg. Co.)

exists in the shipping of produce. Cost of transportation is affected by the actual weight of the packages handled. Usually hardwood veneer is used in the construction of most fruit and vegetable packages. It has been found that material of this character will make the lightest and at the same time most durable package at the lowest price.

The cost of packages is another point worthy of some thought. While attractiveness, weight and durability are important considerations, cheapness must also be considered. The time has come when the better grades of fruit and vegetables are put up in special packages that go with the sale of the product. The increasing demands of the trade for produce in "gift packages" has been the means of creating strong competition among manufacturers. As a result prices have been reduced, and in most localities growers have comparatively easy access to a sufficient supply of desirable packages. Fig. 3 shows some of the modern "gift packages" as commonly used in shipping fruits and vegetables.

At present there are no packages universally recognized as legally standard, yet the one characteristic most notable of the American package is its uniformity. Although many poorly constructed, "short," inferior packages are still found on the markets, it will be only a question of time before this type will become so thoroughly unpopular that the unscrupulous grower and packer who desires to use them will be compelled to recognize the demands of the trade regarding uniformity, or go out of business. While uniformity is a marked characteristic of the American package, a great many growers fail to grasp the importance of this point. They ship produce in packages that may answer the requirements of their local markets, but that do not comply with the demands of distant markets. As a result, dissatisfaction arises between the grower and buyer. The buyer discriminates against this produce, the grower becomes discouraged, and the business that might have become very profitable is given up in disgust, all on account of the disregard, on the part of the grower, of market requirements. Growers should become familiar with the conditions and preferences of the markets on which they expect to place their produce. The business of marketing fruit and vegetables has become so well developed that there is no reason why one should not be thoroughly acquainted with the present requirements and conditions of any market. Buyers, commission merchants and produce dealers in general are always willing to furnish growers with any information regarding the preparation of fruit and vegetables for sale and the most desirable packages to use in placing these products on the markets. If growers would visit the markets to which they send their products they would become better acquainted with existing conditions and preferences, and be enabled to prepare their fruits and vegetables to the better satisfaction of both the buyer and themselves.

Recently, inquiries were sent to buyers and commission merchants of representative Eastern markets, from Florida to Massachusetts, regarding the most desirable kinds of packages to use in marketing the principal fruits and vegetables grown in this State. Without an exception, each reply showed clearly the necessity of using uniform packages. To quote from William Gamble & Co., of New York City: "We know, from our long experience in the business, that best results are always obtained when goods are put up in substantial, uniform, well-filled packages.

Goods carelessly prepared and in flimsy packages do not command nearly so much on the New York market as the uniform article." J. P. Moyer & Co., of Philadelphia, say: "It is very essential that the growers should adopt uniform packages in shipping their products. While good quality is the first consideration, good packing in uniform packages is equally as important." Stevens Bros., of Baltimore, are of the same opinion: "We are particularly interested in the standard package, as we believe it will be very valuable to the grower and save a great deal of dissatisfaction in handling the different crops." D. R. Stewart, president Stewart Fruit Company, another Baltimore house, expresses the same opinion, only a little more forcibly: "In these days of wide distribution of farm products, it is very important that uniform style packages should be adopted. It is to the advantage of the shipper to secure for his products the widest range of distribution possible. This can only be done by the adoption of uniform weights and measures." The above are but a few of the many expressions of this same opinion regarding the use of uniform packages.

Not only are buyers and commission merchants of this opinion regarding the uniform preparation of fruit and vegetables for market, but the more successful growers realize the importance of carefully preparing their products before attempting to market them. Mr. N. B. Dawson, of Conetoe, N. C., in speaking of this subject, says: "Careful grading, sorting and packing of produce is most important to the growers, and it is equally to their interest to use nothing but uniform, standard packages, strongly made from good material. There is a great loss sustained by our growers in using inferior, shabby packages that are not uniform. Such packages will not stand transportation, and their use results in a loss when they reach their destination." Mr. J. A. Westbrook, Mt. Olive, N. C., further emphasizes the necessity of using uniform packages: "I think it just as necessary to have a standard package for fruit and truck crops as to have a standard weight for grain and other farm products." Mr. W. S. Cobb, of Lumber Bridge, N. C., another successful grower and shipper of truck crops, gives his idea of this subject as follows: "The farmers of North Carolina lose thousands of dollars annually in not putting up their truck in good shape for market. No one can realize this condition unless he visits the markets of our large cities throughout the country and sees for himself the fruits and vegetables that are put up in nice shape and in uniform packages, and that, as a consequence, sell for profitable figures. In growing truck, it requires a lot of hard work and experience—that is, to grow it successfully; and when one begins to market the crop, then the experience, intelligence and labor count for more than it does at any other time. There is money in the growing of fruits and vegetables in this State whenever the farmers will use business methods, as do our bankers, manufacturers and other business men. Last season the entire country was flooded with cantaloupes that were selling very cheap, and at a loss to almost all growers throughout the State. I had quite a large crop, and by getting up an honest, attractive package and shipping to commission men who had handled my shipments in former years and had an established trade for my goods, I received a profit for my entire output. I further use attractive labels on all my packages." Another grower who can speak from a wide expe-

rience in the successful production and marketing of fruits and vegetables is Mr. A. A. Boggs, of Waynesville, N. C. Mr. Boggs says: "From an experience of twelve years as a shipper of fruits and vegetables, both from Florida and North Carolina, I can say without hesitation that no grower can neglect to use standard packages for his produce unless he is willing to sacrifice the cream of the profits of his business. I believe that, on the average, fruit and vegetables shipped in anything but standard packages may be relied upon to sell for at least thirty-three and one-third per cent less than the identical fruit would sell for if properly packed in standard packages. It is not reasonable that this should be so, but that does not keep it from being true." Still another of our successful growers expresses the same idea. Mr. W. P. Baugham, of Washington, N. C.: "When I first became interested in trucking, the first thing I did was to adopt a full-size, standard package, as I wished to give full measure, 36 inches to the yard. The next thing was to see that the goods to be packed were properly sorted and graded. They were then packed, each package being entirely filled and labeled. The labels bore the following: 'The contents of this package are guaranteed to be uniform throughout, and we guarantee same to be straight packed. The forfeit is the goods.' To this was added the name of my farm and my own as proprietor. I always use this label in my first-class goods. Any other grade is unlabeled and sells for what it brings. I also mark No. 1, No. 2, or No. 3 on each package, as the case may be. As a result, I have no trouble to sell my produce on any market without inspection."

The above expressions of opinion go to show that it is not the buyer or commission man who alone deems it important and necessary to carefully prepare produce for market, but growers, also, have found this practice necessary to insure a profitable sale for their produce. Fruits and vegetables well grown, carefully graded and packed in attractive, uniform packages and properly labeled always find a sale on any market.

APPLES.

The state of maturity at which apples can best be picked depends upon the varieties and the purposes for which they are intended. Summer varieties, for home use or for the local market, need not be gathered until fully ripe. Fall and winter fruit, intended for the same use, may be allowed to fully ripen, but should be picked before the mellowing process begins. Summer, fall and winter varieties, for long-distance shipment or for storage, should be gathered as soon as fully grown and colored. The best time for harvesting each variety can only be determined by experience. Successful growers study their own local conditions and observe the experience of others having similar environments.

In gathering apples, either for market, storage or home purposes, it is necessary to remove the fruit from the tree with a great amount of care. As stated in the discussion of picking, this work should *always* be done by hand, and not in the careless, wholesale way of shaking, beating or knocking the specimens off with clubs or poles, as is the common practice in certain localities. This latter method invariably results in bruising and snagging the fruit, thereby damaging its keeping qualities and destroying its general attractiveness. Growers need not expect

profitable prices for their apples if treated in this manner. Each specimen should be firmly grasped in the hand and, with a slight twist, the stem separated from the twig or branch. The stems should remain in the fruit. Their removal leaves an opening in the flesh of the fruit, in which decay is apt to develop. As each apple is removed, it is placed in either a basket or sack, arranged to suit the convenience of the picker. These receptacles usually hold about half a bushel. The handle basket, as shown in Fig. 6, is used in a great many localities for harvesting

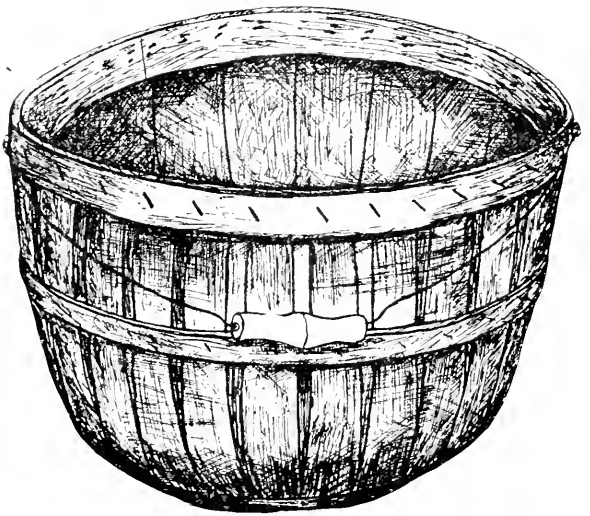


FIG. 6.—BASKET USED IN HARVESTING FRUITS AND VEGETABLES.

fruit. The inside is frequently padded to lessen the liability of bruising. A piece of iron rod bent in the shape of the letter S makes a good hook with which to suspend the basket from either a limb or the rung of a ladder while picking. A convenient way to use a sack is to put a small stone or piece of corncob in one corner of the bottom and tie a rope or strap around this; then, in the same way, tie one side of the mouth of the sack with the other end of the rope or strap, thus making the sack into a loop, that can be thrown around the neck and suspended from the shoulder of the picker. The mouth of the sack is brought to the front and is held open by means of a stout, bent wire placed under the hem. The fruit is picked either from the ground or from stepladders, or other light ladders that can be carefully laid against the limbs or branches of the trees. Ladders should not be thrown on or against the limbs, as this damages both the fruit and the tree. With low-headed trees, a large percentage of the fruit can be harvested from the ground, thus saving not only time but labor.

Apples can be graded and packed at the same time. This may be done either in the orchard or the packing shed, or the storage house, as best suits the convenience of the grower. The main point to be observed is to handle the fruit carefully. Apples are usually divided or sorted into three grades, "firsts," "seconds" and "culls." First-grade specimens

must be uniform in color, size and degree of ripeness. They should also be entirely free from insect injuries, the marks of disease, bruises, or any other defacements or blemishes. When fruits answering these requirements are well packed in suitable packages and placed on sale they never have to go begging for a purchaser. Second-grade fruit should also have a certain degree of uniformity regarding size, color and ripeness, and should not be noticeably marked by insect or fungous injury, nor by bruises or other blemishes. Fruits of this grade, when carefully packed, often sell for a good price. "Culls" are those specimens that fail to answer *all* the requirements of either of the other two grades. Unless there is an unusually strong demand on the market, fruit of this kind had best be kept at home. "Culls" or inferior apples, when mixed with good specimens, damage and almost always ruin the sale of the fruit.

Next to grading, the packing of apples is the most important operation connected with their production and sale. If there is one thing more than another that damages the reputation of any fruit section it is the use of the commonly-called "barrel crate" as a package for placing apples on the market. The best place a fruit grower can use this package is on his wood pile. One had far better give his apples away than to market them, or attempt to market them, in this way. No matter how fine the fruit, or how careful the grading and packing, apples that are shipped in packages of this kind never reach the buyer in a first-class, attractive condition. The fruit cannot be packed firmly, it is rattled and banged against the sharp edges of the slats, and what is not ruined in this way is cut into by the knife of every man handling the package en route from shipper to buyer. As a result, when the apples reach the consumer they are hardly in condition to make a good, first-class grade of cider. The package most universally used, and the one that will answer the requirements of any market is the standard apple barrel. This package contains, approximately, eleven pecks, and when used as a means of placing well-graded and carefully packed apples on the market, the grower is insured of both a profit and a reputation for his fruit.

Before beginning to pack, see that the barrel is resting on a solid base. If packing in the orchard, provide planks or boards on which to place the barrels while being filled. This keeps the head of the barrel clean and enables the packer to "rack" it to better advantage. "Racking" is the shaking of the barrel from time to time during the packing in order to settle the apples, thus making them fit closer and firmer together. The head or end that is usually opened upon reaching market is placed as the bottom end in filling. Before starting to pack, put in a corrugated apple-barrel cap, as shown in B, Fig. 7, or two or three layers of nicely folded paper. This not only keeps the fruit in better shape, but prevents it from bruising. When this is done the barrel is ready to be "faced." This consists of placing, by hand, from two to three rows of fruit, stem end down. After "facing," the apples are carefully poured in and the barrel frequently shaken, until it is almost full. The last two or three rows may be placed by hand, stem end up, thus "facing" both ends of the package. The last layer of fruit should extend about one inch above the chine of the barrel and be covered either with a corrugated apple-barrel cushion, cap, or with two or three layers of neatly folded paper,

FIG. 7 A.—BARREL OF APPLES AS IT REACHED MARKET.

FIG. 7 B.—HEAD REMOVED, SHOWING CORRUGATED APPLE BARREL CAP.

FIG. 7 C.—PROPERLY PACKED.

as used in the other end. The head is then put on and forced into place with an apple-barrel press, as shown in Fig. 8. There are several types of these presses, differing slightly from the one illustrated, but all answering the same purpose. After nailing the head in place and seeing that

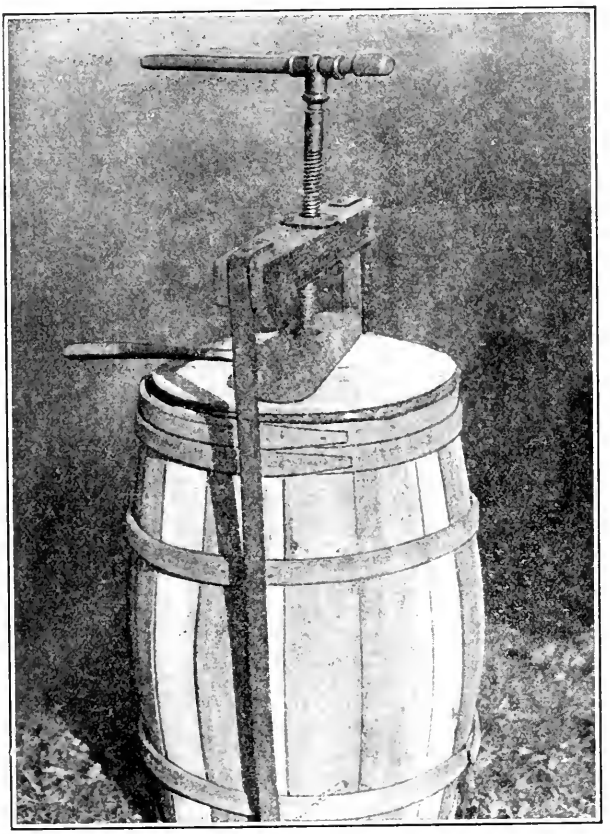


FIG. 8.—BARREL PRESS USED IN HEADING APPLE BARRELS.
(Photo by H. H. Hume.)

all hoops are securely fastened in their proper positions, label the barrel, and it is ready for market. Fig. 7 shows a barrel of apples packed in this way; as it reached market, was opened, and sold for $6. In packing apples, see that each package is well filled with the same grade throughout, including top, middle and bottom. Put up a strictly first-class, honest pack, or keep the fruit at home. "Honesty is the best policy," and the only one that pays in the fruit business.

Within recent years, the more progressive growers have been packing their choice, fancy-grade apples in boxes. Although the bulk of the apple crop is marketed in barrels, there is a steadily increasing demand for choice box-packed fruit. The average uniform box contains approximately one bushel. The fruit is usually wrapped in attractively labeled

paper and packed in layers. During the past season, No. 1 New York State apples sold at $4 per barrel. "Fancy" grade stock of the same variety at the same time brought $4 per box. Most of the apples from

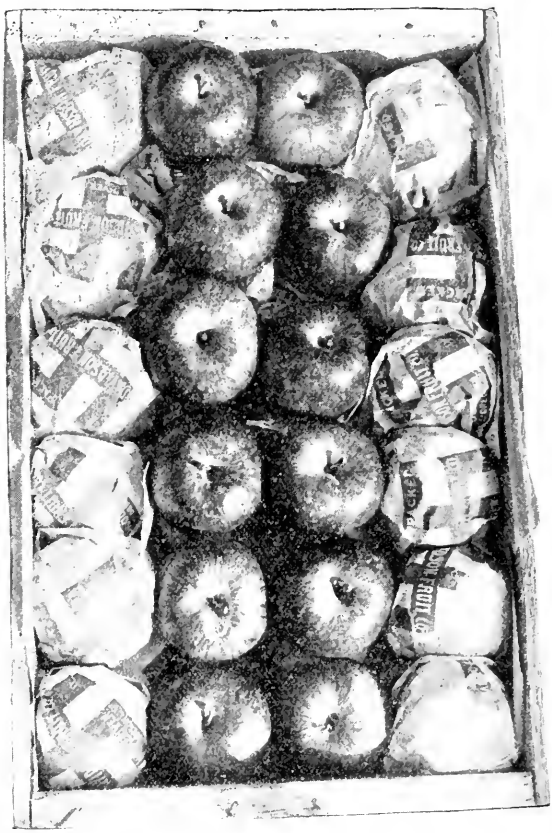


FIG. 9.—APPLES PACKED IN STANDARD BOX.

the Western States are placed on the Eastern markets in boxes. Fig. 9 shows a box of these apples as it reached one of our local markets. The fruit sold at five cents apiece. At the same time, dealers who were selling this fruit refused to handle locally-grown apples because of the careless, indifferent way in which they had been handled and packed in the "barrel crates."

PEACHES.

The peach is one of our most popular fruits, and when properly grown and prepared for market, it finds a ready sale. One of the most effective operations connected with the production of this crop is the thinning of the fruit. This work is not very generally practiced by peach growers, but if properly done, it would give excellent results. A great many growers are likely to allow their trees to overbear. Over-production

usually causes poorly-developed, undersized specimens that never find as ready a sale as do the fully matured, highly-colored fruits. As soon as the "June drop" has safely passed, if the trees are heavily laden, from thirty to forty per cent of the fruit should be taken off. It requires less time and is much cheaper to pick it at this time than it would at the harvest season. The remaining specimens will be of so much better size, color and quality that it will more than pay for the expense of thinning.

Most of the profit in growing peaches depends upon the way in which they are harvested and prepared for market. Work of this kind requires the personal attention of the grower. The average hired labor cannot be depended upon to pick and pack satisfactorily without strict oversight, for this crop probably requires more careful attention than any of the other fruits. The proper time at which to harvest peaches depends almost entirely upon the conditions under which they are expected to be used. For home and local consumption, the fruit need not be picked until fully ripe; but when grown for the distant market, the time required to place the fruit on sale in the best condition must govern the picking season. There is just the right time to pick, and this can only be learned from experience.

The same general directions relating to the harvesting of apples will apply to the picking of peaches, except that the peach necessitates even a more careful handling than does the apple. The natural structure of

FIG. 10.—PEACHES IN STANDARD SIX-BASKET CARRIER.

the peach is such that it does not require to be gathered with the stem on, as is the case with apples; but it is just as necessary that each specimen be pulled by hand and carefully placed in some suitable receptacle. Peaches should also be sorted into three grades before being packed. In packing, it is not necessary to "face" the packages, but they should always contain specimens of the same uniform grade throughout. Particular attention should be given to the degree of ripeness of each fruit placed in the package. One or two peaches a little further advanced in

ripeness than the others sometimes become overripe and soft before reaching market, and as a result, rot may develop, and the general appearance of the entire package be ruined.

At one time, peaches were packed and marketed in slat crates divided into two parts, each holding about a peck of fruit. This package eventually gave place to the Delaware half-bushel, veneer basket, and the Michigan handle basket, holding about a peck. This latter package is almost identical with the Georgia basket. Within recent years a new package, the six-basket carrier, has been successfully introduced, and is now used almost exclusively in the marketing of Southern-grown peaches. Owing to the good condition in which produce reaches market when packed in this carrier, its use has been extended into the marketing of tomatoes, peppers, plums and other fruits and vegetables of a tender nature. Fig. 10 shows this package as used in shipping peaches. Fig. 24 shows the same kind of package used in the marketing of tomatoes. In both instances the illustration shows the products as they reached market. While in some localities the Delaware and Michigan baskets are still used, it is only a question of time before the six-basket carrier will become recognized as the standard peach package.

PEARS.

Nearly all varieties of pears are of better quality if harvested before becoming fully ripe. The fruit should remain on the trees until fully

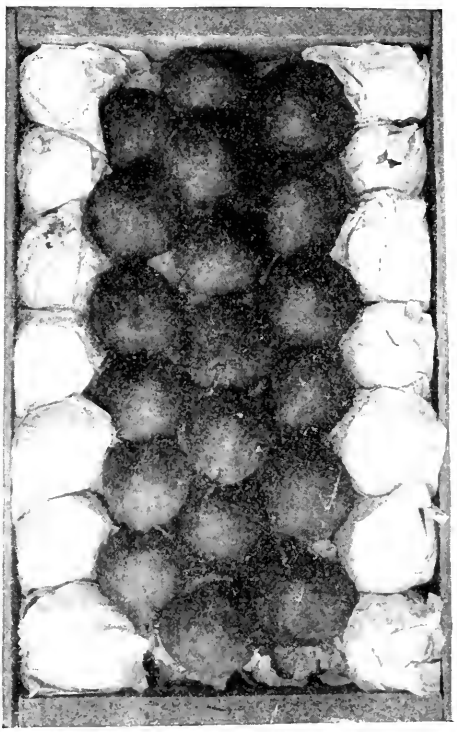


FIG. 11.—PEARS PACKED IN BUSHEL BOX.

grown, and then picked and either shipped at once or else stored in a cool, dark place. Pears are picked and graded in much the same way as apples. Every care should be taken to avoid bruising or injuring the skin. There seems to be a diversity of opinion regarding the most desirable type of package to use in placing this fruit on the market. Some buyers prefer barrels, others want the bushel box, and again some others think the half-barrel hamper basket, as used in shipping lettuce, the most desirable package. Probably the best package to use for the local market is the bushel box or the half-bushel hamper basket, as used in marketing garden peas. For the distant market, varieties like the Keiffer and Duchess seem to be preferred in barrels. Fancy-grade stock and varieties, like Bartlett, carry better and sell more satisfactorily when packed in bushel boxes, as shown in Fig. 11. Wrapping the fruits usually adds to the general appearance of the entire package and aids in preventing the decay of the fruit. In packing pears, whether in barrels, boxes or baskets, the same methods are used as in grading and packing apples.

PLUMS.

The proper time to pick plums for marketing depends upon the variety grown and the time required to place the fruit on the market. As a rule, European varieties, when intended for distant markets, are picked when well colored but still firm. American varieties, being more juicy, must be picked before fully ripe, if they are to be shipped a distance. Japanese plums can be harvested earlier than other varieties, as their color and flavor will develop after being gathered.

Usually, plums can be picked in a greener state than can any of the other fruits. Those intended for market should be harvested by hand and never shaken from the tree. A stepladder is used in gathering, and the fruit picked, with stems on, into suitable baskets. The grading and packing is similar to that employed in the preparation of other fruits for market. Uniformity and neatness are the chief requirements.

The style of package used in marketing plums varies somewhat with the preferences of the different markets. Some prefer the ten-pound handle basket frequently used in marketing grapes; others want the standard thirty-two quart berry crate, but the greatest demand of Eastern markets is for the six-basket carrier used for packing peaches and tomatoes.

GRAPES.

For any market, grapes should be gathered when fully ripe. The harvesting is best done in clear weather, when the vines and fruit are not damp with either dew or rain. Stems should be cut with scissors or a knife and the bunches placed on trays and carried to the packing shed. Here they are sorted and graded. This consists mainly in removing all small, damaged or green berries from the bunch. In some localities grapes are packed in five and ten-pound handle baskets, in others the six-basket peach carrier is used. One of the most attractive packages for handling this fruit is the four-basket carrier, commonly known as the "North Carolina grape carrier." No matter what the style of package used, the bunches are placed with stems downward and packed snugly, the smaller bunches being used to fill the spaces between the

larger ones. The package should be well filled and snugly packed, for unless put up in this manner, the fruit will reach market in a very poor condition.

STRAWBERRIES.

The state of maturity at which strawberries can best be picked depends upon the market for which they are intended. Berries for the home market can be gathered in a much riper condition than fruit intended for shipping long distances. For distant markets, strawberries must be gathered as soon as fully grown and the color well developed. The fruit is picked, with stems on, into quart baskets or boxes and carried to the packing shed on trays holding from six to twelve quarts. Carefully trained pickers can do all the sorting and grading necessary as they gather the fruit. They should be instructed to leave all small, inferior and overripe fruits, and under no circumstances put specimens of this kind in the baskets. Fruits of this kind give less trouble on the vines than in the crates. Trained pickers can also "face" each basket, thereby increasing the attractiveness of the package. This is easily done while picking by placing the last layer of berries stem end down. Fig 12 shows two baskets of fruit as they reached the packing shed. No. 1 shows careful picking and "facing"; No. 2 shows careless picking and no regard whatever to the general appearance.

No. 1.—CAREFULLY PICKED AND "FACED." No. 2.—CARELESSLY PICKED.

FIG. 12.—BERRIES AS THEY REACHED THE PACKING SHED.

Berries should not be allowed to stand in the sun before being packed in the crates. Either the 24 or 32-quart crates are equally popular packages on all markets, and growers must be governed entirely by their experience as to which to use. Fig. 13 shows a standard 32-quart crate of berries as it reached market.

DEWBERRIES AND BLACKBERRIES.

Dewberries and blackberries should be picked when a full, glossy black. Berries that have become dull-looking are too ripe for marketing. Dewberries and blackberries should not be picked when moist, either after rain or heavy dew. The moisture causes development of moulds and results in decay. The method of gathering this fruit differs from that

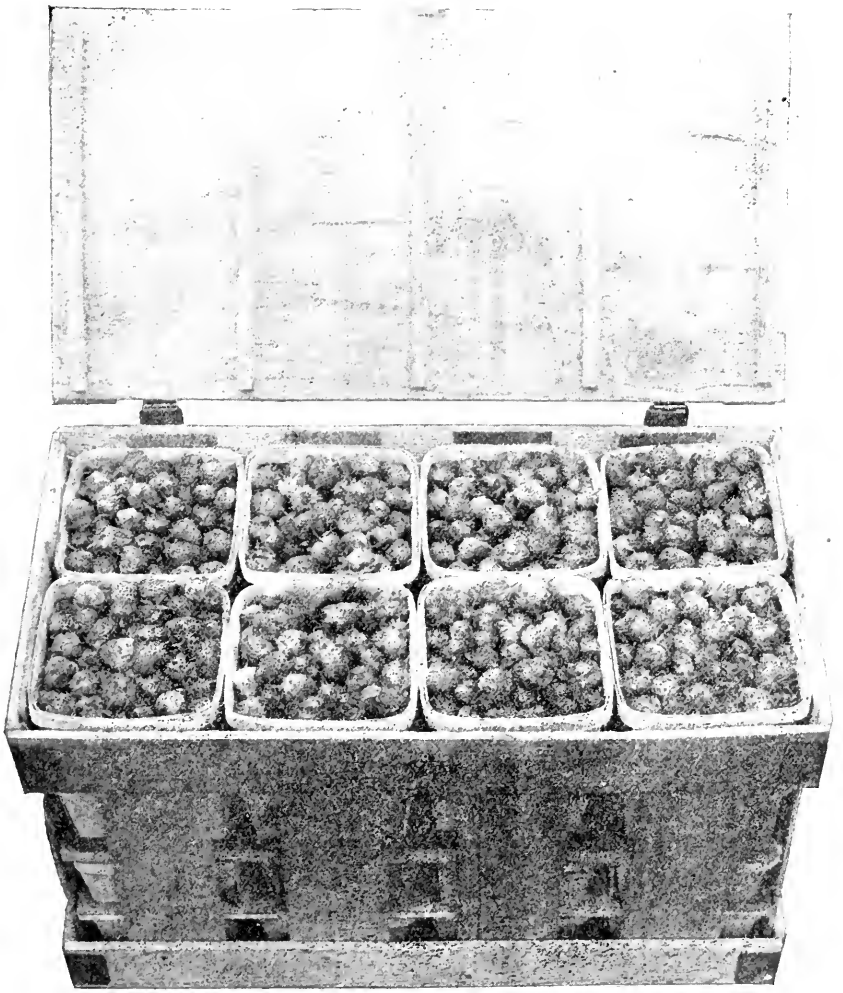


FIG. 13.—STANDARD 32-QUART CRATE AS IT REACHED MARKET.

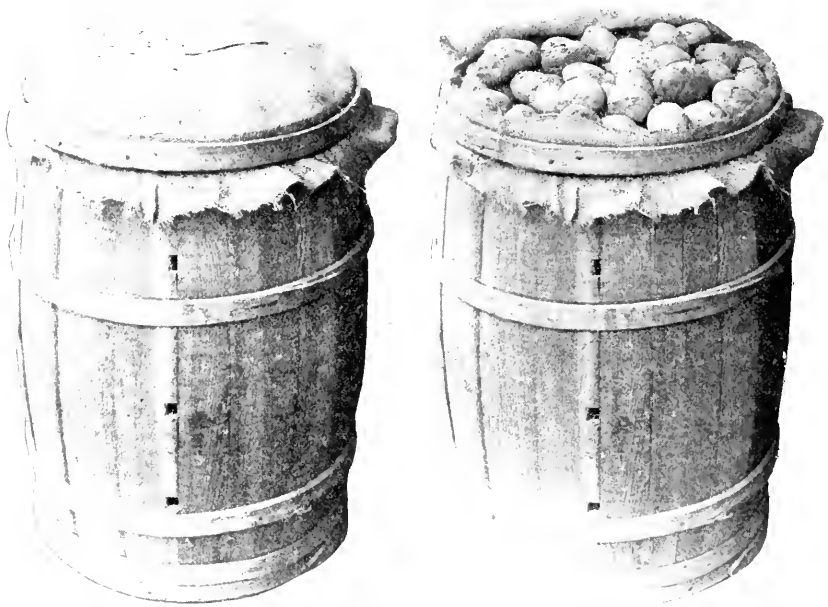
of harvesting strawberries, in that the stems should not be left on; otherwise the operation is practically the same. Berries should be carefully graded as picked and not left standing in the sun before being placed in the standard strawberry crate.

IRISH POTATOES.

The Irish potato is the most universally cultivated of all vegetables. Profitable yields are secured only when the plants are liberally fed and properly cultivated. Various methods are practiced and numerous fertilizers used in the production of this crop, all of which vary with the local conditions under which the crop is grown.

As a rule, the main crop of potatoes is not dug until the vines die, but for early marketing the tubers are lifted as soon as they reach a salable size. In harvesting large areas, where improved machinery can be handled, a "potato digger" is frequently used; for small areas, or under conditions not favorable for the use of machines, the four-tined fork or potato "hook" is probably the most satisfactory implement to use, though many growers prefer and use a hoe or ordinary plow for doing this work. No matter what tool used, potatoes should be dug and handled carefully. This is particularly important with the early crop on account of the tender, immature condition of the skin.

Potatoes should be graded and packed as soon as possible after being dug, for if exposed too much to the sun the tubers will become soft and the skin turn green. Grading and packing may be done in the field as the potatoes are lifted, or they may be taken to the packing shed or storage house and there prepared for market. This crop requires as careful and uniform grading as any other farm product. The tubers should be sorted, according to size, into first and second grades, all scabby, second growth and injured specimens rejected, and the different varieties kept separate.



A. AS THEY REACHED MARKET. B. EXPOSED FOR SALE.

FIG. 14.—POTATOES IN STANDARD BARREL.

Early potatoes are usually shipped in ventilated barrels with burlap covers, as shown in Fig. 14. In some sections this crop is packed in double-headed barrels, the same as apples. Fig. 15 shows potatoes packed in this way as they reached market. Before filling, see that the bottom and hoops are securely fastened in place. During the process of packing, the barrel should be shaken frequently to settle the potatoes and make

the pack firm and snug, so that the package will be well filled when it reaches market. Fig. 2 A shows a barrel carelessly packed, that cannot be expected to sell for as much as a well-filled package. Products put up in this way never bring the top market price.

FIG. 15.—POTATOES PACKED IN DOUBLE-HEADED BARREL.

Late potatoes are shipped either in bulk or in sacks. Fig. 16 shows the common type of sack used in this method of shipping. This crop is usually sold by weight, each sack holding about 150 pounds of tubers. The same care given the sorting, grading and handling of the early crop should be practiced in the marketing of late potatoes.

SWEET POTATOES.

In growing sweet potatoes for commercial purposes, the preferences of the different markets must be taken into consideration. Northern markets prefer a dry, yellow potato of medium size and oval shape. Potatoes of the Jersey type have these qualities. In Southern markets the moist, sugary kind seem to be the most desirable.

Sweet potatoes will not bear rough handling, and for this reason they must be harvested even more carefully than Irish potatoes. For small areas a common turning plow may be used to throw out the potatoes, but perhaps the most commonly used implement is the four-tined fork or potato "hook." In harvesting large areas, a plow provided with a revolving coulter, or some other device for cutting the vines, is used for turning out the potatoes. Another implement used in this work is the "scoop digger," which passes under the potatoes and cuts the roots, leav-

ing the potatoes in the ground and still attached to the plant. The potatoes can easily and rapidly be lifted out of the ground, pulled from the vine, placed in suitable baskets or boxes, and carried to the place of packing or storing. No matter what implement used, the chief requirement in harvesting is to do the work as carefully as possible to avoid injuring the tubers.

FIG. 16.—SACK USED IN MARKETING LATE POTATOES.

The grading and packing of sweet potatoes should receive as much thoughtful consideration as that bestowed on the preparation of apples or Irish potatoes for marketing. Small, irregularly-shaped and damaged potatoes should be kept at home. Very large specimens should also be rejected, as their presence does not add to the attractiveness of the package. Each package should contain potatoes of the same variety and of a uniform size, color and general appearance. Medium-size potatoes are usually preferred by the average purchaser. The eleven-peck ventilated, cloth-covered barrel is the most universally used package for marketing this crop. If sweet potato growers for Northern markets would adopt the method of packing their crop in "double-headed" barrels, the potatoes would reach market in better condition and command a higher price. The preferences of these markets have created a demand for the

"Jersey" type potatoes, and require that they be of uniform quality and size, and be packed in "double-headed" barrels. Packages answering these requirements usually bring the highest prices.

CABBAGES.

Cabbage is a crop usually found on the market the year round. The harvesting should begin when the hearts have become firm and solid. A light, sharp hatchet or a heavy knife are perhaps the most satisfactory tools to use in cutting the heads. This crop should be graded and packed as thoughtfully as any other farm product. Only firm, solid, clean heads should be packed. A few of the outer leaves may be left on, so as to make the pack more firm and snug.

Well ventilated packages should always be used in shipping cabbage. Tight packages frequently cause heating, and as a result, rot develops. Slat barrels are sometimes used, but the package most preferred, partic-

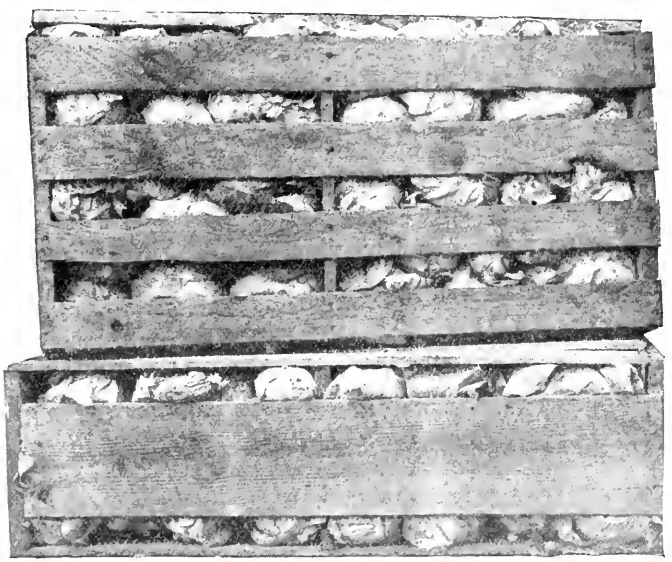


FIG. 17.—WELL-PACKED CABBAGE IN STANDARD CRATES.

ularly for the early crop, is the 100-pound slat crate. The square barrel crate is sometimes used for shipping late cabbage. In packing, each head should be placed by hand and the package well filled and solidly packed. Cabbage usually shrinks during transportation, and it is very necessary to have the packages *full* when leaving the packing shed. Fig. 2 B shows a slack package as it reached market and was sold at a loss. Fig. 17 shows well-packed cabbage in standard crates that sold at a profit.

LETTUCE.

The demands of Eastern markets is for good, firm head lettuce. Small, leafy or discolored heads never find a ready sale at any price. In har-

vesting, the heads are cut close to the ground and the outer leaves removed. Owing to the difference in the time required for the heading of each plant, the entire crop cannot be harvested at one cutting. During

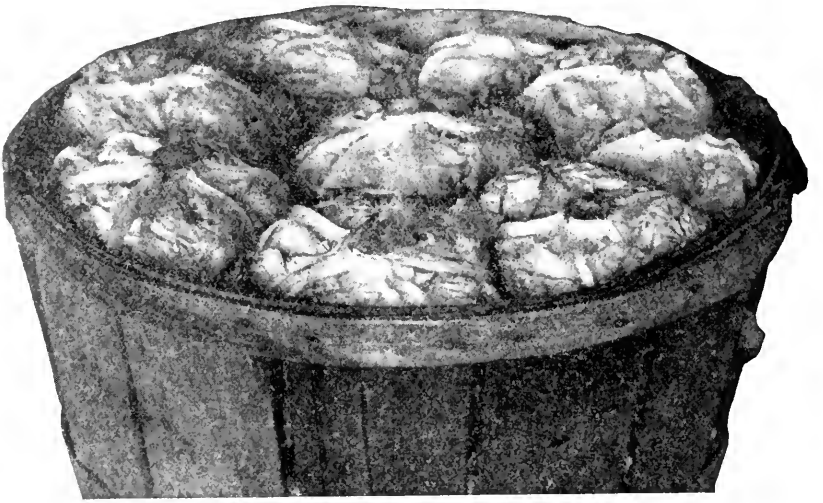


FIG. 18.—PROPERLY PACKED BASKET READY FOR COVER. (Photo by H. H. Hume.)

FIG. 19.—LETTUCE PACKED READY FOR SHIPMENT. (Photo by H. H. Hume.)

the height of the season cuttings are made every day, and only the well-developed, firm heads removed. These are sorted and graded as they are packed. The packing may be done either in the field or in the packing shed. Lettuce is usually marketed in the half-barrel veneer basket, each package being filled with heads of a uniform size and condition. The bottom layer of heads is placed stem end down and the remaining layers stem end up, as illustrated (Fig. 18). Lettuce should be dry before being packed and the heads placed together firmly and snugly in the package. Each package should be well filled, so as to reach market in good, full condition. Fig. 19 shows lettuce packed ready for shipment.

CUCUMBERS.

The marketable size of cucumbers is from six to nine inches in length. When cut from the vine they keep better, and the vine is injured less than where they are pulled. In seasonable weather they are usually

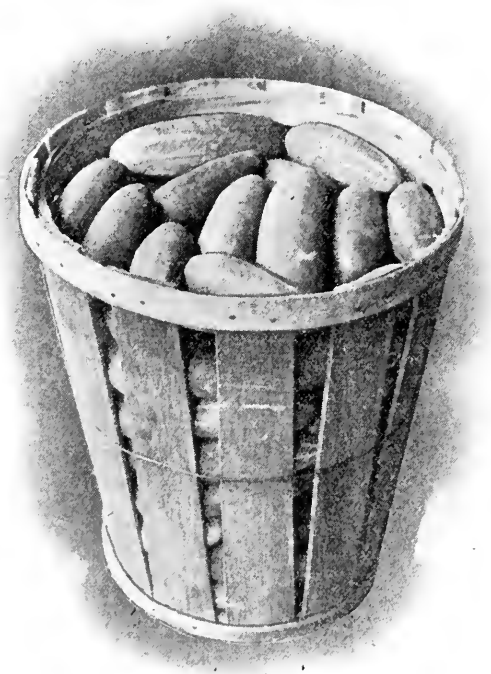


FIG. 20.—CUCUMBERS PROPERLY PACKED.
(Photo by H. H. Hume.)

gathered every second or third day, and should be graded and sorted as carefully as all other vegetables. Those grown in greenhouses and under glass are packed in boxes about eight inches deep and twenty-four inches

square. The outdoor crop and the ones grown in frames are packed in one-third barrel veneer baskets, as shown in Fig. 20. In either case, whether using boxes or baskets, the cucumbers are arranged and packed by hand so as to fit firmly and tightly together. This close packing not only makes it easier to put on the covers, but results in the cucumbers reaching market in better condition and in a full package.

PEAS.

This is a profitable crop, particularly when grown and marketed early in the season. Peas require careful handling, and should not be gathered until the pods are well filled. The pods are picked into half-bushel baskets and carried to the ends of the rows, where they are put in the packages in which they are sent to market. The bushel veneer basket is the most preferable type of package to use. Each package should be well filled with closely packed, comparatively uniform, clean pods. It is important that the package be snugly packed and slightly heaped before the cover is put on, as peas shrink considerably when in transit.

CANTALOUPES.

The exact stage of maturity at which to pick melons for marketing can only be learned by experience. The distance from the market and time required to place cantaloupes on sale are points to be carefully considered in handling this crop. Melons allowed to become too ripe

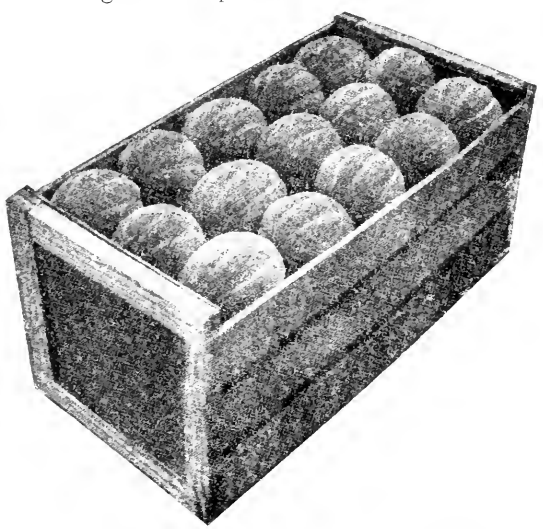


FIG. 21.—STANDARD CRATE, HOLDING 45 MELONS.

before packing usually become soft and decayed before reaching market. This condition invariably results in either a sacrifice of the fruit or a slow sale, that in the end means a loss to the grower. If gathered too green, the melons reach market in firm condition but lacking in flavor, and are not wanted by the best trade. As stated above, the proper time to harvest this crop can best be learned by one's own experience.

Different sections of the country use various packages in marketing cantaloupes, but the one package most universally preferred by the markets for the Eastern-grown crop is the standard slatted crate. This package measures 12 x 12 x 22 inches, inside measurement. Melons should be so graded that each package contains forty-five fruits of uniform size. They should also be of uniform color and degree of ripeness. All *other* specimens not answering these requirements should either be kept at home or marketed in some other style of package. Only first-class, number-one grade melons should be packed and marketed in standard packages. Fig. 21 shows properly packed cantaloupes.

ASPARAGUS.

Asparagus requires special care in its preparation for market. Some preferences are for the white, bleached stalks that must be cut several inches below the surface of the ground; others are for the green, "grassy" stalks that can be cut either at the surface or above ground. In either case only fine, perfect stalks should be shipped. These may be harvested every day or every other day, depending upon weather conditions and

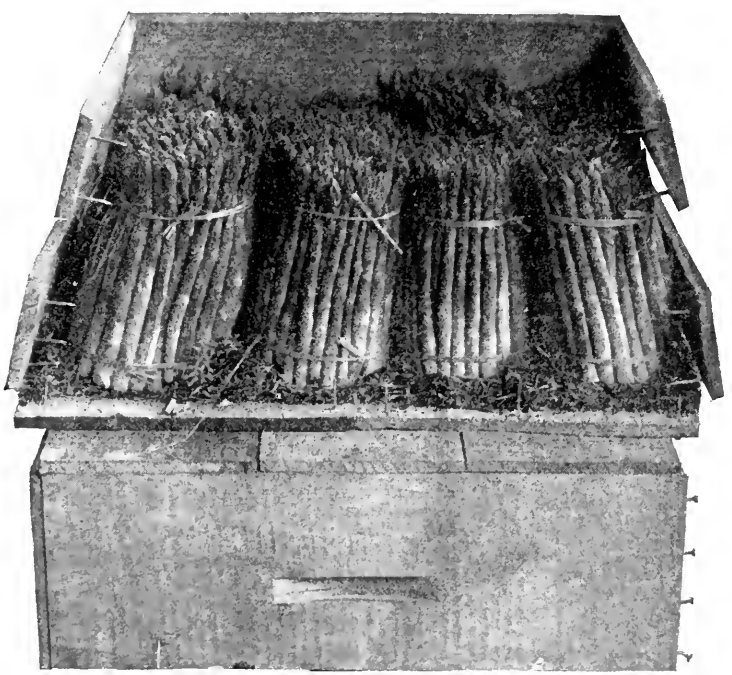


FIG. 22.—PACKAGE HOLDING 12 BUNCHES OF ASPARAGUS AS IT WAS OPENED ON THE MARKET.

the demands of the trade. In this, as in the harvesting of other crops, growers must be governed by experience. The stalks should be tied in bunches of even size and length, usually from 3½ to 4 inches in diameter and from 6 to 8 inches in length. These bunches are tied at each end

with raffia or some other suitable tying material, or held in shape with broad rubber bands. Several styles of "bunching" machines have been invented into which the stalks are placed and held until tied; after tying, the ends are always trimmed to a smooth, even length. The bunches are usually packed in crates holding from one to two dozen bunches. A layer of damp paper or moss is placed on the bottom and the bunches stood on end and placed firmly together, so as to avoid slipping and bruising. Fig. 22 shows a package holding twelve bunches. Note the shape of the box. This holds the bunches firmly in place, and results in placing them upon the market in a better and more attractive condition. Note, also, the moss on which the bunches are placed. This damp moss keeps the stalks fresh and crisp.

BEANS.

String, or "snap" beans, as they are commonly called, are usually grown in localities having a good supply of comparatively cheap labor. They are handled in much the same manner as peas, the pods being picked with sufficient care so as to cause as little disturbance to the roots as possible and before the seeds have become large enough to bulge the pods, and while crisp enough to snap when bent. The gathering is all

FIG. 23.—HAMPER OF "SNAP" BEANS AS IT REACHED MARKET.

done by hand, and the pods, when picked, are carried to the packing shed, where they are sorted and packed ready for market. The same package used in shipping lettuce is used in placing string beans on the market. The beans are arranged and packed tight and snug. This is

necessary in order that the package reach market in a well filled condition, for beans usually dry and shrink somewhat, especially when shipped long distances. Fig. 23 shows a hamper of beans as it reached the market.

TOMATOES.

When the tomato is grown as a truck crop, pickings should be made two or three times a week. If the fruits are to be shipped some distance they should be gathered as soon as the first coloring appears. For home markets the fruits can be allowed to ripen upon the vines. In harvesting, each fruit should be carefully picked, without stem, and taken to the packing shed in small baskets or other suitable receptacles, to avoid as much as possible any bruises or injury to the skin. In packing, only

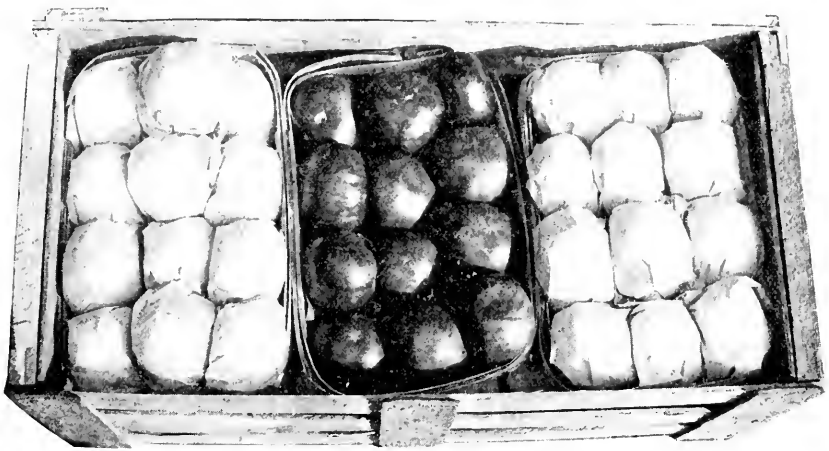


FIG. 24.—TOMATOES PACKED IN SIX-BASKET CARRIER.

sound, perfect fruits should be used, each package containing as nearly as possible fruits of the same size and color throughout. All deformed, bruised or otherwise damaged specimens should be rejected. For long-distance shipments, each individual fruit should be wrapped in thin, pliable brown or white paper and packed in the six-basket carrier (Fig. 24) so universally used in the shipment of peaches. For nearby shipment, or the local market, the fruit may be packed in either the Delaware or Michigan type of baskets.

BEETS.

When grown for the early market, beets usually sell to good advantage. The roots are pulled while quite young, when about two and a half inches in diameter. They are tied in bunches of from four to six and the tops cut back about one-half. If very dirty, the roots may be washed, but they should not be packed until perfectly dry. There seems to be quite a diversified opinion regarding the most desirable type of package to use in marketing this crop. Some markets seem to prefer ventilated barrels; others want the bushel slat crate, and again others prefer either the half bushel or half barrel veneer hamper. Growers should inquire

as to the preference of the market on which they expect to place their crop and be governed accordingly in the use of packages. No matter what package used, beets should be well graded and firmly packed.

PEPPERS.

It has been only within very recent years that this vegetable has become so popular as to create a demand for its profitable cultivation for distant markets. Formerly, peppers were used almost exclusively for pickling purposes, but with the development of the sweet varieties, as the Bull-nose, they have come into general use as a table vegetable. Peppers are picked before fully ripe, carefully sorted into uniform grades, and packed into either bushel veneer baskets or the six-basket carriers used in marketing peaches and tomatoes. This latter package seems to be the most universally preferred on all markets, as the product reaches the consumer in better condition when packed in this way.

EGGPLANT.

Eggplants, as with radishes, require an unchecked growth to produce best results. The average plant should produce from six to nine full-sized fruits. These should be harvested when full grown but before becoming light-colored or tough. The fruits are cut from the plant and about half an inch of the stem allowed to remain. They should be sorted into grades of uniform size and color and the fancy specimens wrapped in paper and carefully packed. On account of the extreme tenderness of the skin of this fruit, it requires very careful handling and packing. There is no universally desired type of package for marketing this product. Each market seems to prefer a different sort of package. The bushel hamper and the bushel slat crate are probably the most desirable packages to use in marketing this crop. It would be advisable, however, for the grower to make inquiry regarding the most desirable type of package to use for the market on which he expects to place his crop.

SQUASH.

Varieties of summer squash, when grown as an early vegetable, bear transportation well, if picked at the proper stage of growth and carefully packed. They bring satisfactory but not fancy prices. Usually, the White Bush Scallop is the best all-round market variety. Squashes intended for shipping should always be cut, and not broken, from the vine. Those intended for local demand can be harvested in a tender, green condition; but for distant markets squash should be gathered just as the green color is disappearing and they are attaining a white and glossy appearance. They should be sorted into grades and carefully packed. The bushel slat crate and the veneer hamper basket used for eggplant are probably the best packages to use in shipping this crop. Squash intended for long-distance shipment carries in better condition if wrapped in coarse brown paper.

CAULIFLOWER.

Cauliflower usually finds a ready sale at profitable prices if marketed early in the season. When the leaves of the plant begin to spread out,

the head has about reached maturity and is ready to be harvested. A strong, sharp knife or small hatchet is used for cutting. Two or three of the larger, tender leaves are left and are folded over the head for protection from bruising. Cauliflower should be sorted and graded the same as any other vegetable. Heads less than 3½ or 4 inches in diameter, those discolored by the sun or from any other cause, or injured by insects or disease should be rejected from the marketable grades and classed as culls. The heads should be white and compact. Those of the first quality should be covered with soft, but tough, white paper, which can be tucked between the head and leaves without tearing. This keeps the heads in better color and condition and prevents injury from bruising. The half-barrel veneer hamper or the half-barrel slat crate are the most desirable types of package to use. Each head should be placed by hand and the package well filled and firmly packed.

CELERY.

Celery is no longer looked upon as a luxury, but is considered one of the common vegetable crops. Only well-bleached, firm, crisp plants should be considered for market purposes. These are removed from the bed and the roots trimmed, so as to leave the short, solid stem. Any

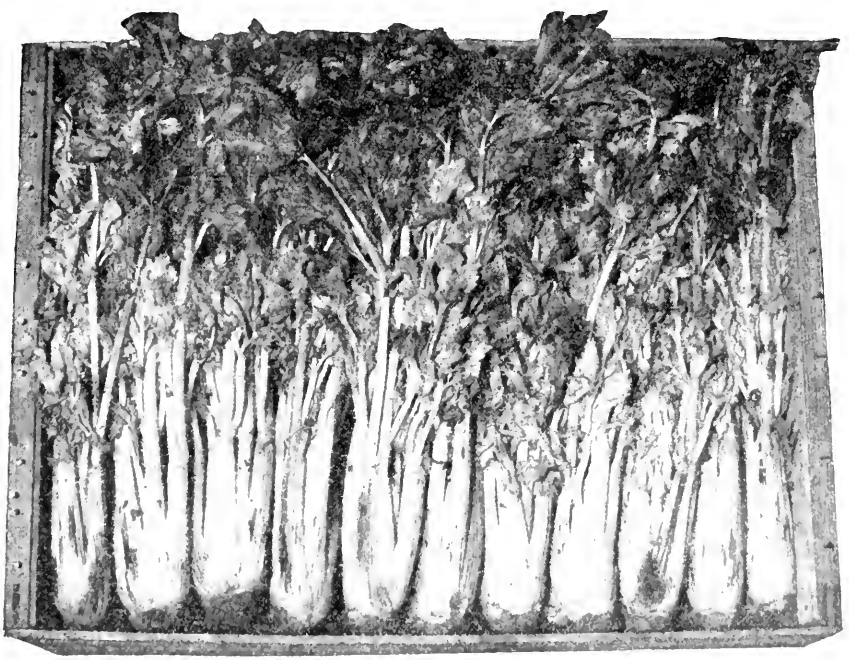


FIG. 25.—CRATE OF EASTERN-GROWN CELERY.

discolored or loose outside leaves or stalks should be removed. In some localities celery is washed before being bunched and packed. After washing it is allowed to drain, and then tied in bunches of about twelve or fourteen plants each. These are then packed in paper-lined slat

crates holding from six to eight bunches. Another method practiced in preparing this crop for market is to trim the plants in the field and pack, without washing or bunching, into flat box crates, as shown in Fig. 25. Note how each plant is firmly and closely packed, with the stems all one way. This latter method is the one most universally employed in preparing and marketing Eastern and Southern-grown celery. It is just as important that the grading and packing of this crop be done carefully as it is in the preparation of any other farm product for market.

RADISHES.

This crop is grown almost entirely for the early spring market. The main point to be observed in the cultivation is to keep the plants growing continuously, as any check in their growth will cause the roots to become tough and stringy. In order for them to be salable they must be crisp, solid and not oversized.

Radishes are usually tied in bunches of about twelve and packed in either half-barrel veneer hampers, as used for shipping lettuce, or in ventilated barrels. The markets seem to be pretty equally divided as to the preference of packages. On account of the perishable nature of the plant, it is advisable in warm weather to put in two or three layers of ice when packing. This tends to prevent decay and keeps the roots fresh and crisp.

LEAF TOBACCO SALES FOR APRIL, 1909.

Pounds sold for producers, first hand	1,188,096
Pounds sold for dealers	68,273
Pounds resold for warehouse	103,193
Pounds resold for other warehouses	4,962
Total	1,364,524

THE BULLETIN

OF THE

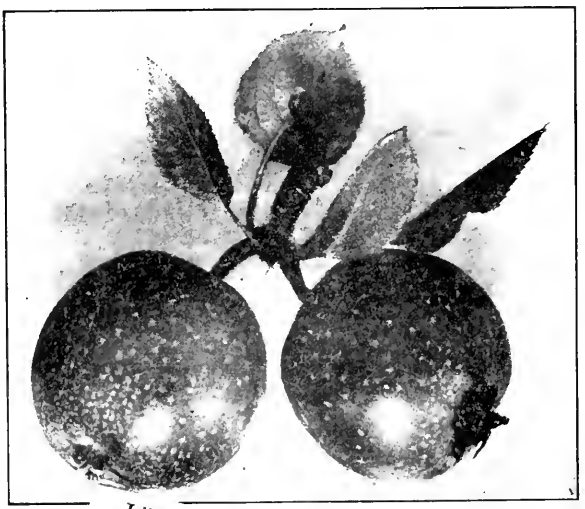
NORTH CAROLINA DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. JUNE, 1909. Number 6

ORCHARD SPRAYING—ORCHARD PROTECTION WORK.

By FRANKLIN SHERMAN, Jr.



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RALEIGH, N. C., June 17, 1909.

SIR:—I submit herewith material for a BULLETIN on the subject of *"Orchard Spraying—Orchard Protection Work,"* which gives an account of the most important matters in connection with the spraying of fruit orchards, and also gives a description of the more important lines of work carried on by the Division of Entomology in the protection of our fruit-growing interests. This BULLETIN answers many of the questions which frequently come up in correspondence, and is designed to be of special benefit to our fruit growers. I recommend that it be issued as the regular monthly BULLETIN of the Department for June, 1909.

Very respectfully,

FRANKLIN SHERMAN, JR.,
Entomologist.

MAJ. WILLIAM A. GRAHAM,
Commissioner of Agriculture.

ORCHARD SPRAYING—ORCHARD PROTECTION WORK.

By Franklin Sherman, Jr., Entomologist.

INTRODUCTION.

The fruit-growing industry in North Carolina is steadily and safely increasing, without any "boom" or unhealthy growth. The great majority of our orchards are owned and managed by native North Carolinians, who should be careful to guard them from injury by insects or disease, and whose profits will be increased by giving their orchards intelligent, painstaking care.

It has been rightly said that at least four operations are essential to success in fruit-growing, namely: (1) Cultivation, (2) Fertilization, (3) Pruning, and (4) Spraying. The fruit grower, however, should begin his careful study of the business even before the orchard is planted in order to make the best possible selection of varieties, soil, exposures, etc. And even after a crop is secured attention must be given to the picking, grading, packing and marketing. All of which shows that fruit growing, if rightly practiced, is one of the highest types of agriculture, and the man who knows and practices the proper methods may make a good profit in years when his less intelligent and less careful neighbor will lose money.

Insect pests and fungus diseases of various kinds have become so widespread that the question of *Spraying* is now as important as any other part of orchard management, and many of our growers assert that it is the most important single operation. This Bulletin is therefore largely devoted to the question of Spraying, devoting especial attention to the Bordeaux Mixture (poisoned), and to the Lime-sulphur Wash, which are the two mixtures most used in the State. We also discuss some field demonstrations which we conducted during 1908, showing the great benefit secured by spraying apple trees in the orchards of actual growers. An account is also given of the orchard inspection work which is being conducted by this office. We give certain important suggestions to those who intend to plant orchards or expect to purchase fruit trees of any kind, and, finally, we give an excellent list of the larger fruit growers of the State, in the hope that it may stimulate more interest and friendship among growers in all sections by giving them opportunity to communicate with one another.

SPRAYING FRUIT TREES.

Insect pests and diseases of various kinds make it necessary to spray our trees in order to keep them in health and to get satisfactory crops of fruit of good quality. In proof of this we need only examine our apples at harvest and see how many have fallen prematurely and how many of those remaining are knotted, one-sided and wormy, to be convinced.

Yet these defects can be very much reduced by thorough spraying with the poisoned Bordeaux Mixture. On the other hand, the San José Scale has become widely distributed in many parts of the State, kills hundreds of trees every year, and nearly half of our large commercial orchards seem to be more or less infested by it, and for this insect the chief remedy is to spray with the Lime-sulphur Wash. These two mixtures—(1) the Bordeaux Mixture (poisoned), and (2) the Lime-sulphur Wash—are the most important ones for our growers to understand.

THE BORDEAUX MIXTURE.

(Poisoned With Paris Green, or With Arsenate of Lead.)

This is the standard spraying remedy for the majority of those kinds of caterpillars, beetles, worms, etc., that devour the foliage or eat into the fruit, and also for those diseases commonly known as rots, rusts, scab, etc., that attack the foliage and fruit. It is not expensive, is easy to prepare, and the ingredients may be obtained in almost every village.

All of our orchard fruits are attacked by a number of insect enemies and fungus diseases every year, and we can only be assured of keeping them in check by adopting a regular system of spraying to be followed *every year,* making the applications at the proper times, regardless of whether the pests have appeared at that time or not.

There is no one fixed formula by which the poisoned Bordeaux Mixture must always be prepared. Some persons use a little more or a little less of each of the ingredients than others. All things considered, we use and recommend what is known as the "five-five-fifty" formula; that is, a formula in which *five* pounds of lime and *five* pounds of bluestone are used to make *fifty* gallons, and to this we add from 5 to 8 ounces of Paris green (or 3 to 5 pounds of arsenate of lead). This is the ordinary formula for the regular mixture, as used on apple and pear trees, though for use on peach, plum, cherry and apricot a weaker mixture is used:

Preparing the Mixture.

FORMULA.—Stone lime (unslaked).....5 pounds
Bluestone.....5 pounds
Paris green.....5 to 8 ounces
(or arsenate of lead.....3 to 5 pounds)
Water.....50 gallons.

Important Note.—If it is to be used on peach, plum, cherry or apricot, use only 2½ pounds bluestone and 2½ or 3 ounces of Paris green (or 3 pounds of arsenate of lead).

Directions for Making.—Put the bluestone in a cloth sack and hang it in a tub or keg of water so that it is just below the surface. In this way it will dissolve much more rapidly than if thrown in so that it sinks to the bottom. Warm or hot water will dissolve it much more rapidly than cold. Put this to dissolve the evening before it is intended to spray and it will be dissolved by morning. This should be in a wooden receptacle. After the bluestone has dissolved, add water to make 25 gallons (if there is not that amount already).

Slake the lime slowly (preferably with hot water), and when completely slaked add water to make 25 gallons. Keep this in a separate keg or barrel.

We now have 25 gallons of the bluestone solution and 25 gallons of the lime solution. We now take equal parts of each of these solutions and pour them together into a third tub or barrel. Do not pour a bucketful of one into a half-barrel of the other, but mix them always in equal quantities. Thus we may take two water buckets and fill one with the lime solution and the other from the bluestone solution and then pour them both at the same time into the third barrel or keg. This little point of always mixing them in equal quantities results in a better mixture than when they are carelessly mixed, or when the whole mass of one solution is poured bodily into the whole mass of the other. Always stir the solution well before dipping out, so that the liquid you take out shall be fully charged with the ingredients of the solution.

Poisoning the Mixture.—It now remains to add the poison, whether it be Paris green or arsenate of lead. Either of these may be used, their relative merits being about as described below.

Paris green is a well-known remedy for various insects and has the advantage of being well-known, and is obtainable in almost every village. It should be used at the rate of *one ounce for each eight or ten gallons,* or 5 to 8 ounces for a barrel (50 gallons) of the Bordeaux Mixture. Some persons use as much as half a pound (8 ounces) to a barrel, and if the green is of poor quality this may be necessary, but in our experience 5 ounces to the barrel has always given good results, and an excessive amount is apt to have a burning effect on the foliage and young fruit. It is a very cheap poison to use, as it can be had at a cost of from fifteen to twenty-five cents per pound. This is the poison which is principally used by our growers.

Mix the green first with a little water in a cup or dish (using the fingers or a small stick) until it is thoroughly wetted to a thin, watery paste in which there are no dry lumps or bubbles of the Paris green. Then wash this into the mixture and stir thoroughly. The mixture is then ready to apply to the trees.

Arsenate of lead.—This is a newer poison, but one which has several advantages over Paris green. It does not have the same tendency to burn the foliage, and it sticks to the leaves better, so that an application of it is effective for a much longer time than is the case with Paris green. On account of these advantages, the progressive fruit growers in most parts of the country are using it in preference to Paris green. It is sold in the form of a white paste, which readily dissolves in the Bordeaux Mixture (or in water), and it does not settle to the bottom so quickly as does Paris green. It costs about the same per pound as Paris green (fifteen to twenty-five cents), but a much greater quantity is used, from 3 to 5 *pounds* being used for each barrel of the Bordeaux Mixture. This makes it more expensive, but the better results fully make up for the difference. Arsenate of lead is not usually sold by our local stores, but any good drug store in our larger towns or cities can likely supply it if the order is placed with them well in advance of the time when it is to be used.

The arsenate of lead paste is first dissolved in just enough water to make it liquid and is then stirred into the Bordeaux Mixture. It is then ready to apply.

Strain Before Using.—Before using, the mixture must be carefully strained through a cloth or fine wire gauze. Remember that all the spray must come out through the small hole in the end of the nozzle; therefore, to avoid clogging, strain carefully before using. Care in the thorough straining before spraying will pay for the trouble many times over. If one uses considerable quantities of the mixture, it is well to have a large funnel strainer made, fitted with two nettings, one of iron wire window screening and the other with much finer gauze, preferably of brass. Having strained the poisoned mixture, it is ready to apply.

Applying the Mixture.

Spray pumps are necessary to make the application to best advantage. In growing fruit on a commercial scale, the spray pump will be found as necessary as the plow, after you once get into the habit and know how and when to use it.

Always strain the mixture through a cloth or fine wire gauze before attempting to spray it. Stir thoroughly before straining, *and stir it occasionally while spraying.* The spray pump should preferably be fitted with an agitator, which keeps the mixture stirred.

Have long enough hose on the pump, so that the nozzle can be put to within two to four feet of the part to be treated. You cannot do good work in spraying a fruit tree with only four or five feet of hose. The spray is in best condition at from two to four feet from the nozzle.

In pumping, keep up a good pressure, so that the spray will be forced out in a fine, penetrating mist.

Move the nozzle around briskly, so as to throw the spray to all parts of the plant. Remember that only the parts actually touched and dampened by the spray are protected, yet do not put it on until it runs off in streams; just a light, even, thorough dampening, in which every inch of space is covered, is the ideal treatment.

It is not absolutely necessary to use poison in any application which may be given when there are no leaves; but when there are leaves, even if only partly grown, it is very important to use it. In the second spraying of apples and pears the poison is especially important.

If the trees are infested with San José Scale, this pest must be combated by spraying with the Lime-sulphur Wash in late winter before the buds open. When this is done it *takes the place of* the first treatment of (poisoned) Bordeaux Mixture, so that the poisoned Bordeaux would not be applied until after the blossoms fall. There is no need to spray with both the Bordeaux Mixture and the Lime-sulphur Wash before the buds open.

The most important spraying for apples and pears is the one made just after the blossoms fall. There will be some irregularity about this, and we must strike the most opportune time to do the most good. It is important that this application be made promptly, as soon as the bulk

of blossoms have fallen; so we must do it then, even if there are some belated blossoms still on the trees. But it is considered to be poor practice to spray when the trees are in full bloom.

If rain falls immediately after an application, it must be repeated as soon as the plants are fairly dry again. But if the mixture once gets dried on the foliage, it will adhere very well in spite of rains. From one to two hours will dry it satisfactorily, especially if there is sunshine.

After a day's spraying, pump a little clear water through the pump and hose to clean them of the mixture, so that there shall be no unnecessary corrosion.

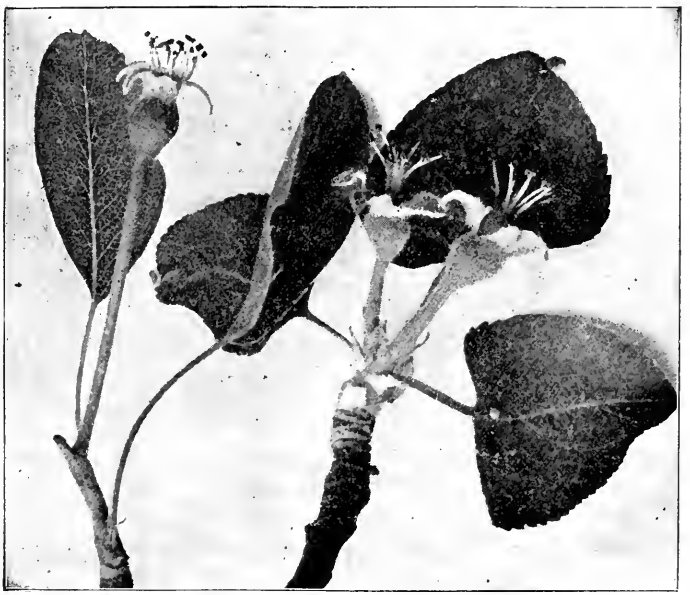

Fig. 1.—Just the best time for the second spraying of apples and pears. The blooms have shed, and the blossom end of the young fruits is wide open to receive the poison. (After Slingerland.)

Oil the working parts of the pump and nozzle occasionally.

If the insect to be combated works mostly on the upper surface of the leaves, the spraying must be done so as to reach the upper surface, and if they work more on the under surface, give attention to that. Use judgment with each pest and fight it according to its habits.

Special Hints.—Don't forget the poison. There is a tendency to forget all about the poison when one mixes the two solutions, but the bluestone and lime do not kill insects. Be sure to add the poison, mixing it carefully first with a little water, as already explained.

Bluestone dissolves slowly. If you want to spray in the morning, put the bluestone in the water the evening before, so it will be dissolved in time. It dissolves more quickly in hot water than in cold. It also

dissolves more rapidly if hung so that it is just below the surface than it will if simply thrown in the water to sink to the bottom. It is well to crush the lumps of bluestone just before putting it in the water.

The bluestone solution has a corrosive effect on certain metals. It should be prepared and kept only in wooden, iron, brass or copper receptacles. The lime solution may be kept in any ordinary receptacle.

After the Bordeaux Mixture is made up ready for use, it must be used in twenty-four hours.

Spraying System (with Poisoned Bordeaux Mixture) for Fruit Trees.—The treatments outlined below are such as are necessary to give adequate protection to fruit orchards. It is to be remembered that *apples especially* will almost always give excellent returns for spraying. With *pears* the result is nearly always good, though not so marked as with apples, and this remark applies to *plums* also. With *peaches* the result is much less certain.

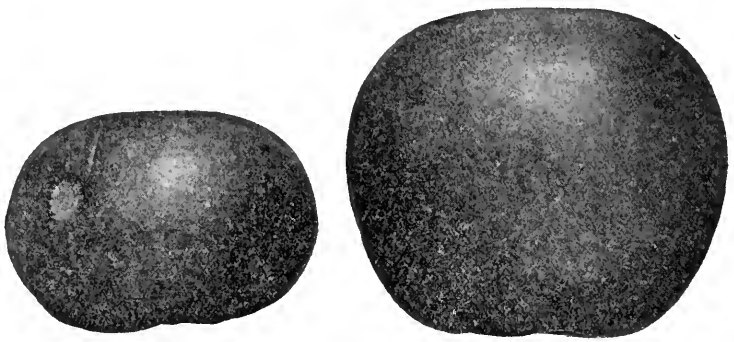

Fig. 2.—Unsprayed (at left) and Sprayed (at right) Winesap Apples, from J. W. Spainhour, King, N. C. Mr. Spainhour sent these as fair **average** (not selected) samples showing the difference between fruit on sprayed and unsprayed trees. Four-fifths of actual size. (Photo by Z. P. Metcalf.)

Apple.—Give three (or four) treatments each spring and summer, as follows:

1. Late February or early March, before buds open.
2. Just after blossoms fall, *promptly.*
3. Two weeks after second spraying.
4. (If apples rot on trees). When fruit is about grown, but not yet colored.

Of these treatments the second (just after blossoms fall) is much the most important.

The principal pests which will be destroyed by these treatments are: Tent Caterpillars, Fall Webworms, Caterpillars (all other kinds), Codling Moth, and (to slight extent) Curculio; also, among the fungus diseases, leaf rust, apple scab and bitter rot.

The principal pests which it will not destroy are: Borers (all kinds), Scale Insects (all kinds), Green Apple Louse, Woolly Aphis, and (to large extent) Curculio; also fire blight, a fungus disease.

Pear.—Subject to most of the same pests, and, therefore, given the same treatment as for apple.

Peach.—For this fruit use only one-half the amount of bluestone and one-half the quantity of Paris green that is used for the regular formula. *Arsenate of lead is, however, much the most effective and safest poison for use on peach and plum,* and should be used at rate of 3 pounds to 50 gallons. Late peaches usually require four sprayings for best results, as follows:

1. Late February or early March, before buds burst.
2. About a week after blossoms fall.
3. Ten days to two weeks after second spraying.
4. When fruit is nearly grown, but before coloring begins and before rot appears.

Very early varieties of peaches may be sufficiently protected by three sprayings, or perhaps with only two.

These treatments will, to considerable extent, lessen the ravages of the Curculio, which makes the worm at the pit; also, leaf curl and the brown rot of the fruit.

Plum.—Same remarks as for peach.

Cherry.—Same general enemies as the peach, but usually not necessary to spray, and results are not usually satisfactory.

Conclusion.—It may not every year be necessary to give all the treatments which we have outlined, but, as we cannot tell what insects are going to be present in any particular year, it is best to have a regular plan of treatment in mind, to be followed as closely as circumstances will permit. Sometimes there will come seasons when the spraying fails to do what is desired of it; but taking it all in all and year after year, the man who follows the methods here outlined will soon find that he is paid for his trouble and expense many times over.

Finally it should be said that success in spraying with the Bordeaux Mixture (poisoned) depends fully as much on its being done *thoroughly* and *at the right times* as on the number of times that the trees are sprayed. Some good growers never attempt more than two sprayings and do well. Time and again growers have told me of cases where only one spraying with apples (given just after the blossoms fall) worked wonders in securing better fruit. *Of all sprayings with apples, the one which comes soon after the blossoms shed is the most important, and must not be neglected.*

THE LIME-SULPHUR WASH.

This is the material now mostly relied upon for controlling the San José Scale, and it has proven so effectual in all parts of this State that when one once finds that his trees are infested and knows how to prepare this wash, there is no real necessity for another tree being lost from the scale. When the ingredients are properly boiled together and the wash then sprayed (or applied by hand with mop or brush) on the trees, so as to thoroughly treat all the branches and twigs, it is fatal to every scale that is wetted by it. It cannot, however, be relied upon to *exterminate* the San José Scale, for it is impracticable to make any application so thorough as to reach *all* of the tiny scales. It is so effective, however, that one *thorough* treatment late each winter is sufficient to keep the trees in good condition. Trees that are very badly infested

when the scale is first discovered might be treated in the fall after the leaves are off and again in late winter. But once the scale is subdued, one treatment each winter is sufficient.

The Lime-sulphur Wash is mainly a *winter remedy,* and the later in the winter the treatment is given the better, just so the work is finished *before the buds open.* It is fatal, or at least injurious, to young foliage, blossoms, etc. If one is unavoidably delayed in using it and finds that he must treat the trees after the buds have opened, the application should be directed merely to the trunk and branches, and care should be used

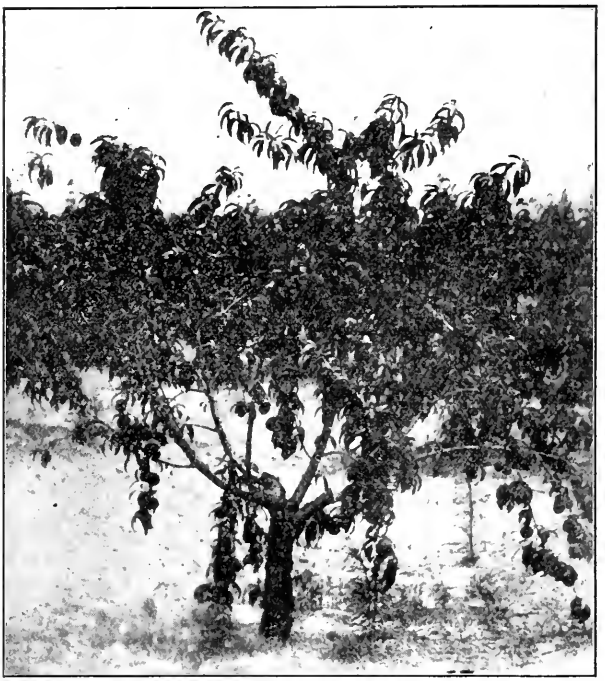

Fig. 3.—Sixth successive crop of peaches in a scale-infested orchard, showing that fruit growing may be profitably carried on in spite of the San Jose Scale. (Photo by Sherman.)

to touch as little as possible of the flowers, foliage or young fruit with it. When this care is used, it may be used as a remedy for San José Scale even in summer.

When trees have been sprayed with the Lime-sulphur Wash in late winter there is then no need to spray with the Bordeaux Mixture until after the blossoms fall—in other words, a late-winter application of the Lime-sulphur Wash takes the place of the late-winter application of Bordeaux Mixture. The writer strongly advises that fruit growers should use this remedy every two or three years anyway (even if no San José Scale is known to be present) on account of its excellent general

effect on the tree in removing moss, dead bark, etc. Such a practice would also check the scale if it should get started at any time, and would entirely prevent the scale from killing dozens or hundreds of valuable trees before it is discovered, as it often does.

The Lime-sulphur Wash has its disadvantages. It is somewhat troublesome to prepare, and is destructive to spray pumps by reason of its corrosive action. This latter point should be provided against by purchasing pumps with all working parts, or all parts which come in contact with the material, of brass, as brass will withstand it quite well. Copper pumps or tanks are quickly destroyed by it.

Fig. 4.—Making Lime-sulphur Wash. Outfit used in preparing wash for orchard of 400 young peach trees. (Photo by Sherman.)

Ample experience has proven that salt, bluestone or other material added to the wash merely adds to the expense and do not materially add to its effectiveness. The lime and the sulphur are the only materials needed.

There is some variation in the quantities of lime and sulphur used by growers to make a barrel of this wash, two men with orchards standing side by side often using different quantities with practically the same results. Therefore, a slight departure from the fixed formulas is not a serious matter, and this safety with which it may be used is a strong point in its favor. The following will be found satisfactory for preparing one barrel of the wash. Smaller or larger quantities may be prepared by using different *amounts,* but observing the same *proportions:*

Stone lime	15 pounds.
Sulphur (flowers)	15 pounds.
Water (to make)	50 gallons.

Heat from 4 to 6 gallons of water to boiling over fire in large iron or brass kettle. Mix the sulphur with enough hot water to make a thin paste and pour it into the kettle with the hot water. Now add the lime

part at a time, and as it slakes dash in a little cold water, as needed, to keep it from boiling over or to keep it from becoming dry. Keep the fire going and stir the mixture frequently. As the slaking ceases, keep it boiling from the fire for half an hour longer, then dilute with water (cold is all right) to make the 50 gallons; strain through a fine wire screen or cloth to remove all sediment, and spray.

Notes About the Lime-sulphur Wash.—The Lime-sulphur Wash not only kills the scales with which it actually comes in contact, but it forms a thin, firm coating over the twigs upon which the young insects seem to find difficulty in settling down to feed and grow. As this coating is gradually worn off by rains or by growth of the tree, it is important that the wash be applied as late in the winter as possible, so that the

Fig. 5.—Steam-boiler outfit for making Lime-sulphur Wash for orchard of 35,000 peach trees. Moore County, N. C. (Photo by Sherman.)

coating shall be present when the insects begin to breed in the spring. *The best time to treat the trees, therefore, is in late winter—as late as possible, so the work is completed before the buds have opened.* Trees that are very badly infested may be given two treatments, the first in late November or December, and the second as late as possible, as just directed (usually in February); but once the scale is subdued, one application late each winter is sufficient.

About a week after the trees are treated they will look almost as white as if they had been whitewashed, and it is then an easy matter to detect any places which were missed in the application. Absolute thoroughness must be the rule in treating trees for this scale. Spray the trees from two or three sides to be sure that it is done thoroughly, and then if missed spots are noted later go over the trees again and complete the job.

It is well to prune the trees before the wash is applied, so that any dead or useless wood will be removed, thus giving a better opportunity to treat thoroughly what remains.

The majority of our largest and most successful peach growers believe in pruning very heavily every year. This results in a lower, stouter

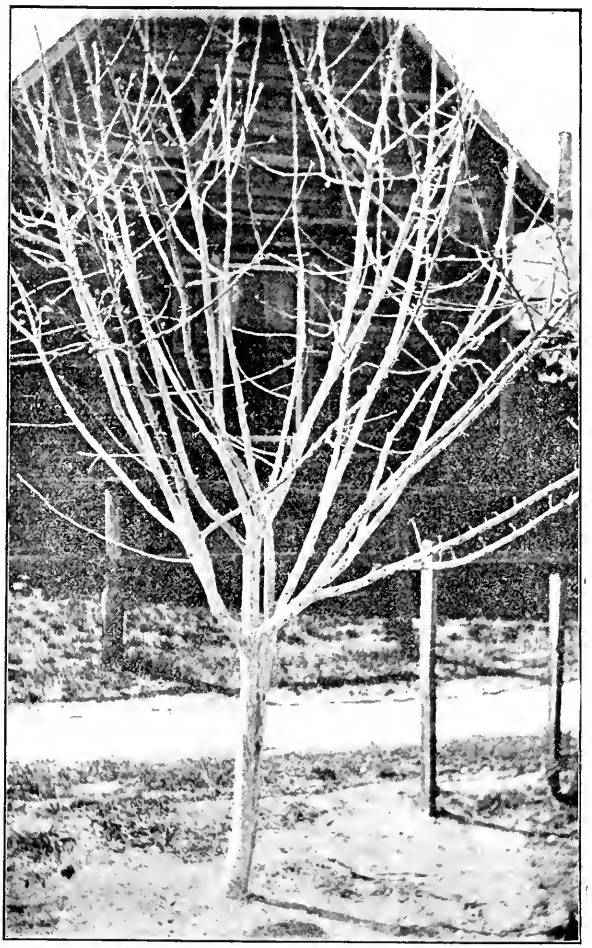

Fig. 6.—Tree thoroughly treated with Lime-sulphur Wash several days after spraying. Note whitened appearance and note that every twig is covered. (Photo by R. W. Collett.)

tree, capable of carrying a heavy load of fruit without breaking, and also renders it possible to give a very thorough coating with the wash. While it is not thought practicable to cut back apples so heavily, yet it must be remembered that low heading and liberal cutting back is a help in making a thorough application of this wash.

Trees that are so badly infested as to appear to be beyond saving may often be restored by cutting back to mere stumps and then giving a

thorough application of the wash. New growth is put forth in the spring, and after a year or two a new and bearing top is gained. This is especially the case with peach trees. We have before us a photograph of a vigorous peach tree in an orchard in Guilford County, which in

Fig. 7.—Peach trees before pruning. Note how difficult it would be to thoroughly treat all the long, slender twigs. (Photo by Sherman.)

Fig. 8.—Same orchard as shown in Fig. 7, after being pruned and sprayed. Note that all branches were shortened and that the trees are in thrifty condition. (Photo by Sherman.)

August (1908) had an estimated crop of over 6 bushels to the tree. Three years before the tree was so badly infested that it seemed impossible to save it. The tree was cut back severely and the remaining stubs *thoroughly* treated with Lime-sulphur Wash, and has been sprayed with it once each winter since. The tree is still slightly infested. The owner has no expectation of exterminating the Scale, but he is holding it in entire control and is making money from his orchard.

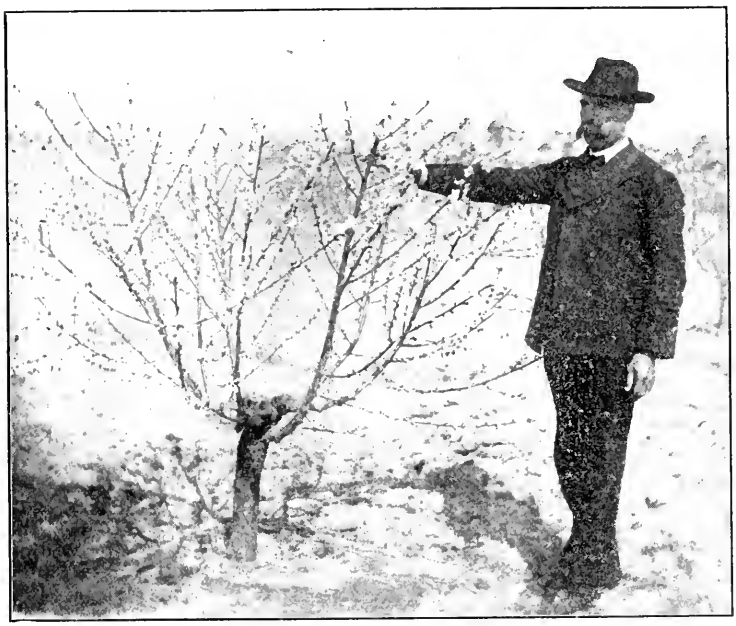

Fig. 9.—Peach tree cut back to stub two years before, now making new top and filled with bloom. Moore County. (Photo by Sherman.)

Ready-made Remedies for San Jose Scale.—While every fruit grower should know from actual practice how to make up and apply any spraying material which he may need, yet it should be remembered that there are firms constantly at work on the discovery and manufacture of materials which will do the work satisfactorily and which can be sold in form ready for immediate use. There has been a great flood of remedies for San José Scale placed on the market, some of which contain lime and sulphur, and some of which contain oil in such a form as to mix readily with water and to be not dangerous to the trees if directions are followed. We make no effort to test all these remedies—if we did so we could do little else. Our growers are advised to depend at first on the home-prepared remedies which are known to be good; but they may test these other remedies on a few trees, as they see fit, watching the effects carefully for a year, and decide for themselves which remedy they prefer to rely on for the years to follow.

Without pretending to say a word against any other firms, it may be stated that up to this time (March, 1909) there are two firms which are offering these ready-made remedies which have made special efforts to establish their trade in this State, both of whom have many entirely satisfied customers among our people. These are: *The B. G. Pratt Co., 55 Church Street, New York City,* who manufacture the oil preparation known as "Scalecide," and the *Thomsen Chemical Co., Baltimore, Md.*, who manufacture a remedy known as "Orchard Brand Concentrated Lime-sulphur Solution," and also an oil preparation known as "Soluble Oil." Growers who prefer to avoid the trouble of preparing the Lime-sulphur Wash may correspond with these firms in regard to their materials, prices, quantity needed, method of using, etc.

OTHER SPRAYING MIXTURES.

We have given special prominence to the Bordeaux Mixture (poisoned with Paris green or arsenate of Lead) and to the Lime-sulphur Wash because these two are used far more in this State than all other spraying mixtures combined. There are certain other spraying mixtures which are used more or less frequently for such insect pests as the soft-bodied plant lice or aphids, the soft scales or lecaniums, and for summer applications to check the San José Scale.

Kerosene Emulsion.—This was once the standard remedy for all kinds of scale insects and for most plant lice, and though it has been replaced by the Lime-sulphur Wash as a remedy for San José Scale, it is still used by some growers for treatments in spring or summer, when the regular strength of Lime-sulphur Wash cannot be freely used. It is often used against plant lice and some soft-shell species of scale insects. When carefully made and applied as a fine misty spray, it is a very effective insecticide.

For use on Peach and Plum, we advise that it be used at a strength not greater than 15 per cent oil for treatments in winter and early spring, and not stronger than 10 per cent oil in summer.

For use on Apple and Pear, it may be used as strong as 25 per cent, or even 50 per cent oil in winter and until the buds open in spring; but after the buds have opened, we advise that it be used not stronger than 15 per cent oil. Some growers have used pure kerosene (without any water at all) and have had good results without injury to trees, but this is dangerous to trees, expensive at best, and is not advisable.

Here is the usual formula for preparing the Kerosene Emulsion, together with statement of amounts of water to be added to get 10 per cent, or 15 per cent, or 25 per cent, or 50 per cent, of oil:

Kerosene (coal oil)	2 gallons.
Laundry, or soft soap	½ pound.
Water	1 gallon.

Shave the soap into thin pieces in the water and heat to boiling over fire and stir to dissolve the soap. Then *remove from the fire* and pour in the 2 gallons of oil, and churn the whole mixture together vigorously for several minutes. This may be done by pumping it through the spray pump, directing the nozzle back into mixture so that it is sprayed

back into itself again. After this whole mass has been thoroughly churned together it will be of a light creamy nature, and will then mix readily with even cold water. This gives us a total of *three* gallons, two gallons of which (or 66 per cent) is oil. To reduce this down to the proportions desired, observe the following table:

To get 10 per cent oil, add 17 gallons of water.
To get 15 per cent oil, add 10 gallons of water.
To get 25 per cent oil, add 5 gallons of water.
To get 50 per cent oil, add 1 gallon of water.

If desired, the emulsion may be prepared in less (or greater) quantity than here indicated, but care must be taken to carefully follow the *proportions* here given, so that the final mixture that is sprayed on the trees will be of the desired strength—not more and not less. It often requires a little experience and skill in making the mixture and a thorough understanding of how much water to add to reduce the mixture to the strength desired. It must be remembered that this remedy only affects those insects that are actually wetted by it, hence the application must be very thorough.

Soap Solution.—For many soft-bodied insects, such as plant lice, a strong solution of ordinary soap in water is quite effectual. We do not know that the exact proportions necessary for all the different species has been worked out, but we have used the following with excellent results against the gray Cabbage-louse, which often infests cabbage and turnips in the spring, and no doubt the same strength would be effectual against the Black Peach Aphis and the Green Apple Aphis, which often infest the young growth of peach and apple trees in spring and early summer:

Laundry soap.....1½ pounds.
Water .....4 gallons.

The soap should preferably be of a cheap grade which contains plenty of lye. It is shaved into thin pieces in about two gallons of water, which is then heated to boiling over the fire. Stir vigorously to thoroughly dissolve the soap. Then add two gallons of cold water (or more, if needed, so as to make four gallons in all) and spray while it is still warm.

This is such a simple preparation, so cheap and easy to prepare that, if needed, several applications can be made. It must be remembered that it (like the Kerosene Emulsion) only affects those insects that are actually wetted by it, hence the application must be very thorough.

SPRAYING APPARATUS.

What is the best spray pump? That is a question often asked, and entirely impossible to answer with any assurance of satisfaction. Some growers get along very nicely with the small bucket pumps (if their orchards are not large), while others quickly abandon them for the larger and more powerful kinds. Some (especially gardeners and truckers) prefer the knapsack pumps, while others say that they wouldn't have one, as they are too hard to work with. Some like the compressed-

air sprayers that are carried about by hand (many are in use among tobacco growers), while others object that they hold too little liquid and that too much time is required in filling the tank every few minutes.

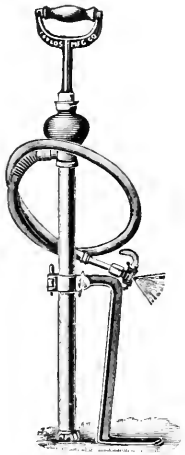

Fig. 10. — Bucket pump with only 3 or 4 feet of hose. Suitable for small orchards when fitted with longer hose, etc. (After Goulds Mfg. Company.)

There is just one invariable rule that can be laid down, and that one holds good regardless of whether you are rich or poor, and that is, *get a good, strong, durable pump—large enough and strong enough and with enough hose and extension pipe to reach every part of your trees with a fine, misty spray.* It is also a great advantage if the pump has an agitator for keeping the liquid stirred so the ingredients will not settle to the bottom.

It will be well to write to any or all of the following firms and ask for their illustrated catalogues and price lists of spraying outfits, study them carefully, figure on the length of hose, extension pipe, etc., before placing your order:

A few hardware firms in this State carry spray pumps in stock.

Snydor Pump and Well Co., Richmond, Va.
Goulds Manufacturing Co., Seneca Falls, N. Y.
Friend Manufacturing Co., Gasport, N. Y.
Hurst Manufacturing Co., Canton, Ohio.
Morrill & Morley, Benton Harbor, Mich.
E. C. Brown Co., Rochester, N. Y.
Spramotor Co., Buffalo, N. Y.

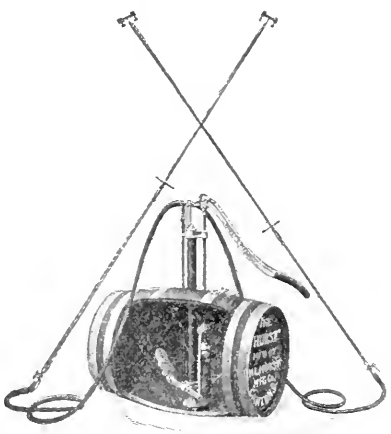

Fig. 11.—Barrel pump fitted in side of barrel with two leads of hose, two extension rods, each with stopcock at base and double nozzles at end. A good general type of barrel outfit for commercial orchards. (After Hurst Mfg. Co.)

Appliances.—Aside from selecting a good pump, you must also decide how much *hose* you want, how long an *extension pipe* will be needed, and the kind of *nozzle.* You must also state that you want whatever *connections, washers, etc.,* will be needed to put the entire outfit in condition for use. It will also be an advantage to have a *stopcock at base of the extension pipe,* so the spray can be cut off at any moment to prevent waste. All these little appliances add more or less to the cost, but a suitable arrangement of them is the very making of a satisfactory outfit.

For bucket, knapsack and compressed-air pumps, from six to ten feet of extra hose is enough, but for barrel pumps we advise at least fifteen feet of extra hose.

The extension pipe should be six to ten feet long, according to the size of trees. We give preference to the "Vermorel" type of nozzles. The "Friend" nozzle (made by the Friend Manufacturing Company) is an excellent one, but costs more. We like to have a stopcock at base of extension pipe.

Barrel Pumps for Standard.—Considering *everything*—the cost, the durability, the capacity, the labor we have, the kinds of fruit and the size of our orchards, we believe that for the majority of our people who have or are planting orchards for market purposes the barrel pumps are best, and should be generally considered as the standard. Those with orchards of 1,000 or more apple or 3,000 or more peach may profitably get more elaborate outfits, while those with only about 100 apple or 200 peach (or less) may do all right with the smaller pumps.

A good barrel pump, with two leads of hose, extension pipes, double nozzles, stopcocks, etc., will cost, complete and ready for use, about $25 to $35. It is usually better to order that the pump be fitted into the *side* of the barrel. If you get the pump alone and fit it into the barrel yourself it will cost less.

SPRAYING CHEMICALS.

Lime.—This can usually be had in any village at very cheap rates. For spraying work it should be the fresh unslaked (or "stone") lime. If this cannot be had, the powdered air-slaked lime *can* be used, but must be carefully sifted and lumps crushed, and twice as much by weight should be used as is recommended for the stone lime. Fresh lime should cost from $1 to $1.20 per barrel.

Bluestone.—This may be had at any drug store, but can be had more cheaply by ordering in large quantity from some wholesale firm which makes a specialty of handling spraying chemicals. At retail it costs from fifteen to twenty-five cents per pound; when purchased in quantity, eight to twelve cents.

Paris Green.—This well-known poison can be found in most general stores in the country, where it retails at twenty-five to forty cents per pound. In quantity it can be had at cheaper rates.

Arsenate of Lead.—This is a newer poison than Paris green, and is used for the same purposes. It costs less per pound (fifteen to twenty-five cents), but as much greater quantity is used, it is actually more expensive. It has the advantage, however, of not settling to the bottom so quickly, and that it can be used on very delicate foliage (such as peach) without burning. It is sold by some large drug manufacturers and by those firms which specialize in spray chemicals. It is not kept by most druggists in this State, but can be ordered through the larger firms.

Sulphur.—There are two grades of sulphur: "flour of sulphur" and "flowers of sulphur." For making the Lime-sulphur Wash the "flowers" is considered better. Sulphur may be ordered through any drug firm, or perhaps some general stores handle it or can order it. At retail it costs from about fifteen to twenty cents per pound, at wholesale from eight to twelve cents.

Other Materials.—The other spraying materials mentioned in this BULLETIN—soap, oil, etc.—can be easily procured everywhere at varying rates.

CO-OPERATIVE ASSOCIATIONS.

In communities where there is considerable interest in fruit growing something can be saved if the growers will combine their needs into large wholesale orders. It is perfectly evident, for example, that if a dozen or fifty men in a community send off a combined order for a ton of bluestone, twenty barrels of sulphur, five hundred pounds of Paris green, etc., that the rates both of purchase and for transportation will be cheaper than if each man sends off a small independent order. And it is in just such matters that the local fruit growers' associations have a chance to do good work. There is already an association at Mount Airy (Surry County) and one in the Brushy Mountain region of Alexander and Wilkes counties. There are several other localities where similar local associations could be formed to advantage—not to "fight the trusts" or to "resolute," but to be mutually helpful among the members, to study among themselves the best means of growing more fruit and better fruit, methods of planting, cultivating, fertilizing, pruning, spraying, canning, drying, picking, grading, packing, shipping, buying of supplies, etc., etc. We find that as a rule four meetings a year—one each in spring, summer, fall and winter—are about the right number. There need be nothing complicated about such an organization, but there should be an active, reliable business man for secretary or business agent who can and will see to it that members have the chance to get their materials to advantage.

In addition to the two associations already mentioned, we have reason to believe that, with proper spirit among the fruit growers in the community, very beneficial organizations could be formed and kept up in the following neighborhoods:

Guilford County and vicinity,
Catawba County and vicinity,
McDowell County and vicinity,
Buncombe County and vicinity,
Haywood County and vicinity,

and perhaps a few others not here mentioned. But we know that the "organization" sentiment has been worked considerably in recent years, and we advise that the sentiment of the community be carefully sounded and measured before an attempt is made. The keynote should be education and progress in better methods among the growers themselves, rather than to fight for redress of real or fancied wrongs. When our growers are practicing proper methods among themselves it will then be time to take up the other matters. This is said not in discouragement, but to warn against a common mistake.

APPLE-SPRAYING DEMONSTRATIONS.

In the first pages of this BULLETIN it is stated that every grower should know how to make and should know when, how and why to use the poisoned Bordeaux Mixture. This is the best general spray mixture for fruit trees, though for San José Scale, plant lice, etc., other remedies are required.

During 1908 we conducted a number of public demonstrations in the spraying of apple trees with the *Bordeaux Mixture and Paris green,* in order that the fruit growers might see the exact process of preparing the material and spraying it on the trees, and that they might watch the trees through the season and notice the results. These tests were conducted at the following places:

Stokes County, in orchard of J. W. Spainhour, at King.
Alexander County, in orchard of R. B. Lowe, near Poors Knob.
Caldwell County, in orchard of J. A. Dula, near Lenoir.
Henderson County, in orchard of Jonathan Case, at Dana.
Jackson County, in orchard of George P. Miller, at Sylva.

In all cases the material used was the *Bordeaux Mixture and Paris green,* and three applications were given, as nearly as practicable at the following times:

First application in late winter, before buds opened.
Second application immediately after the blossoms fell.
Third application from two to three weeks after the second.

This is exactly in accord with the directions which we have been sending out from this office for years.

In each case three trees of good bearing size and age were selected for the work, and all treatments were given exactly as should be done in regular orchard practice. Not a single thing was done nor a single implement used that is not entirely practicable for the ordinary fruit grower of moderate or small means. We simply put science to a test on a practical job, and it justified the claims made for it.

At several places one of the trees was sprayed only on one side, the other side receiving only such of the spray as was accidentally blown or thrown upon it. This was done to see if we could demonstrate the difference between the sprayed and unsprayed halves of the same tree.

The dates on which these three sprayings were given can best be shown by the following table:

TABLE SHOWING DATES OF DEMONSTRATION SPRAYING, 1908.

	King, Stokes County.	Poors Knob, Alexander County.	Lenoir, Caldwell County.	Dana, Henderson County.	Sylva, Jackson County.
First Treatment	January 31	February 3	February 5	February 15	February 18
Second Treatment	April 16	April 17	April 19	April 21	April 23
Third Treatment	May 6	May 7	May 8	May 9	May 16

We requested two separate reports from the owners—the first in July, to show the effect and condition at midsummer, and the other in October, to show the actual result at harvest.

In every case, every report, whether in summer or in autumn, showed most favorable results from the spraying. From the ten reports received we quote the following:

KING, N. C., October 7, 1908.

DEAR SIR:—The foliage and fruit on the Winesap trees were fine—the fruit almost perfect and the foliage at this writing (October 7th) is fresh and Green. On the Maiden Blush tree the fruit was fine, but did not keep as well

as it should have done. I sold three bushels to a cannery, and they told me these were the only apples they found with no worms in them. Foliage on this tree is now fresh and green. Two other trees of the same variety, right near the one sprayed, have foliage all off, and did not get an apple from either one fit to use.

The Magnum Bonum tree—half sprayed and half not—showed marked difference in the fruit on the sprayed side; the fruit on the side that was sprayed was much larger and finer. The foliage on that side is now fresh and green; on the side not sprayed, nearly all off.

Respectfully yours, J. W. SPAINHOUR.

For proof of the results at Mr. Spainhour's place the reader should examine Fig. 2 of this BULLETIN, on page 10.

POORS KNOB, N. C., October 13, 1908.

DEAR SIR:—Your work here was very satisfactory, as the foliage is yet green, while the trees nearby that were not sprayed have lost most all their foliage. The fruit is much larger and nicer and less infested with worms. The half tree that was sprayed is bright and green and the fruit is fine, while the opposite side (not sprayed) has lost very near all its foliage. All parties that have seen those trees say there is a great difference between the trees that were sprayed and the ones that were not. * * * *

Yours very truly, R. B. LOWE.

LENOIR, N. C., October 7, 1908.

MY DEAR SIR:—In regard to the apple trees your department sprayed last spring and summer. The foliage is still (October 7th) green and healthy, and the apples still hanging on the trees, sound and free from worms and bitter rot.

The variety sprayed is my seedling—Dula Beauty. One-half of one tree was sprayed, and the other half which was not sprayed shed its leaves and fruit more than three weeks since, and the fruit is on the ground rotten; and that is the condition of a large part of my orchard. I hope that the demonstration on my place will emphasize the importance of spraying to obtain sound fruit. It is no longer an experiment. Respectfully, J. A. DULA.

DANA, N. C., November 11, 1908.

DEAR SIR:—Business has prevented an earlier report on the final outcome. The Limbertwig apples have been gathered and marketed, and I am sure that the trees that were sprayed gave double the real value that three other corresponding ones (unsprayed) gave. More apples and better apples are the result.

The trees held a green foliage for about three weeks longer than those that were not sprayed, and the apples were almost free from worms and defects. The color was very much improved and the size larger and almost twice the number of bushels on the trees sprayed than there were on the same number of other trees not sprayed, of the same varieties, and grown under the same conditions. Yours very truly, JONATHAN CASE.

SYLVA, N. C., October 8, 1908.

DEAR SIR:—The sprayed apple trees show the benefits of spraying more definitely now than they did when I made my last report. At this date (October 8) the foliage and fruit are far better than other trees (unsprayed) of the same variety near by.

We have had several hard frosts this month, yet the foliage is still green, luxuriant and dense; the apples are cleaner, larger and still growing. The sprayed trees are very much better in every way.

Yours respectfully, GEORGE P. MILLER.

The following letter from a farmer who attended one of these demonstrations, and who then went home and put the matter into practice, is worthy of notice:

R. F. D. No. 1, WALNUT COVE, N. C., October 7, 1908.

DEAR SIR:—My apple trees are still full of dark green leaves and very few, if any, have fallen. I have the finest lot of apples by far that I have ever had, and fewer with rotten specks than ever before. From fifteen bushels of Winesaps gathered from my sprayed trees I did not get over one-fourth of a bushel of specked apples, and practically none were wormy. The Virginia Beauties showed a little rot, but I can safely say it was fifty per cent less than ever before. The Ben Davis fell off worse than any of the others that were sprayed, but showed no signs of rot. The Royal Limbertwig showed very little rot and hung on the trees until gathered. As yet they show no signs of rotting, although heretofore very bad to rot. My neighbors say that I am well repaid for the money spent for spray pump and the labor of spraying.

Yours respectfully,

I. G. ROSS.

We claim that these demonstrations and letters from the growers constitute an argument and a proof that cannot be denied or weakened. *It pays to spray!*

A similar series of demonstrations, including a larger number of localities, is already under way for 1909.

Our fruit growers must spray. They must learn how to make and when to apply the *Bordeaux Mixture and Paris green.* It will result in more fruit, better fruit, better prices and healthier trees. Spraying must come to be the *regular* practice of the *majority* of our fruit growers, and not practiced regularly by an insignificant number and trifled with spasmodically by a few more. The western part of our State has great natural advantages in the production of winter apples for the Southern markets, but until we learn to spray and to grade and pack our apples properly we will continue to sell our apples at profitless prices, while the more progressive growers of the North and West send their fancy fruit to our markets and sell it at fancy prices, to the exclusion of North Carolina apples.

Just so soon as our growers learn this lesson and make it a vital part of their practice, they will find fruit growing profitable, but not before.

ORCHARD INSPECTIONS.

The prevalence of the San José Scale in many parts of the State, and the great harm that it often does before it is discovered by the grower, plainly indicates the value of maintaining a systematic inspection of the commercial orchards of the State. Accordingly the Board of Agriculture, at its regular meeting in December, 1906, provided for the employment of an assistant in the Division of Entomology to be especially assigned to the work of inspecting the orchards and nurseries of the State.

The work was begun in February, 1907, with Mr. L. M. Smith as inspector, and he continued until September, when he resigned. He was succeeded by Mr. S. C. Clapp, of Guilford County, who has continued since that time. The work has therefore been in progress for the two whole years of 1907 and 1908 (except January, 1907). It is to be remem-

Fig. 12.—Spraying demonstrations, 1909, showing the audiences that gathered to witness the work at three of the meetings.

bered, however, that nearly half of the time is given to the *nursery inspection* and work connected with it, and the *orchard inspection work* here reported upon represents a little more than half of the work of the inspector.

Object and Methods of Work.—The object of this work is to assist our fruit growers to discover serious insect pests, if they are present, and to give timely suggestions for treatment of trees *before* the trees are fatally injured.

The Inspector carries a blank book, in which a separate sheet is filled out for each orchard inspected. These are sent in to the office, and when San José Scale is found full information and suggestions are sent to the owner of the orchard. The Inspector does not examine every tree, but the orchard is walked through in several directions, a few limbs being examined here and there throughout. Both the fruit grower and the Inspector ask and answer questions freely. Suggestions are given as to spraying, mixtures to be used, etc. If San José Scale is found, the grower is taught to know it, and the methods of combating it are explained. While it may happen that the scale is present and overlooked, yet the owner may know that if it were at all widespread and doing damage it would *likely* be found, and he is therefore relieved of present anxiety if it is not found.

Results.—We have been able to see some very decided and beneficial results from this work. In very many cases we have been able to find the San José Scale in time to give the owner opportunity to treat it before serious injury is done. A letter from western Catawba County, where Mr. Clapp spent several days inspecting, says: "There will be fourteen new sprayers put into use in this section this year that I know of." A letter received from Mount Airy, where we have done considerable inspection work, says: "There is much more spraying being done than formerly—fully ten times as much as in any previous year." This is the sort of evidence that *counts for something,* and must mean much to our fruit industry if the spraying is properly done, at the right time, with the right materials.

"Commercial Orchards" and "Small Orchards."—In this inspection work we find it necessary to set some limit for what we consider "commercial orchards" as contrasted with what we would call "small or family orchards." For this limit we have chosen *100 trees of a kind* (not *variety)* as the limit—thus, if a man has *100 apple trees* we consider that he has a commercial apple orchard; but if he has only 60 or 75 apple trees we consider it as a "small or family orchard." The same rule is followed for the other fruits. Of course we understand that some orchards of over 100 apple trees are not used as market orchards, while some other orchards with less than 100 apple trees are used as market orchards, but the figure given nevertheless indicates fairly well the line of difference between the two classes of orchards.

We Want Names of Growers.—We want to get the *name and address* and information as to number, kind, variety and age of trees, etc., of *every fruit grower in the State who has 100 or more trees of a kind* (not variety). We want this in order that we may send these men such publications as are of use to them, and in order that we may inspect their orchards when practicable. Readers of this BULLETIN who are inter-

ested in commercial fruit growing are urged to send in their names and addresses at once if they are not already in touch with this office. At present our list includes about 1,500 names, but there must be many more. Also send names of your acquaintances who are likewise interested. This is an important work which is for the benefit of our fruit industry, and we wish those who are interested to take full advantage of it. Address, Division of Entomology, State Department of Agriculture, Raleigh, N. C., or address the writer, at Raleigh.

Persons who especially desire to have their orchards inspected should make request and we will attend to it when we can. Remember, however, that there is but one inspector for the entire State, and as he has both orchard and nursery inspection duties, we cannot promise to answer every call, nor to answer any call promptly. Often the work is mapped out a month or more in advance.

Inspections in 1907 and 1908.—During the two years of 1907 and 1908 inspections were made of 82 small or family orchards which contained a total of 3,875 trees. With these small orchards we have in the past only kept record of those which are infested with the San José Scale, so all of these 82 orchards were more or less infested.

Of commercial orchards there were inspected during these two years (1907 and 1908) 258 orchards, which contained a total of 472,138 trees (nearly half a million). Of these 258 orchards 133 (or about 51 per cent) were found to be infested with the San José Scale, and these 133 infested orchards contained a total of 282,572 trees.

The following table gives in condensed form the conditions as shown by the inspections of 1907 and 1908:

Counties.	Small Orchards.		Commercial Orchards.			
	Number Inspected.	Total Trees.	Number Inspected.	Total Trees.	Number Found Infested With San José Scale.	Number Trees in Infested Orchards.
Alexander			15	13,775	3	3,500
Brunswick			1	300	1	300
Buncombe	3	96	8	12,200	1	2,000
Carteret			1	4,150	1	4,150
Catawba	29	1,866	23	6,627	23	6,627
Cherokee			5	5,650	1	250
Cumberland			1	3,200	1	3,200
Davidson			1	656	1	656
Davie			2	2,170	1	1,250
Duplin			4	3,775	4	3,775
Durham	22	301	1	510	1	510
Edgecombe			7	6,882	5	4,070
Forsyth			4	4,510	2	3,305
Guilford	2	286	21	17,979	19	17,179
Halifax			1	2,300		
Haywood			50	87,949	15	30,725
Henderson			6	12,565	1	1,300
Iredell			5	1,313	2	595
Jackson			4	13,625	2	2,225
Lenoir			2	1,625	2	1,625
McDowell	5	270				
Montgomery	10	337	4	51,500	3	35,250
Moore			6	52,900	6	52,900
Nash			2	2,450		
New Hanover	1	53				
Pender			1	2,000	1	2,000
Polk	1	40	3	4,150	1	1,150
Robeson	2	45	1	690	1	690
Rockingham	2	155	7	2,240	7	2,240
Rutherford	2	64	8	16,212	2	1,100
Sampson			2	10,600	1	8,000
Stokes	2	252	3	1,630	1	1,100
Surry			22	24,836	15	16,725
Wake	1	110				
Watauga			2	35,300	1	35,000
Wayne			3	1,925	2	1,350
Wilkes			21	23,137		
Wilson			7	6,137	4	5,575
Yadkin			4	34,670	2	32,250
39 Counties	82	3,875	258	472,138	133	282,572

Explanation.—Lest there might be any possibility of misunderstanding, let us explain this table so that the reader can surely understand it. In Alexander County (the first one listed) there were no infested small orchards examined, but 15 commercial orchards were inspected, these 15 orchards containing a total of 13,775 trees. Of the 15 orchards

only 3 were found to have San José Scale, and those 3 orchards contained a total of 3,500 trees. This is a good showing, for while the average for the whole State shows slightly over half of the orchards were found infested, yet here only one orchard out of five was found infested.

Any reader can thus readily tell what the conditions are (so far as we have found them) in any of the 39 counties where we have yet made inspections. If *you* live in Guilford County you can see that 2 infested small orchards were inspected; that 21 commercial orchards, containing 17,979 trees, were inspected, and that of these, 19 orchards, containing 17,179 trees, were found to have San José Scale. This shows that Scale is prevalent in Guilford County orchards. In Haywood County 50 orchards, with 87,949 trees, were inspected, and 15 orchards, containing 30,725 trees, were found infested. Of the entire list, Wilkes County makes the best record, so far as freedom from Scale is concerned—out of 21 orchards, with a total of 23,137 trees, no San José Scale whatever was found.

We figure that as a rule the average infested orchard will have more or less Scale on about half of the trees, so that in Alexander County the 3 infested orchards, while they have a total of 3,500 trees, *probably* have about 1,750 trees that are actually more or less infested. Perhaps in a slightly-infested county, like Alexander, there would be less than half of the trees infested in the infested orchards, while in a badly-infested county, like Guilford or Surry, more than half of the trees in the infested orchards might have scale. But taking an average for the entire State, we figure that in the 133 infested orchards, with their 282,572 trees, it is likely that about half of that number, or 141,286 trees, are to-day actually infested, more or less, with the San José Scale.

A Large Task.—While the figures given in the table may look dull and uninteresting, yet they represent a large amount of work, both by the Inspector in the field and by the Entomologist and clerk in the office. It means that thousands of trees have been carefully examined, that hundreds of miles have been tramped over hill and swamp in the inspections, that hundreds of reports have been filled out and mailed to the office, that hundreds of letters have been written, and that thousands of circulars and bulletins have been sent to the growers. And it is in order that we may do more of this work in counties where we now know of few (or no) commercial orchards that we want all interested persons to put themselves into communication with this office.

SUGGESTIONS TO PURCHASERS OF NURSERY STOCK.

With so much activity in the planting of new orchards, and with so many insects to be provided against, it is necessary that every person who buys trees should exercise some caution. Much of the trouble with unprofitable orchards arises from the fact that inferior or diseased trees are planted, and as little or no attention is given them, they soon decline, or perish altogether.

Nursery Inspection.—The laws of North Carolina require that all nurseries in the State be inspected each year. The object of these inspections is to ascertain the condition of the nurseries with regard to certain

serious insect pests and plant diseases, and to prevent, so far as may be practicable, the sale of infested trees. The actual work of inspection is done by the Entomologist or his assistants.

San Jose Scale.—The one pest above all others which the nursery inspections are intended to control is the San José Scale, a small, inconspicuous insect which does great damage when it becomes established in orchards. If a tree is infested with this insect at the time it comes from the nursery, it may show no signs of decline *then*, but it will usually die in from one to four years, and during that time the insect is likely to become established on neighboring trees. As the San José Scale is not easily observed until the trees have become badly infested, it can be readily seen that every precaution should be taken that infested trees shall not be sent out from the nurseries, and the grower himself should exercise every care to see that infested trees are not sent to him.

Certificate Should Accompany Every Delivery.—Every delivery of nursery stock sent to any purchaser in this State is required by law to be accompanied by a certificate of inspection, which states that the nursery from which the stock was sent has been inspected and is apparently free from the San José Scale, or other dangerous pests. The wording of the certificate is usually printed on a card or shipping tag and attached to the box or bundle. And the certificate must bear the name (either written or printed) of the State Entomologist, State Horticulturist, State Nursery Inspector or other duly qualified officer of the State, or State Experiment Station, where the nursery is located.

Requirements for Certification.—While the certificates issued in all the States indicate that the nursery is "apparently free from San José Scale," etc. (or words to that effect), this cannot be taken as a guarantee that it is free, for the reasons which we have already explained. It may be that not one of the individual trees in the shipment was actually inspected, as the most that the inspector can do is to go into all parts of the nursery and inspect occasional trees or groups of trees. And the statement that the nursery "is apparently free" is not to be taken literally. So far as we know, there is not a single eastern State in which real close inspections are actually made which carries out to the letter the idea implied in that statement. If only one or two, or a few scale-infested trees are found, it is a usual thing to destroy those trees, closely inspect all around them, and if no more scale is found, the certificate is issued. In some States a further precaution is taken, in that the inspector or his agent personally does the work of fumigating (explained later) the stock when it is dug. In some cases, where the nursery is not too large, and the infestation is quite bad, arrangements are made to have the inspector or his agents inspect every individual tree when the stock is dug. By these various means the purchaser receives considerable protection, though of course it is not perfect. Despite the fact that the wording of the certificate cannot be relied on literally to the letter, it is perhaps best to have the wording as it is, for a nurseryman will know that his nursery must be kept reasonably free, at least, in order to get a certificate entitling him to do business. It frequently happens that an entire field or block of nursery stock is found to be so generally infested that the whole lot has to be condemned and destroyed before the nursery can receive a certifi-

cate to do business. Sometimes the entire nursery becomes so badly infested, through accident, carelessness or mismanagement, that it is not certified at all under any circumstances, and the nurseryman suffers a complete loss. But when a man is conducting an honest nursery business, is exercising every possible precaution, and is really doing a good work for the fruit-growing industry, then we do not believe it to be fair to him, or needful for the public good, to put him out of business by withholding his certificate when a very, very small proportion of his trees have the San José Scale. It is a pest which each individual purchaser of fruit trees should watch for, and if he will use the precautions here suggested he will greatly reduce the chances of getting the Scale from the nursery. Of course, it might later spread in from neighboring orchards or trees.

Shipments Not Accompanied by Certificate.—If stock is sent to any person in this State which does not have a certificate attached, *it is in violation of law*, and the purchaser should at once notify the Entomologist at Raleigh, and tell him the name and address of the nursery from which the shipment was received. But before you take this step *be sure* that there is no certificate. It is usually plainly attached on the outside of the package, bundle or box, and is a card or shipping tag bearing the wording of the certificate. If there is no certificate, the trees should be simply bedded in, and *not set out* until the Entomologist is heard from. Uncertified stock is more likely to be infested than certified stock. Sometimes a duly certified nursery fails to attach the certificate through oversight, but if the trees are from a nursery which does not have a certificate and which is carrying on an illegal business, then the trees should not be planted in any case, as they are very likely to be infested, or there may be something doubtful or dishonorable in the dealings of the concern. We think this should make it clear that *it is the duty of every purchaser to see that no uncertified stock is sent him.*

See that the Certificate is Valid.—Every certificate bears a statement showing at what time it becomes invalid or useless. *See that the certificate on your stock is good at the time the stock is delivered to you.*

Demand that Stock be Fumigated.—All the nurseries in this State are required by law to fumigate all stock of certain kinds that they send out. The fumigation is done with a very poisonous gas (hydrocyanic acid gas) and is required on all stock of apple, apricot, cherry, peach, pear, plum and quince, as they are the kinds most likely to be infested with San José Scale. This is required of all nurseries in the State, whether or not the Scale has ever been found in them. Some States besides North Carolina have a similar law, but some others do not. When pure chemicals are used, and the box or room used is air-tight, the fumigation is *very effective* against Scale, it being only in exceptional cases that any will escape destruction. *It is the part of wisdom, therefore, for every purchaser to require of the nursery a positive guarantee that his stock will be fumigated with hydrocyanic acid gas—he should secure this promise before he gives his order, and it goes almost without saying that he should deal only with a nurseryman on whose word he can depend.*

Don't Buy Because Stock is Cheap.—We do *not* say that you should refuse trees because they are cheap; we simply say that they should not be bought because they are cheap. There are some nurserymen who

only grow a limited number of trees, or who do not make it a regular business, who may have most excellent stock at low prices. Remember that we are not advising against these. It is not the cheapness of price in itself which we warn you against, but it is the poor quality of trees that you are likely to get when they are offered at such cheap prices. There are some nurseries whose stock is always so poor, neglected and scrubby that they are obliged to sell at a low price. If you are going to neglect the trees—do not intend to cultivate, fertilize, prune or spray them—then a poor tree is about as good as a first-class one, for you simply take your chances in either case. But if you want good, thrifty, well-shaped, profitable trees, you must expect to pay the price, and you cannot afford to order trees from the man offering the lowest prices simply on account of the cheapness. If you *know* that they are first-class trees, then cheapness is not objectionable, but it is cheaper in the end to pay a high price for a first-class tree than to receive diseased trees as a gift. But do not fail to give the trees good attention after they are set. Cultivate, fertilize, prune and spray them. If this is done intelligently, and good trees are planted in the first place, good results should be secured. *Remember, therefore, that it is better to order where you feel sure of getting good stock, even at high prices, than to buy cheap trees at the risk of getting poor stock.*

Buy Young Trees.—There is a growing tendency among fruit growers to buy young stock, only one year from the bud or graft. This allows the grower to shape the tree as he pleases by cutting back or pruning. This plan is safer, also, so far as San José Scale is concerned, because the older the stock becomes in the nursery, the more liable to be infested with San José Scale. Hence you run less risk if you buy young trees.

Order Direct.—Large nurseries usually employ agents, who sell either on commission or for a fixed salary. As a general rule it is better to order your trees direct from the nursery, and not to place the order with an agent. Of course, there are many agents who are perfectly honorable, probably as high a percentage as in any other line of business, but most of us know that there *are* dishonest ones, and it is well not to give your order to a man about whom you are in doubt. At least, *never* patronize an agent who has no price list or catalogue of his firm as evidence of his stability or the reliability of his firm. Make sure that he represents a duly licensed nursery, which can be ascertained by writing to this office. If there is in your vicinity a man whom you know well and who has for a long time conducted an honorable agency, then patronize him; but we do caution you against buying from any and every agent who comes to your door and with whom you are not acquainted. We believe it is best to deal with the nearest nurseryman known to you to be reliable and on whom you can depend to furnish the desired stock, fumigate it, etc.

Varieties.—Just what varieties to plant is always a perplexing question. It will vary according as you want fruit for home use or market, local market or shipping, etc., etc. A good nurseryman will help you make a suitable selection. If there is a successful fruit grower in your neighborhood, talk the matter over with him. Or you may write to the State Department of Agriculture, or Experiment Station (both located at Raleigh), and ask advice.

You cannot afford to order all sorts of fancy fruits with high-sounding names unless you know something about the business of fruit culture to begin with. Don't be misled into purchasing every kind of new fruit or variety which the agent may tell you about. Those things should be left for the experienced fruit grower who already knows something about fruits, and who is anxious to try all the new things that come along. *It is better to take a few well-known and reliable varieties than to take a large number of varieties which you do not know about.*

Fraudulent Claims.—Every year we hear of new and marvelous kinds of fruits—tree strawberries, frost-proof peaches, seedless grapes, apples without cores and seeds, enormously prolific pears, plums, etc.—trees or plants grafted or budded or grown so as to render them especially profitable in some way. We advise you to leave all these alone. As a rule they are fakes, pure and simple, or, if they in any degree fulfill the claims made for them, they are likely to be of such inferior quality as to be almost worthless. You shouldn't be misled by a pretty picture in a catalogue. Learn to know the kinds of fruits *yourself* and then you can place your order with confidence, but it is not well to leave the selection to an unknown agent. If you know the agent and can rely on his recommendations, well and good, but an unscrupulous agent will sell you what is most profitable to him, and that is often what is most expensive to you. If any unknown agent tries to sell you some marvelous fruit trees at $1 each, or thereabout, leave him alone, for such prices are exorbitant and fraudulent, even for the choicest trees of the choicest varieties. If a reliable nursery offers stock at such high prices it may be for some good reason, but the *unknown agent* who drifts into your community, takes orders and money and drifts out again is usually a fraud if he sells trees at such a price. There might be a few remarkable exceptions.

The good, steady, honest fruit-tree agent, who works the same territory year after year, or who returns to the same community from time to time, so that he meets his customers repeatedly, is a decided help to the farmer and amateur fruit grower, for he will usually give him many valuable hints on the care of the trees, etc. It is the mysterious unknown agent of an unknown nursery who offers such remarkable plants that we advise against. Use discretion in placing your order; act on your own knowledge, or the advice of some reliable person known to you, and do not be misled by the talk of an unknown agent.

LIST OF LARGER FRUIT GROWERS.

In our correspondence and in the orchard inspection work we have acquired a good list of fruit growers of the State who have as many as *100 or more trees of a kind*, and for the convenience of those interested we publish the following list of the larger growers. All of these have reported that they have as many as 500 or more of a kind, and we list opposite each name the number of trees of such kinds. They are listed according to the county where the orchard is located, whether the address of the owner is in the same county or not. In a few cases only the number of trees is our estimate and not the grower's statement.

LIST OF LARGER FRUIT GROWERS.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Alamance	Kernodle, F. A.	R. D. 1--Elon College		500		
	Martin, C. D.	R. D. 8--Burlington			1,250	
Alexander	Barnett, W. R.	R. D.---Taylorsville	500			
	Bentley, A. D.	R. D. 3--Taylorsville	900			
	Bumgarner, W. J.	R. D. 5--Taylorsville	700			
	Childers, Jno. W.	R. D. 3--Taylorsville	700			
	Childers, J. Marion	R. D. 3--Taylorsville	500			
	Clanton, J. F.	R. D. ---Taylorsville	900			
	Daniels, W. M.	R. D. 3--Taylorsville	600			
	Davis, M. C.	R. D. 5--Taylorsville	500			
	Deal. M. K.	R. D. 2--Poor's Knob	500			
	James, W. A.	R. D. 2--Poor's Knob	2,000			
	Kerley, Mrs. Chas.	---Charlotte	2,000			
	Kerley, R. C.	R. D. 3--Taylorsville	575			
	Kincaid Bros. & Thomas.	---Statesville	1,000			
	Lowe, B. P.	R. D. 2--Poor's Knob	500			
	Lowe, J. J.	R. D. 2--Poor's Knob	1,000			
	Lowe, R. B.	---Taylorsville	1,500			
	Matheson, Chas. P.	---Taylorsville	500			
	Meadows, G. C.	R. D. 3--Taylorsville	500			
	Rowland, W. T.	---Taylorsville	3,000			
Beaufort	Latham, F. P.	R. D. 1--Belhaven		750		
Bladen	Layton, N. A.	R. D. 1--Whiteoak			500	
Buncombe	Blackstock, H. C.	---Homerville	500			
	Clark, M. O.	---Gem	500			
	Craggy Lumber Co.	---Swannanoa	3,000			
	Garrett, E. S.	---Cleelum	500			
	Gaston, T. P.	R. D. 2--Candler	1,200	4,500		
	Giles, L. R.	---Cleelum	1,000			
	Greenwood, Jno. M.	---Barnardsville	500			
	Harwood, A. J.	---Barnardsville	1,500			
	Jamison, D. B.	---Candler	800			
	Morris & Sheppard	---Alexander	1,200			
	Patton, J. S.	R. D. 3--Canton	1,400	1,000		
	Penland, W. A.	R. D.---Weaverville	800			
	Reagan, J. J.	---Weaverville	1,000	1,000		
	Scott, J. M.	---Gem	600			
	Stevens, A. E.	---Black Mountain	1,000			
	Tucker, J. H.	---Asheville	2,500			
	Weaver, T. H.	---Weaverville	1,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Buncombe	Webb, C. A.	Asheville	2,000			
	Whitaker, G. W.	Dillingham	700			
	Whitted, J. A.	Asheville	1,200			
Burke	Crawley, W. A.	Morganton	600			
	Hudson, E. J.	Connelly Springs	500			
Caldwell	Coffey, Joseph	Gragg	500			
	Coffey, Thos. A.	Blowing Rock	1,000			
	Dula, J. A.	Lenoir	1,000	600		
	Hatley, T. W.	R. D. 1 Hudson	500			
	Ingle, Jno.	Blowing Rock	600			
	Shearer, David R.	Collettsville	600			
Carteret	Ives, Geo. N. & Son	New Bern		3,000	800	
Catawba	Baker, Calvin	R. D. 1 Hickory	600			
	Shuford, A. C.	R. D. 1 Newton		1,500	800	
Chatham	Green, G. J.	Merry Oaks	1,000			
Cherokee	Stewart, H. S.	Andrews	1,000	500		
	Stimpson, A. R.	Penrose	800	1,000		
Cleveland	Osborne, J. C.	Lawndale			600	
Columbus	Bailey, Elroy	Chadbourn		800		
Craven	Perry, O. H.	R. D. 2 New Bern	500	500		
Cumberland	Breece, Jno. S.	Fayetteville				700
	Kivett, H. J.	R. D. 6 Fayetteville		1,000		
	Sayer, J. D.	Leavitt		2,700		
Davie	Young, T. M.	Mocksville		700		
Duplin	Wells, E. D.	Teacheys		1,000		
	Wells, J. J.	Teacheys		1,100		
Durham	Cole, J. E.	R. D. 2 Durham		500		
	Flintom, G. W. & Sons.	R. D. 2 Durham		1,500		
	Holloway, Dr. R. L.	West Durham	600			
	Hornaday, J. M.	Durham		900		
	Horton, W. A.	R. D. 2 Durham		800		
	Jones, H. L.	Durham	500	700		
	Latta, Jno. N. W.	R. D. 2 Durham		850		
Edgecombe	Holderness, Geo. A.	Tarboro		1,300		
	Jenkins, T. P.	R. D. 1 Tarboro		1,000		
Forsyth	Holton, A. E.	Winston-Salem		600		
	Jenkins, G. F.	Winston-Salem	1,500	500		
Gaston	Dewstoe, M. R.	Mount Holly		500		
	Garrison, D. A.	Bessemer City		700		
	Pegram, E. L.	Stanley	500			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Granville	Broughton, R.	Oxford	650			
Guilford	Anthony, Mrs. G.L.	R. D. 1 Greensboro			1,000	
	Boulton, Chas.	Jamestown	800			
	Causey, J. C.	R. D. 2 Liberty		700		
	Hughes, J. R.	Greensboro		3,000		
	Hunter, Henry	Box 81 Greensboro	1,000	2,000		
	Idol, W. H.	R. D. High Point		3,000		
	Smith, J. Ed.	R. D. 3 Greensboro	1,000	1,000		
Halifax	Clark, Judge Walter,	Raleigh		2,200		
	Hussey, E. B.	Tarboro		1,000		
Harnett	Lusca, J. N.	R. D. 3 Dunn				500
Haywood	Allen, Jno. H.	R. D. 1 Waynesville	700			
	Allen, Dr. R. L.	Waynesville	1,000			
	Allen, W. L.	Balsam	600			
	Barber, R. N.	Mocksville	6,000	10,000		
	Boggs, A. A. & Co.	Waynesville	4,500			
	Boone, J. K.	Waynesville	2,500			
	Brendle, J. H. N.	R. D. 1 Waynesville	2,500			
	Cagle, D. M.	Clyde	2,000			
	Cagle, G. L.	R. D. 2 Waynesville	800			
	Cogburn, F. H.	Cruso	800			
	Cogburn, J. W.	Cruso	700			
	Cole, W. H.	R. D. 1 Waynesville	3,800			
	Davis, Z. C.	R. D. 2 Waynesville	700			
	Farrior, Jno.	Waynesville	3,000			
	Ferguson, N. N.	R. D. 1 Waynesville	1,600			
	Gentry, L. A.	Waynesville	500			
	Hall, J. E.	Waynesville	5,500			
	Haight, A. H.	Balsam	700	1,200		
	Hannah, Mack. W.	Ola	700			
	Howell, E. J.	R. D. 2 Waynesville	500			
	Howell, J. K.	Covecreek	1,000			
	Howell, Jno.	Covecreek	800			
	Hyatt, J. D.	Care Piedmont House, Waynesville.	600			
	Hyatt, T. M. Partners.	R. D. 1 Waynesville	4,000			
	Hyatt, R. A. L.	R. D. 1 Waynesville				
	Ketner, C. D.	Plott	1,500			
	McClure, W. H.	R. D. 1 Waynesville	700			
	Mease, E. E.	Cruso	1,500			
	Medford, C. V.	R. D. 1 Waynesville	1,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Haywood	Medford, Sewell	Waynesville	700			
	Messer, W. G. B.	Ola	500			
	Norman, N. N.	R. D. 1—Waynesville	600			
	Pless, J. H.	Cruso	800			
	Queen, J. L.	R. D. 2—Waynesville	1,500			
	Rice, Jno. S.	R. D. 2—Waynesville	800	600		
	Scott, H. P.	R. D. 1—Canton	550			
	Scott, H. R.	R. D. 1—Canton	600			
	Setzer, A. V.	Maggie	500			
	Setzer, J. S.	Maggie	900			
	Silver, W. H.	R. D. 1—Crabtree	500			
	Singleton, J. A.	R. D. 2—Waynesville	600			
	Sloan, B. J.	R. D. 1—Waynesville	2,000			
	Smathers, B. F.	Waynesville	4,000			
	Smathers, D. T. L.	Clyde	1,000			
	Swift, J. P.	Waynesville	500			
	Trull, Jas. A.	R. D. 3—Waynesville	600			
	Welch, Julius	Waynesville	3,000			
	Wharton, Geo.	Cruso	7,000			
	Woody, S. L.	Nellie	1,000			
Henderson	Bane, J. D.	R. D. 1—Zirconia	1,000			
	Barber, E. W.	Saluda	625			
	Brown, Dr. J. Steven	Hendersonville	700			
	Brown, R. J.	R. D. 2—Hendersonville	5,000			
	Freeman, W. S.	Batcave	1,500			
	Huntley, J. F.	Bear-wallow	900			
	Johnson, T. L.	R. D. 1—Fletchers	500			
	Laughter, L.	Ottanola	500			
	Lyda, J. Manly	R. D. 1—Edneyville	6,000	500		
	Lyda, Jno. S.	R. D. 1—Edneyville	500			
	Marshall, B. W.	R. D. 1—Hendersonville	600			
	Merrell, Jas. H.	Ottanola	800			
	Merrell, Jno. A.	Ottanola	600			
	Merrill, P. O.	Fairview	1,000			
	Merrill, P. O.	Bat-cave	1,500			
	Moore, Prof. G. B.	U. of S. C., Columbia, S. C.	4,000			
	Pace, J. M.	R. D. 1—Saluda	500			
	Toms, C. F. and Toms, M. C. Partners	Hendersonville	5,000	2,000		
Hyde	Mann, J. S.	Supt. State Prison, Raleigh,			1,200	

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Iredell	Branch, E. L.	R. D. 6 Statesville	500			
	Cathey, Albert M.	R. D. 25 Davidson			500	
Jackson	Allison, Sam'l C.	Barker's Creek	600			
	Bryson, T. C.	Sylva	2,000			
	Buchanan, J. W.	Dillsboro	700			
	Clayton, W. A.	Addie	1,035			
	Fisher, R. M.	Barker's Creek	500			
	Fisher, R. W.	Beta	700			
	Hensau, W. A.	Beta	600			
	Jarrett, R. F.	Dillsboro	1,700	600		
	Miller, Geo. P.	Sylva	5,200	500		
	Rickards, T. M.	Balsam	600			
	Williams, Jas. M.	Clyde	(?)2,500			
Johnston	Jones, J. M.	R. D. 1 Smithfield				1,000
Lenoir	Pittman, R. E.	Grifton		500		
Lincoln	Killian, Jacob F.	Denver		2,800		
McDowell	Wilson, J. D.	Craig	500			
Macon	Bascom, H. M.	Highlands	1,500			
	Edwards & Son	R. D. 3 Franklin	1,200			
	Harbison, T. G.	Highlands	1,500			
	Harrison, J. O.	R. D. 1 Franklin	800			
	Love, D. W.	R. D. 1 Franklin	700			
	Mincey, C. G.	Ellijay	4,000	2,000		
	Moore, Alex.	Ellijay	800			
	Moore, J. C.	Ellijay	600			
	Moore, J. P.	Ellijay	1,200			
	Rogers, D. J.	Ellijay	1,000	800		
	Rogers, Robt.	Ellijay	2,000	1,000		
	Rogers, T. N.	Alonzo	700			
	Slagle, A. B.	R. D. 1 Franklin	1,000			
	White, G. P.	Scaly	700			
Madison	English, W. M.	Foust	1,000			
	Sams, J. R.	Mars Hill	1,400			
	Trollinger, C. B.	Hot Springs		800		
Mecklenburg	Chatham, Paul	Charlotte		2,500		
	McDonald, R. E.	Charlotte		700		
Mitchell	Burleson, T. J.	Hawk	1,000			
	Burleson, W. C.	Hawk	1,000			
	Ingram, J. S.	Ingalls	500			
	Lawrence, H. F.	Mica	2,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Mitchell	Phillips, J. G.	Ingalls	500			
Montgomery	Candor Fruit Co. (H. R. Clark, Mgr.)	Candor		33,000		
	Carolina Fruit Co. (H. C. Richardson, Mgr.)	Candor		16,000		
	McCallum, Ed.	Candor		500		
	Tomlinson, J. G.	Troy (orchard at Candor).		1,600		
	Wooley, W. F.	Troy		500		
Moore	Bilyeu, H. P.	Southern Pines				500
	Bradley, C. C.	Southern Pines		2,400		
	Foley, M.	Aberdeen		800		
	Giles, W. W.	Swann		1,200		
	Hatcher, Jno. A.	Manly		900		
	Huttenhauer, Jno.	Southern Pines		3,000		
	Lindley, J. Van, Orchard Co.	Pomona (orchard near So. Pines).		35,000		1,000
	Niagara Grape and Fruit Co.	Southern Pines		8,500		
	Palmer, Jno.	Southern Pines		600		
	Richards, Jos. F.	Southern Pines		1,500		
	Smith, Noah	R. D. 1, Jackson Springs		700		
	Tilghman, J. H.	Southern Pines		2,500		
Nash	Robbins, H. C.	Sharpsburg	500			
	Williams, M. T.	R. D. 1, Rocky Mount	1,500			
Orange	Hobbs, Jno. R.	R. D. 2, Efland	500			
	Williams, H. H.	Chapel Hill	2,000	800		
Pender	Corbett, W. M., Jr.	Olga		3,000		
	Learned, Lyman	Burgaw		1,000		
Polk	Burgess, N. C.	Dennis	800			
	Bushnell, J. C.	Saluda	1,200			
	Chisholm, W. B.	Saluda	500			
	Lindsey, W. T.	Tryon		800		
	McCrain, Edgar	Walker	500			
	McCraw, J. A.	R. D. 1, Dana	600			
	McMurray, A. G.	Dennis	900	600		
	Pace, Thos. E.	Fishtop		500		
	Thompson, Wm.	Walker	1,000			
	Williams, P. D.	R. D. 1, Mill Spring	500		500	
Randolph	Hammer, Wm. C.	Ashboro	1,000	2,800		
	Hobbs, C. H.	Newmarket			1,500	
Richmond	Spivey, A. D.	Ellerbe		500		
Robeson	McDonald, W. J.	Wakulla		800		
Rockingham	Cunningham, C. D.	R. D. 1, Benaja	1,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Rockingham	Pratt, Thos. R.	Madison	2,000			
	Price, Jas. S.	R. D. 1 Madison	1,500	500	600	
	Price, Jas. V.	Winston	2,000	500	600	
Rowan	Hall, W. A.	R. D. 5 Salisbury		500		
	Williams, W. W.	R. D. 1 Salisbury			1,200	
Rutherford	Bridges, A. M.	Ellenboro		500		
	Flack, J. M.	Bat Cave	500			
	Frady, D. F.	Uree	1,000	500		
	Harrill, W. H.	R. D. 3 Bostic			500	
	Haynes, Berry	Uree		500		
	Henderson, Mrs. Dora.	Chimney Rock	1,000			
	Martin, Jno.	R. D. 2 Bostic	1,000	500		
	Williams, P. D.	R. D. 1 Millspring	2,000	700		
Sampson	Britt, J. H.	R. D. 1 Keener	3,400			
	Hobbs, T. A.	R. D. 1 Keener	8,000	2,000		2,000
Stokes	Culler, Walter L.	Pinnacle		1,000		
Surry	Ashburn, J. A.	R. D. 1 Pilot Mountain		1,000		
	Banner Orchard, care J. M. Dix.	R. D. 6 Mt. Airy	800			
	Brim, T. L.	Brim	3,000			
	Brim, W. M.	Brim	500			
	Combs, E. S.	R. D. 1 Roaring Gap	600			
	Combs, N. P.	R. D. 7 Roaring Gap	500			
	Cooper, J. C. (estate)	Dobson	500			
	Critz, R. D.	R. D. 3 Mt. Airy	700			
	Dison, Robt.	R. D. 5 Mt. Airy	500			
	Franklin, Chas. W.	Mt. Airy	800			
	Gardner, Jno. W.	R. D. 3 Mt. Airy	500			
	Jones, A. S.	R. D. 4 Mt. Airy	500			
	Jones, T. A.	R. D. 3 Mt. Airy	1,100			
	Lewis, S. T.	R. D. 1 Brim	500			
	McCargo & Smith	Mt. Airy	800			
	Merritt, W. E.	Mt. Airy	1,200			
	Moore, M. D.	Mt. Airy	1,800			
	Mt. Airy Orchard Co.	Ladonia	4,000			
	Reeves, J. T.	R. D. 1 Mt. Airy	500			
	Scott, P. G.	Shoals	500			
	Sparger Orchard Co.	Mt. Airy	6,000	1,800		
	Wolfe, Wm. H.	R. D. 1 Roaring Gap	500			
	York, W. J.	R. D. 4 Mt. Airy	500			
Swain	Black, S. W.	Bryson City	1,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Swain	Bryson, T. D.	Bryson City	2,250			
	Fry, A. M.	Bryson City	2,500			
	Randall, C. E.	R. D. 1, Bryson City	500			
Watauga	Austin, W. L.	Blowing Rock	650			
	Brown, J. D.	Blowing Rock	4,000			
	Cone, Moses H. (estate).	Blowing Rock	33,000			
	Downs, C. W.	Blowing Rock	700			
	Killian, S. E.	Hickory	1,000			
	Phillips, H. C.	Sweetwater	600			
	Reece, B. F.	Zionville	700			
	Underdown, E. G.	Blowing Rock		500		
	Valle Crucis Orchard (H. A. Dobbin, Mgr.)	Valle Crucis	2,000			
	Wilson, A. J.	R. D. 1, Zionville	1,500			
	Wilson, J. A. J.	R. D. 1, Zionville	1,200			
Wayne	Granger, W. P.	Goldsboro	550			
Wilkes	Ashley, J. H.	R. D. 1, Poor's Knob	500			
	Bentley, W. A.	Poor's Knob	1,500			
	Beny, W. W.	R. D. 2, Wilkesboro	700			
	Brayhill, W. A.	R. D. 2, Poor's Knob	700			
	Call, C.	No. Wilkesboro	2,000	500		
	Childers, J. M.	R. D. 3, Taylorsville	2,000			
	Davis, J. W.	R. D. 1, Poor's Knob	1,500			
	Duncan, C. D.	Moravian Falls	1,200			
	Edsill, R. M.	Moravian Falls	1,000			
	Finley, T. B.	Wilkesboro	600			
	Fletcher, H. F.	R. D. 1, Poor's Knob	3,000	1,000		
	Fletcher, J. W.	Straw	3,000	1,000		
	Fletcher, Z. T.	Oakwoods	1,500			
	Fortner, J. G.	R. D. 2, Poor's Knob	1,500			
	Fox, C. H.	R. D. 2, Poor's Knob	500			
	Frazier, W. R.	Moravian Falls	500			
	Jennings, J. S.	R. D. , Poor's Knob	1,100			
	Lowe, C. A.	R. D. , Poor's Knob	600			
	Lowe, E. F.	R. D. 2, Poor's Knob	1,300			
	Lowe, J. F.	R. D. 1, Poor's Knob	600			
	Lowe, W. P.	R. D. 1, Poor's Knob	600			
	McGhinnis, Vance	R. D. 1, Boomer	2,000	1,000		
	Morlow, J. M.	Gilreath	514			
	Myers, W. C.	Osbornville	1,000			

LIST OF LARGER FRUIT GROWERS—CON.

County.	Name.	Address.	Apple.	Peach.	Pear.	Plum.
Wilkes	Peden, J. T.	Wilkesboro	500			
	Roberson, J. J.	R. D. 1 Poor's Knob	500			
	Rock, Wm. D.	Box 87 Charlotte	1,800			
	Russell, Jefferson	R. D. 2 Poor's Knob	600			
	Smoot, C. C. & Co.	No. Wilkesboro	3,000			
	Wike, D. R.	R. D. 1 Poor's Knob	1,000			
Wilson	Jenkins, J. T. Partners Privett, A. A.	Wilson		2,400		
Yadkin	Brandon, F. F.	R. D. 1 Cana		500		
	Cosstevens, M. A.	R. D. 1 Booneville			500	
	Garner, S. W.	R. D. 1 Yadkinville		1,500	500	
	Wilkins, Dr. G. W.	R. D. 1 Yadkinville	10,000	10,000	10,000	1,000
Yancey	Byrd, S. G.	Swiss	1,500			
	Edwards, J. M.	Wampler	500			
	Gibbs, A. L.	Bald Creek	700			
	Hensley, W. H.	Bald Creek	500			
	McCracken, R. H.	Flinty	1,600			
	McPeters, C. L.	Bald Creek	1,200			
	Pendland, J. R.	Burnsville	3,000			
	Penland, J. R.	Pensacola	10,000			
	Proffitt, H. A.	Bald Creek	700			
	Ray, R. F.	Bald Creek	600			
	Wray, W. B.	Cane River	1,200			

NOTICE.

The Division of Entomology is maintained for the purpose of gathering and spreading information concerning insects, their lives, habits, and remedies for those that are injurious. Every person in the State is invited to correspond with us at any time that any matter in this line arouses interest or apprehension. When practicable, specimens should accompany inquiries. They may be sent in tight tin, wooden, or strong pasteboard box, with enough food to last several days. Never send insects in a letter, and never in a bottle, unless preserved in alcohol. Twigs which are suspected of being infested with San José Scale may be sent in package neatly wrapped. Four to six twigs about six inches long, from one and two-year growth, is usually sufficient.

All packages should be neat, and should have the name and address of the sender plainly marked on the outside. Letter should be separate from package.

Additions to our collection of insects are earnestly desired. Special instructions for those who are interested in collecting, mounting and preserving insects will be sent on request. We wish to stimulate an interest in this study among our younger people.

In furtherance of our work, bulletins and circulars are issued from time to time. The regular monthly BULLETINS, of which this is a copy, are sent out to the entire general mailing list of the department, consisting of about 35,000 names. The circulars are sent out to those known to be especially interested in the subjects they discuss and to special lists, but not to the general list. Each circular is devoted to some one subject, and consists of only from six to fifteen pages.

The following is a list of our publications, any of which will be sent on request, so far as our supply will allow (those marked * are not available):

ENTOMOLOGICAL CIRCULARS.

No. 1. The Hessian Fly.
No. 2. The Cotton Boll-worm.
*No. 3. The Round-headed Apple-borer.
*No. 4. Spraying Apparatus.
*No. 5. (Replaced by No. 13 and No. 26.)
*No. 6. Spraying Apples and Pears.
*No. 7. The Peach-tree Borer.
No. 8. The Harlequin Cabbage Bug.
No. 9. The Potato Beetle.
No. 10. Preparation and Use of Kerosene Emulsion.
No. 11. The San José Scale.
No. 12. The Strawberry Weevil.
*No. 13. (Replaced by No. 26.)
No. 14. The Cotton Boll-weevil.
No. 15. Collecting and Preserving Insects.
No. 16. The Cotton Worm.
No. 17. Bordeaux Mixture and Paris Green.
No. 18. Entomology that the Farmer Should Know.
No. 19. Suggestions to Purchasers of Nursery Stock.
No. 20. The Codling Moth.
No. 21. Erroneous Reports of Cotton Boll-weevil.
No. 22. Regulations Governing Nursery Trade.
*No. 23. Orchard Inspections, 1907.
No. 24. Apple Spraying Demonstrations, 1908.
No. 25. The House Fly.
No. 26. Remedies for San José Scale.

MONTHLY BULLETINS.

*June, 1903. Injurious Insects—Spraying.
May, 1905. Insect Enemies of Corn.
May, 1907. San José Scale and Remedies.
June, 1907. San José Scale in North Carolina.
January, 1908. Bee-keeping in North Carolina.
June, 1908. Insect Enemies of Cotton.
June, 1909. Orchard Spraying—Orchard Protection Work, etc.

All correspondence on these subjects, all packages and all requests for these publications should be addressed to

DIVISION OF ENTOMOLOGY,
State Department of Agriculture,
RALEIGH, N. C.

FRANKLIN SHERMAN, JR., *Entomologist.*
Z. P. METCALF, *Assistant Entomologist.*
S. C. CLAPP, *Orchard and Nursery Inspector.*

LEAF TOBACCO SALES FOR MAY, 1909.

Pounds sold for producers, first hand	542,692
Pounds sold for dealers	45,517
Pounds resold for warehouse	5,841
Total	594,050

SUPPLEMENT TO JUNE BULLETIN, 1909.

North Carolina Department of Agriculture.

SPECIAL BULLETIN.

JULY AND AUGUST

WORK IN SELECTING SEED CORN.

BY

W. A. GRAHAM,

COMMISSIONER.

PUBLISHED AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MAIL MATTER.

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SELECTING SEED CORN.

WORK FOR JULY AND AUGUST.

Corn is the basis of farm operations in this State. That it is more profitable for the farmer to produce a sufficient supply on his farm than to raise other crops, from the receipt of sales of which to purchase it, is generally admitted. Usually the farmer who has corn to sell each year has money to lend, and the farmer who buys corn each season to run his farm generally wishes to borrow money to pay for it. The Department of Agriculture desires to induce the farmers to recognize these evident facts, which have so vividly impressed themselves upon our history, and thus emerge from the condition of debt and humiliation, so common among them, by producing at least the corn needed upon each farm.

In 1897 the farmers in the "Corn Belt," as it is generally called—viz., Ohio, Indiana, Illinois, Wisconsin, Kansas and Iowa—realized that the production of corn per acre was hardly half what it was twenty years prior thereto. The agricultural associations began an investigation of the subject, and afterwards corn growers' associations were formed in each State to consider solely the subject of the production of seed corn.

This paper is intended to present some of the developments along this line, as shown by their conclusions. Every grain of corn in embryo (at first) produces a strand of silk, which comes through the shuck at the end of the ear. In order to complete this grain some of the pollen or dust from a corn tassel must get on this silk and convey its vitality to the grain. If this is not done, the grain shrivels and fails to be perfected. The stalk from which the pollen is received determines in a large measure the kind of grain produced. The ear is the mother, the tassel the father of the grain of corn. As in the case of animals, it was seen that a good type or basis was necessary to produce a desired individual, and that there must be a recognized ear of corn as the example of what was desired. Many of the readers of this paper, like the writer, have selected seed corn every year—some for near fifty years. But to-day, while the corn in their cribs may be all sound and marketable, there are a dozen or perhaps twenty different types. One of these is best, or perhaps combining two into a new type would be better. The associations fixed on certain types and have bred to them. The small grains (wheat, oats and rye) brought into this State from the Middle States generally give the best crop the first season, but deteriorate in a few years. This has been the experience

of the writer. Corn does not do this if carefully selected, but continues to improve after the first crop. We shall have to take varieties best suited to the different sections of the State and endeavor by selection to improve upon them.

1. Crossbreeding. 2. Inbreeding.

Our Western friends report that "inbreeding" in corn is as undesirable and degenerating as in animals. The Department of Agriculture of Kansas, in 1903, published a bulletin on this subject. By the kindness of Mr. F. D. Coburn, secretary of the Board of Agriculture of Kansas, I present a picture of the result of five years of inbreeding and crossbreeding.

To prevent inbreeding was one of the first steps taken after choosing the type. Last spring, through the newspapers, I requested those interested to plant six ears of corn in six parallel rows. This corn will soon be shooting and tasselling. To prevent inbreeding or the pollen from the tassel fertilizing altogether the silk on the ear of the same stalk, just as the tassel appears cut out every tassel on one-half of row No. 2; then get over on row No. 3 and cut every tassel to the end of it; then at that end begin on row No. 4 and cut tassels halfway back; then change to No. 5 and cut to the end, as follows:

1. *
2. Detasselled. * * * * * * * * * * * *
3. * * * * * * * * * * Detasselled.
4. Detasselled. * * * * * * * * * * * *
5. * * * * * * * * * * Detasselled.
6. *

Then go through the corn that has not been detasselled and detassel every barren or undesirable stalk (that is, every one that has no ear upon it). If you desire a variety of more than one ear to the stalk, then detassel all the stalks having less than two ears. If a stalk has its ears too high and tends to produce too much stalk, then detassel these, and thus fix the desired type.

Where you have a field of one kind of corn you might select any portion of it for your seed patch and treat it as recommended for the six rows above. Detasselling should be done as soon as the tassel appears.

BARREN STALKS.

Barren stalks are said to produce a greater amount of pollen, therefore should be promptly removed, or the pollen will cause the shoots upon the good stalks to produce ears that will bring other barren stalks.

Barren stalks were found to be perhaps more detrimental than inbreeding. The loss from such cause is no surmise or guesswork, but can be easily proven. Go through a row of corn, count the barren stalks as compared to those bearing ears, and you have the proportion of loss. If you and a neighbor are passing through your or his field, let each of you take two rows and count as above, and then calculate what would be the increase if every stalk bore an ear. You have the stalk, and your fertilizer and land are taxed to produce it. All that is lacking is the ear. This loss was reported to be at least one-third, but has been reduced to less than ten per cent in five years.

If you find a stalk of corn you deem desirable for seed, detassel all undesirable stalks within ten feet of it, or you may have for your seed the very stalk you deem most undesirable. Careful attention to this matter will do much to increase the quality and quantity of corn in this State next year.

SCORE CARD FOR JUDGING CORN.

The associations determined the points desired in an ear of corn of a specified type, and arranged them in groups of 100 points. to be used in judging corn. The score cards are not uniform in all the States. The following table shows the cards of the respective States named:

		Missouri.	Mississippi.	Texas.	Illinois.	Kansas.	Ohio.	Iowa.	Indiana.	Nebraska.	Pennsylvania.	Wisconsin and Maine.
1	Uniformity of exhibit	15	5	5	5	10	----	5	10	5	10	----
2	Maturity and market condition	10	10	10	----	5	----	10	5	5	10	10
3	Purity as shown by color kernel	5	5	10	10	10	10	5	10	10	5	5
4	Purity as shown by color cob	5	5	5	----	----	----	----	----	----	5	5
5	Shape of ear	10	10	10	10	5	10	10	5	5	5	10
6	Proportion length and circumference	10	----	5	----	----	----	----	----	----	----	----
7	Butts	5	5	5	5	5	5	5	5	5	5	5
8	Tips	5	5	5	5	10	5	5	10	10	5	5
9	Space between rows	5	5	5	5	10	----	5	----	5	5	5
10	Per cent corn to ear	10	10	15	10	20	10	10	20	20	15	10
11	Trueness to type	----	10	5	10	----	10	10	----	10	5	10
12	Space between rows at cob	----	5	5	5	----	10	5	10	----	----	5
13	Grains—(*a*) shape	5	10	5	5	5	5	5	5	5	10	5
	(*b*) uniformity	5	5	5	5	5	5	10	5	5	10	10
	(*c*) germ	10	----	5	10	----	20	----	----	----	----	----
14	Length of ear	5	5	10	10	10	5	10	10	10	5	10
15	Circumference	----	5	----	5	5	5	5	5	5	5	5
		100	100	100	100	100	100	100	100	100	100	100

SCORE CARD FOR NORTH CAROLINA.

The determination as to what this shall be should have careful consideration. There must be several, as we have different types of corn that are most productive in different sections of the State or in different kinds of soil, as upland and bottom, *e. g.*, prolific corn, upland

corn and bottom corn. The same score will not answer in the same degree for each of these. I would propose the following, which can be varied after an opinion as to what is desired has been formed:

1. Market condition, *i. e.,* maturity, condition, etc	15
2. Per cent shelled corn	20
3. Trueness to type	10
4. General appearance (including 5, 11 and 14 of Western table)	10
5. Shape and length of grain	10
6. Uniformity	5
7. Butts	5
8. Tips	10
9. Length of ear	5
10. Circumference	5
11. Color of cob	5

The rule established for length and circumference is that the circumference one-third from the butt shall not be greater than three-fourths of the length of the ear.

If seed corn is to be judged, I would put vitality at 20 and omit 7, 8, 9 and 10.

At the farmers' institutes this summer and at the fairs this fall and especially at the meetings of the alliances and Farmers' Union, I hope this question will be considered and conclusions published in the papers, and afterwards the matter referred to competent authority to determine what shall be the provisions of the score card.

Next fall and winter it is proposed to have numerous corn-judging demonstrations, so that the farmers shall be made familiar with the various points obtainable on this subject. Our Western friends have two causes for anxiety about their seed corn which give us but little concern: First, injury to the seed by cold weather; second, failure to germinate. While the latter deserves attention, it is not often that we suffer from this, further than a reduction of the stand.

I have published this paper for the information of our farmers, and hope they will give careful attention. While corn is the basis of our operations, yet a farmer should not forget the small-grain crops, nor crimson clover and vetch for pasture and winter cover crops. Where you have land in peas this summer, if it is at all thin do not cut the peas, but in September disc the ground into good condition and sow crimson clover and vetch, covering with a light weeder; then follow with corn next spring, after the crimson clover is ripe, and repeat the sowing of peas and crimson clover.

THE BULLETIN

OF THE

NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. JULY, 1909. Number 7.

I. ANALYSES OF FERTILIZERS { FALL SEASON, 1908. SPRING SEASON, 1909.

II. ANALYSES OF COTTON-SEED MEAL.

III. REGISTRATION OF FERTILIZERS.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, N. C., July 14, 1909.

SIR:—I submit herewith analyses of fertilizers and cotton-seed meals made in the laboratory of samples collected during the past fall and spring. These analyses show fertilizers and meals to be about as heretofore and to be generally what was claimed for them. This material has been published heretofore as the July BULLETIN of the Department, and I recommend that it be issued as the July BULLETIN.

Very respectfully, B. W. KILGORE,
State Chemist.

To WILLIAM A. GRAHAM,
Commissioner of Agriculture.

I. ANALYSES OF FERTILIZERS, FALL SEASON, 1908; SPRING SEASON, 1909.

B. W. KILGORE, STATE CHEMIST.

BY W. G. HAYWOOD, FERTILIZER CHEMIST,

AND

J. M. PICKEL, L. L. BRINKLEY AND S. O. PERKINS, ASSISTANT CHEMISTS.

The analyses presented in this BULLETIN are of samples collected by the fertilizer inspectors of the Department, under the direction of the Commissioner of Agriculture, during fall months of 1908 and the spring months of 1909. They should receive the careful study of every farmer in the State who uses fertilizers, as by comparing the analyses in the BULLETIN with the claims made for the fertilizers actually used, the farmer can know by or before the time fertilizers are put in the ground whether or not they contain the fertilizing constituents in the amounts they were claimed to be present.

TERMS USED IN ANALYSES.

Water-soluble Phosphoric Acid.—Phosphate rock, as dug from the mines, mainly in South Carolina, Florida and Tennessee, is the chief source of phosphoric acid in fertilizers.

In its raw, or natural, state the phosphate has three parts of lime united to the phosphoric acid (called by chemists tri-calcium phosphate). This is very insoluble in water and is not in condition to be taken up readily by plants. In order to render it soluble in water and fit for plant food, the rock is finely ground and treated with sulphuric acid, which acts upon it in such a way as to take from the three-lime phosphate two parts of its lime, thus leaving only one part of lime united to the phosphoric acid. This one-lime phosphate is what is known as water-soluble phosphoric acid.

Reverted Phosphoric Acid.—On long standing some of this water-soluble phosphoric acid has a tendency to take lime from other substances in contact with it, and to become somewhat less soluble. This latter is known as reverted or gone-back phosphoric acid. This is thought to contain two parts of lime in combination with the phosphoric acid, and is thus an intermediate product between water-soluble and the original rock.

Water-soluble phosphoric acid is considered somewhat more valuable than reverted, because it becomes better distributed in the soil as a consequence of its solubility in water.

Available Phosphoric Acid is made up of the water-soluble and reverted; it is the sum of these two.

Water-soluble Ammonia.—The main materials furnishing ammonia in fertilizers are nitrate of soda, sulphate of ammonia, cotton-seed meal, dried blood, tankage, and fish scrap. The first two of these (nitrate of soda and sulphate of ammonia) are easily soluble in water and become

well distributed in the soil where plant roots can get at them. They are, especially the nitrate of soda, ready to be taken up by plants, and are therefore quick-acting forms of ammonia. It is mainly the ammonia from nitrate of soda and sulphate of ammonia that will be designated under the heading of water-soluble ammonia.

Organic Ammonia.—The ammonia in cotton-seed meal, dried blood, tankage, fish scrap, and so on, is included under this heading. These materials are insoluble in water, and before they can feed plants they must decay and have their ammonia changed, by the aid of the bacteria of the soil, to nitrates, similar to nitrate of soda.

They are valuable then as plant food in proportion to their content of ammonia, and the rapidity with which they decay in the soil, or rather the rate of decay, will determine the quickness of their action as fertilizers. With short season, quick-growing crops, quickness of action is an important consideration, but with crops occupying the land during the greater portion, or all, of the growing season, it is better to have a fertilizer that will become available more slowly, so as to feed the plant till maturity. Cotton-seed meal and dried blood decompose fairly rapidly, but will last the greater portion, if not all, of the growing season in this State. While cotton seed and tankage will last longer than meal and blood, none of these act so quickly, or give out so soon, as nitrate of soda and sulphate of ammonia.

Total Ammonia is made up of the water-soluble and organic; it is the sum of these two.

The farmer should suit, as far as possible, the kind of ammonia to his different crops, and a study of the forms of ammonia as given in the tables of analyses will help him to do this.

FORM OF POTASH IN TOBACCO FERTILIZERS.

Tobacco growers are becoming yearly more disposed to know the form of potash, whether from kainit, muriate or sulphate, which enters into their tobacco fertilizers. Considerable work of this kind has been done for individuals, and we now determine the form of potash in all tobacco brands, for the benefit of tobacco growers.

The term potash from muriate, as reported in the analyses, does not mean, necessarily, that the potash was supplied by muriate of potash. Sulphate or some other potash salt may have been used, but in all fertilizers where the term potash from muriate is used, there is enough chlorine present to combine with all the potash, though it may have come from salt in tankage, kainit, or karnalite. As the objection to the use of muriate of potash in tobacco fertilizers arises from the chlorine present, it does not matter whether this substance is present in common salt or potash-furnishing materials.

The use of sulphate of potash where there is chlorine present in the other ingredients of the fertilizer will not prevent the injurious effect of the chlorine. The term potash from muriate in our analyses, therefore, means that there is sufficient chlorine present in the fertilizer from all sources to combine with the potash to the extent indicated by the analyses.

VALUATIONS.

To have a basis for comparing the values of different fertilizer materials and fertilizers, it is necessary to assign prices to the three valuable constituents of fertilizers—ammonia, phosphoric acid, and potash. These figures, expressing relative value per ton, are not intended to represent crop-producing power, or agricultural value, but are estimates of the commercial value of ammonia, phosphoric acid and potash in the materials supplying them. These values are only approximate, as the cost of fertilizing materials is liable to change as other commercial products are, but they are believed to fairly represent the cost of making and putting fertilizers on the market. They are based on a careful examination of trade conditions, wholesale and retail, and upon quotations of manufacturers.

Relative value per ton, or the figures showing this, represents the prices on board the cars at the factory, in retail lots of five tons or less, for cash.

To make a complete fertilizer the factories have to mix together in proper proportions materials containing ammonia, phosphoric acid and potash. This costs something. For this reason it is thought well to have two sets of valuations—one for the raw or unmixed materials, such as acid phosphate, kainit, cotton-seed meal, etc., and one for mixed fertilizers.

VALUATIONS FOR 1908.

In Unmixed or Raw Materials.

For phosphoric acid in acid phosphate	4	cents per pound.
For phosphoric acid in bone meal, basic slag and Peruvian guano	3½	cents per pound.
For nitrogen	18	cents per pound.
For potash	5	cents per pound.

In Mixed Fertilizers.

For phosphoric acid	4½	cents per pound.
For nitrogen	19½	cents per pound.
For potash	5½	cents per pound.

The valuations decided on this season, for reasons already given, are:

VALUATIONS FOR 1909.

In Unmixed or Raw Materials.

For phosphoric acid in acid phosphate	4	cents per pound.
For phosphoric acid in bone meal, basic slag and Peruvian guano	3½	cents per pound.
For nitrogen	18	cents per pound.
For potash	5	cents per pound.

In Mixed Fertilizers.

For available phosphoric acid	4½	cents per pound.
For nitrogen	19½	cents per pound.
For potash	5½	cents per pound.

HOW RELATIVE VALUE IS CALCULATED.

In the calculation of relative value it is only necessary to remember that so many per cent means the same number of pounds per hundred, and that there are twenty hundred pounds in one ton (2,000 pounds).

With an 8—2—1.65 goods, which means that the fertilizer contains available phosphoric acid 8 per cent, potash 2 per cent, and nitrogen 1.65 per cent, the calculation is made as follows:

Percentage, or Lbs. in 100 Lbs.	Value Per 100 Lbs.	Value Per Ton, 2,000 Lbs.
8 pounds available phosphoric acid at 4½ cents..	0.36 ×20=	$7.20
2 pounds potash at 5½ cents.....	0.11 ×20=	2.20
1.65 pounds nitrogen at 19½ cents.....	0.321×20=	6.42
Total value	0.791×20=	$15.82

Freight and merchants' commission must be added to these prices. Freight rates from the seaboard and manufacturing centers to interior points are given in the following table:

FREIGHT RATES FROM THE SEABOARD TO INTERIOR POINTS.—From the Published Rates of the Associated Railways of Virginia and the Carolinas. In car-loads, of not less than ten tons each, per ton of 2,000 pounds. Less than car-loads, add 10 per cent.

Destination.	From Wilmington, N. C.	From Norfolk and Portsmouth, Va.	From Charleston, S. C.	From Richmond, Va.
Advance	$ 3.20	$ 3.20	$ 3.40	$ 3.20
Apex	2.70		3.80	3.00
Ashboro	3.20	3.20	3.60	3.20
Asheville	4.00	4.00	4.00	4.00
Chapel Hill	2.95	3.20	3.90	3.20
Charlotte	2.65	3.20	2.85	3.20
Clayton	2.48	2.86	3.63	2.80
Cherryville	3.85	3.60	3.40	3.63
Clinton	1.60	3.00	3.20	3.00
Creedmoor	3.00	3.00	3.80	3.00
Cunningham	3.00	2.40	4.00	2.40
Dallas	3.00	3.60	3.40	3.60
Davidson College	3.00	3.20	2.20	3.20
Dudley	1 70	3.00	3.20	3.00
Dunn	2.00	2.80	3.20	2.80
Durham	2.80	2.83	3.20	2.83
Elkin	3.60	3.20	3.60	3.20
Elm City	2.10	2.60	3.20	2.60
Fair Bluff	1.60	3.80	2.40	3.80
Fayetteville	1.80	3.00	3.00	3.00
Forestville	2.85	3.00	3.80	3.06
Gastonia	3.12	3.25	3.12	3.25
Gibson	2.10	3.50	2.10	3.50
Goldsboro	1.80	2.80	3.20	2.80
Greensboro	2.96	3 00	3.40	3.00
Hamlet	2.00	3.00	3.60	3.00
Henderson	3.00	2.83	3.55	2.83
Hickory	3.20	3.60	3.20	3.60
High Point	3.00	3.08	3.40	3.08
Hillsboro	2.88	2.88	2.68	2.88
Kernersville	3.00	3.00	3.40	3.00
Kinston	2.10	2.80	3.50	2.80
Laurel Hill	1.90	2.40	3.80	3.40
Laurinburg	1.90	3.40	3.80	3.40
Liberty	2.72	3.60	3.80	3.60
Louisburg	2.95	3.00	3.80	3.00
Lumberton	1.60	3.60	3.70	3.60
Macon	3.05	3 00	3.85	3 00
Madison	3.00	3 00	3.40	3.00
Matthews	2.60	3.20	3.20	3.20
Maxton	1.80	3.40	2.70	3.40
Milton	3.44	2.40	4.00	2.40
Mocksville	3.36	3.20	3.40	3.20
Morven	2.55	3.60	2.50	3.60
Mount Airy	2.20	3 40	3.80	3.40
Nashville	2.30	2.90	3.40	2.90
New Bern	1.25	1.75	3.95	1.75
Norwood	3.68	3.20	3.20	2.23
Oxford	3.04	2.83	3.55	2.83
Pineville	2.77	3.25	3.00	3.20
Pittsboro	2.60	3.30	4.10	3.30
Polkton	2.40	3.00	2.20	3.00
Raleigh	2.56	2.83	3.40	2.83
Reidsville	3.00	2.96	3.40	2.36
Rockingham	2.10	3 00	3.80	3.00
Rocky Mount	2.20	2 50	3.40	2.50
Ruffin	3.28	2 80	3 40	2.20
Rural Hall	3.28	3.20	3.60	3.20
Rutherfordton	3.05	3 65	3.05	3.65
Salisbury	3.25	3.20	3.20	3.20
Sanford	2.10	3.00	3.40	3.00
Selma	2.10	2.80	3.20	2.80
Shelby	2 90	3.60	3.90	3.60
Siler City	2 60	3.60	3.80	3.60
Smithfield	2.20	2.80	3.20	2.80
Statesville	3.50	3.20	3.60	3.20
Stem	2.95	2.83	3.80	2.83
Tarboro	2 30	2.40	3.00	2.40
Waco	2.90	3.60	3.40	3.60
Wadesboro	2 30	3.00	2.50	3.00
Walnut Cove	3.00	3.00	3.40	3.00
Warrenton	3.05	3 25	4.10	3.25
Warsaw	1.50	3.00	3.20	3.00
Washington	2.65	1.75	2.25	1.50
Weldon	2.55	1.90	3.85	1.90
Wilson	2.00	2.60	3.20	2.60
Winston-Salem	3 00	3 00	3.40	3.00

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per Ton at Factory.
					Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
	MIXED FERTILIZERS.										
	Brands claiming				**8.00**			**1.65**	**2.00**	**2.00**	**$ 15.82**
6859	Armour Fertilizer Works, Wilmington, N. C.	General Fertilizer	Wilkesboro	R	8.68	.28	1.14	**1.42**	1.72	**1.91**	**15.45**
6902	Atlantic Chemical Co., Norfolk, Va.	Atlantic Co.'s Soluble Guano	Elkin	S	**7.92**	.86	.66	**1.52**	1.85	2.31	**15.60**
6828	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Crown Brand Ammoniated Guano.	Walnut Cove	R	**7.81**	.52	1.14	1.66	2.02	3.15	16.97
6836	do	Eli Ammoniated Fertilizer	Stoneville	S	8.68	.36	.68	**1.04**	1.26	2.42	**14.53**
6875	Columbia Guano Co., Norfolk, Va.	Columbia Soluble Guano	Roxboro	S	8.05	1.16	.76	1.92	2.33	2.33	17.29
6814	Listers' Agrl. Chemical Works, Newark, N. J.	Listers' Success Fertilizer	Mooresville	S	8.10	.80	.88	1.68	2.04	**1.93**	15.96
6894	Navassa Guano Co., Wilmington, N. C.	Navassa Grain Fertilizer	Forest City	S	**7.16**	1.14	.78	1.92	2.33	2.23	16.38
6872	Patapsco Guano Co., Baltimore, Md.	Sea Gull Ammoniated Guano	Roxboro	R	8.43	.78	1.10	1.88	2.28	2.08	17.21
6917	do	do	Mooresville	R	8.49	.78	1.06	1.84	2.23	2.19	17.22
6846	Powhatan Chemical Co., Richmond, Va.	Magic Tobacco Grower	Mt. Airy	S	8.35	.72	1.08	1.80	2.19	2.69	17.79
6888	Richmond Guano Co., Richmond, Va.	Premium Brand Fertilizer	Wilkesboro	S	8.76	.50	.78	**1.28**	1.55	2.38	**15.49**
6912	do	do	Dunn	R	8.50	.40	1.20	**1.60**	1.94	2.15	16.45
6903	Royster, F. S., Guano Co., Norfolk, Va.	Farmers' Bone Fertilizer	Wilson	S	**7.88**	1.10	.52	**1.62**	1.97	2.05	**15.66**
6873	do	do	Durham	S	8.02	1.00	.68	1.68	2.04	2.13	16.11
6916	do	do	Mt. Airy	R	**7.98**	1.00	.72	1.72	2.09	2.12	16.22
6816	Swift Fertilizer Works, Atlanta, Ga.	Swift's Red Steer Guano	Mooresville	R	9.91	.64	.90	**1.54**	1.87	2.03	17.16
6847	Tuscarora Fertilizer Co., Wilmington, N. C.	Tuscarora Standard Fertilizer	Wilkesboro	R	**7.55**	.62	1.14	1.76	2.14	**1.66**	**15.48**
6818	Union Guano Co., Winston, N. C.	Old Honesty Guano	Mooresville	R	**7.37**	.30	1.26	**1.56**	1.89	3.00	16.02
6906	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Anchor Brand Fertilizer.	Whiteville	R	**7.59**	.62	1.00	**1.62**	1.97	**1.98**	**15.33**
6834	do	do	Stoneville	R	9.28	.24	.96	**1.20**	1.46	3.29	16.65
6876	do	Ajax C. S. M.	Oxford	D	**7.93**	.16	1.48	**1.64**	1.99	2.20	15.95
6905	do	Davie & Whittle's Owl Brand Guano.	Vineland	D	9.47	.70	.68	**1.38**	1.68	3.07	17.28
6849	do	Electric Standard Guano	Wilkesboro	R	9.25	.22	1.12	**1.34**	1.63	2.17	15.94
6866	do	Farmers' Favorite Fertilizer	Pilot Mountain	R	10.26	.36	1.08	**1.44**	1.75	2.16	19.22
6892	do	Genuine Slaughterhouse Bone Guano.	Elkin	R	**7.98**	.36	1.52	1.88	2.28	2.24	16.98

6871	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Special Wheat Guano.	Winston	S	**7.77**	.84	.76	**1.80**	1.94	2.36	15.83
6848	....do	Owl Brand Guano	Wilkesboro	S	8.55	.36	1.50	1.86	2.26	2.36	17.74
6897	....do	Powers, Gibbs & Co.'s Eagle Island Ammoniated Guano.	Lincolnton	S	**7.93**	.50	1.66	2.16	2.62	**1.51**	17.28
6908	....do	Powers, Gibbs & Co.'s Soluble Ammoniated Guano.	Whiteville	R	8.15	.66	1.00	1.66	2.02	2.00	16.01
6900	....do	Stonewall Guano	Stoneville	R	9.37	.32	1.28	**1.60**	1.94	2.14	17.03
6823	....do	Travers & Co.'s Beef, Blood and Bone Fertilizer.	Statesville	R	**7.97**	.24	1.14	**1.38**	1.68	**1 88**	**14.82**
6879	....do	Travers & Co.'s National Fertilizer.	Durham	D	**7.79**	1.10	.82	1.92	2.33	3.20	18.02
	Brand claiming				**8 00**			**.82**	**1.00**	**3 00**	**13.70**
6829	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Comet Guano	Stoneville	S	9.66	.12	.64	**.76**	.92	**2 07**	13.93
	Brand claiming				**8.00**			**.82**	**1.00**	**4 00**	**14.80**
6857	Powhatan Chemical Co., Richmond, Va.	Magic Grain Special	Mt. Airy	D	9.07	.16	.82	.98	1.19	**3.87**	16.24
	Brands claiming				**8 00**			**2 06**	**2.50**	**2 00**	**17.43**
6910	Navassa Guano Co., Wilmington, N. C.	Ammoniated Soluble Navassa Guano.	Wallace	R	8.20	1.04	.72	**1.76**	2.14	2.31	**16.78**
6907	Va.-Car. Chemical Co., Richmond, Va.	Travers & Co.'s Capital Cotton Fertilizer.	Vineland	R	9.48	1.02	.40	**1.42**	1.72	3.08	17.46
	Brands claiming				**8.00**			**2.06**	**2.50**	**3 00**	**18 53**
6874	Royster, F. S., Guano Co., Norfolk, Va.	Orinoco Tobacco Guano	Durham	S	**7 95**	1.48	.76	2.24	2.72	3.50	19.74
6877	Va.-Car. Chemical Co., Richmond, Va.	Blue Star	....do	D	**7.95**	.70	1.38	2.08	2.53	3.75	**19 39**
	Brands claiming				**8 00**			**2 47**	**3.00**	**3.00**	**20.13**
6914	Swift Fertilizer Works, Atlanta, Ga.	Swift's Ruralist Guano	Burgaw	R	8.89	.80	1.80	2.60	3.16	3.11	21.56
6817	Union Guano Co., Winston, N. C.	Union Homestead Guano	Statesville	R	**6.35**	1.66	2.12	3.78	4.59	**2 41**	23.10
6899	....do	Victoria High Grade Tobacco Fertilizer.	Ararat	R	9.51	1.52	.90	**2.42**	2.94	**2 69**	20.95
6904	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Guano Co.'s Farmers' Friend Guano.	Selma	R	8.49	1 14	1.24	**2.38**	2.89	3.05	20.27
	Brand claiming				**8.00**			**3.29**	**4 00**	**4 00**	**24.47**
6913	Swift Fertilizer Works, Atlanta, Ga.	Swift's High Grade Monarch Vegetable Grower.	Chadbourn	R	8.59	.78	2.54	3.32	4.03	**3 73**	24.78
	Brand claiming				**9 00**			**.82**	**1 00**	**2 00**	**13.50**
6850	Va.-Car. Chemical Co., Richmond, Va.	Ford's Wheat and Corn Guano	Wilkesboro	R	10.25	.30	.56	.86	1.04	2.45	15.27
	Brands claiming				**9.00**			**.82**		**3.00**	**14.60**
6862	Patapsco Guano Co., Baltimore, Md.	Coon Brand Guano	Wilkesboro	R	9.23	.46	.66	1.12	1.36	3.22	16.22
6890	Va.-Car. Chemical Co., Richmond, Va.	Bigelow's Crop Grower	Forest City	S	9.02	.48	.30	**.78**	.95	**2.60**	**14.02**
	Brand claiming				**9.00**			**1.65**	**2.00**	**1.00**	**15.64**
6878	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Star Brand Guano	Durham	R	**7.86**	.30	1.22	**1.62**	1.97	1.47	**15 00**
	Brands claiming				**9.00**			**2.06**	**2.50**	**2.00**	**18.33**
6815	Patapsco Guano Co., Baltimore, Md.	Patapsco Guano	Mooresville	R	9.35	.86	1.40	2.26	2.74	2.03	19.46
6832	Va.-Car. Chemical Co., Richmond, Va.	Owl Brand Special Tobacco Guano.	Stoneville	R	9.33	1.44	1.54	2.98	3.62	**1.52**	21.69
	Brand claiming				**11.00**			**2.47**	**3.00**	**4 00**	**23 93**
6895	Va.-Car. Chemical Co., Richmond, Va.	Charlotte Oil and Fertilizer Co.'s Perfect Wheat Grower.	Elkin	R	11.32	1.04	.98	2.62	3.18	**2.87**	**23.56**

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Relative Value per Ton at Factory.
					MIXED FERTILIZERS.						
	Brand claiming				**6.00**			**4.12**	**5.00**	**7.00**	**$ 29.17**
6911	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano	Chadbourn	S	6.84	3.32	1.12	4.44	5.39	8.10	32.38
	Brand claiming				**7.00**			**8.24**	**10.00**	**2.00**	40.64
6909	American Fertilizer Co., Norfolk, Va.	Ten Per Cent Ammonia Guano	Wallace	S	7.70	6.02	1.32	**7.32**	8.89	2.62	**38.36**
	Brands claiming				**8.00**					**4.00**	**11.60**
6827	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Buncombe Wheat Grower	Walnut Cove	R	10.97					4.42	14.73
6825	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	do	R	8.11					**3.11**	**10.72**
6831	Richmond Guano Co., Richmond, Va.	Winter Grain and Grass Grower	do	R	**7.74**					**3.36**	**10.60**
6840	Union Guano Co., Winston, N. C.	Union Wheat Mixture	Mt. Airy	R	9.03					**1.97**	**10.29**
6843	Va.-Car. Chemical Co., Richmond, Va.	Carr's Special Wheat Grower	do	R	8.82					**3.64**	11.94
6841	do	Miller's Special Wheat Mixture	Elkin	R	8.32					**3.98**	11.87
	Brands claiming				**10.00**					**2.00**	**11.20**
6858	Armour Fertilizer Works, Wilmington, N. C.	Armour's Superphosphate	Wilkesboro	D	10.13					2.18	11.51
6826	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Electric Bone and Potash Mixture.	Walnut Cove	R	10.64					3.64	13.58
6824	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	do	R	**9.41**					2.13	**10.81**
6887	Richmond Guano Co., Richmond, Va.	Bone and Potash Mixture	Wilkesboro	R	10.05					2.00	11.24
6863	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Bone and Potash Mixture.	Winston	S	**9.92**					**1.98**	11.08
6839	Union Guano Co., Winston, N. C.	Union Bone and Potash	Mt. Airy	R	10.58					**1.47**	**11.14**
6844	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s McGavock's Special Potash Mixture.	do	R	10.80					**1.80**	11.70
6855	do	Mammoth Wheat and Corn Grower.	Wilkesboro	R	10.06					**1.77**	**11.00**
6867	do	Old Dominion Co.'s Alkaline Bone and Potash.	Winston	R	10.21					**1.55**	**10.69**
6820	do	V.-C. C. Co.'s Blue Ridge Wheat Grower.	Statesville	R	10.34					**1.76**	11.24

6819	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Standard Wheat Grower.	Statesville	R	10.00					1.39	10.53
	Brand claiming				**10.50**					**1.50**	**11.10**
6880	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s Great Wheat and Corn Grower.	Roxboro	R	10.87					1.41	11.33
	Brands claiming				**10.00**					**4.00**	**13.40**
6860	Armour Fertilizer Works, Wilmington, N. C.	Armour's Superphosphate and Potash Fertilizer.	Wilkesboro	R	**8.91**					4.63	**13.11**
6889	Richmond Guano Co., Richmond, Va.	Rex Bone and Potash Mixture	do	R	10.77					**3.50**	14.44
6842	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Special Potash Mixture.	Elkin	D	11.03					**3.87**	14.18
6856	do	Winner Grain Mixture	Wilkesboro	R	**9.92**					4.22	13.57
	Brand claiming				**10.00**					**5.00**	**14.50**
6853	Tuscarora Fertilizer Co., Wilmington, N. C.	Tuscarora Alkaline	Wilkesboro	R	**9.80**					5.09	**14.24**
	Brand claiming									**12.00**	**12.00**
6883	Va.-Car. Chemical Co., Richmond, Va.	Genuine German Kainit	Oxford	S						13.12	13.12
	Brand claiming							**2.47**	**3.00**		**25.69**
6884	Armour Fertilizer Works, Baltimore, Md.	Armour's Bone Meal	Tobaccoville	D				**2.40**	2.91		**25.15**
	Brand claiming							**3.70**	4.49		[1]**28.37**
6886	Baugh & Sons Co., Norfolk, Va.	Baugh's Raw Bone Meal	Madison	D				3.84	4.66		[2]28.73
6833	Va.-Car. Chemical Co., Richmond, Va.	Pure Raw Bone Meal	Stoneville	D				4.24	5.15		[3]30.87
6898	do	do	Ararat	D				4.12	5.00		[4]29.09

[1]Total Phosphoric Acid found, 23.58, valued at 3½ cents per pound.
[2]Total Phosphoric Acid found, 21.30, valued at 3½ cents per pound.
[3]Total Phosphoric Acid found, 22.30, valued at 3½ cents per pound.
[4]Total Phosphoric Acid found, 23.38, valued at 3½ cents per pound.

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ANALYSES OF COMMERCIAL FERTILIZERS—FALL SEASON, 1908—CONTINUED.

RAW OR UNMIXED FERTILIZER MATERIALS.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per Ton at Factory.
					Available Phosphoric Acid.	Water-soluble Ammonia.	Organic Ammonia.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
	Brands claiming				**12.00**						**$ 9.60**
6885	Armour Fertilizer Works, Baltimore, Md.	Armour's Acid Phosphate	Tobaccoville	R	**10.12**						**8.10**
6870	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Royster Acid Phosphate.	Winston	R	15.11						12.08
	Brands claiming				**13.00**						**10.40**
6881	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s I X L Acid Phosphate	Durham	D	13.63						10.90
6896	do	Norfolk-Carolina Chemical Co.'s Best Acid Phosphate.	Elkin	D	**12.45**						**9.96**
6868	do	Old Dominion Bone Phosphate	Winston	R	14.79						11.83
6001	do	Va.-Car. Chemical Co.'s Clipper Brand Acid Phosphate.	Elkin	R	13.37						10.69
6851	do	Victor Acid Phosphate	Wilkesboro	D	16.92						13.54
	Brands claiming				**14.00**						**11.20**
6837	Baugh & Sons Co., Norfolk, Va.	Baugh's High Grade Acid Phosphate.	Winston	D	15.05						12.04
6852	Royster, F. S., Guano Co., Norfolk, Va.	Royster's 14 Per Cent Acid Phosphate.	do	R	**12.60**						**10.08**
6891	Va.-Car. Chemical Co., Richmond, Va.	Almont High Grade Acid Phosphate.	Lincolnton	R	15.07						12.05
6869	do	Old Dominion High Grade Acid Phosphate.	Winston	D	**13.66**						**10.92**
6835	do	S. W. Travers & Co.'s Dissolved Bone Phosphate.	Stoneville	R	14.29						11.43
6882	do	V.-C. C. Co.'s 14 Per Cent Acid Phosphate.	Oxford	D	14.29						11.43
	Brands claiming				**16.00**						**12.80**
6861	Patapsco Guano Co., Baltimore, Md.	Florida Soluble Phosphate	Wilkesboro	R	**15.82**						**12.66**
6915	Richmond Guano Co., Richmond, Va.	Rex Dissolved Bone Phosphate	Dunn	R	16.27						13.02
6864	Royster, F. S., Guano Co., Norfolk, Va.	Royster's High Grade Acid Phosphate.	Winston	R	16.69						13.35
6865	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s 16 Per Cent Acid Phosphate.	do	R	16.16						12.93

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Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	MIXED FERTILIZERS.													
	Brand claiming				**8.00**			**.82**	**1.00**	**2.00**				**$13.50**
7422	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Comet Guano	Lexington	R	8.58	.20	.78	.98	1.19	2.92				14.76
	Brand claiming				**8.00**			**.82**	**1.00**	**3.00**				**14.60**
7456	Union Guano Co., Winston, N. C.	Sunrise Ammoniated Guano	Lexington	R	**7.21**	.30	.92	1.22	1.48	3.45				15.04
	Brand claiming				**8.00**			**.82**	**1.00**	**4.00**				14.80
7184	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Farmers' Favorite	Spring Hope	S	**7.99**	.38	.68	1.06	1.29	4.50				16.27
	Brands claiming				**8.00**			**1.85**	**2.00**	**2.00**				**15.82**
6991	Acme Mfg. Co., Wilmington, N. C.	Cotton-seed Meal Guano	Mt. Olive	R	8.20	.76	1.16	1.92	2.32	2.00				17.07
7161	do	Gem Fertilizer	Rocky Mount	R	**7.85**	.62	1.34	1.96	2.38	2.22				17.15
7328	American Agricultural Chemical Co., New York, N. Y.	Bell's Special Compound for Tobacco.	Mebane	R	8.27	.98	.88	1.86	2.26	2.19	2.19		6.85	17.10
7109	do	Purity Guano	Elizabeth City	S	**7.97**	1.28	.58	1.86	2.26	2.13				16.77
6963	American Fertilizer Co., Norfolk, Va.	Bone and Peruvian Guano	Greenville	R	8.09	.78	1.38	2.16	2.62	2.48				18.43
7176	Armour Fertilizer Works, Wilmington, N. C.	Armour's Slaughterhouse Fertilizer.	Oak City	R	**7.94**	.92	.62	**1.54**	1.87					**15.03**
7094	Arps, Geo. R., Norfolk, Va.	Arps' Premium Guano for Cotton, Tobacco, etc.	Edenton	R	8.09	1.00	.62	**1.62**	1.97	2.13				15.94
7457	Ashepoo Fertilizer Co., Charleston, S. C.	Standard Carolina Guano	Lexington	R	9.01	1.12	.94	2.06	2.50	2.09				18.44
7345	Atlantic Chemical Co., Norfolk, Va.	Atlantic Soluble Guano	Edenton	R	**7.79**	1.08	.72	1.80	2.19	2.42				16.69
6936	Baugh & Sons Co., Norfolk, Va.	Baugh's Animal Bone and Potash.	do	S	8.02	.96	.72	1.68	2.04	2.38				16.40
6948	do	Baugh's Fish Mixture	Elizabeth City	R	9.29	.28	1.58	1.86	2.26	2.05				17.87
7369	Berkley Chemical Co., Norfolk, Va.	Brandon Superphosphate	Roper	S	8.12	1.24	.64	1.88	2.28	2.11				16.96
6966	Bragaw Fertilizer Co., Washington, N. C.	Tar Heel Special Guano	Washington	R	8.57	.30	1.38	1.68	2.04	2.82				17.37
7438	Burton, C. J., Guano Co., Baltimore, Md.	Burton's Butcher Bone	Henderson	R	8.02	1.20	.56	1.76	2.14	2.18				16.48
7171	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Crown Brand Ammoniated Guano.	Dunn	D	8.23	1.18	.88	2.06	2.50	2.32				17.99
7401	Columbia Guano Co., Norfolk, Va.	Columbia Soluble Guano	Ahoskie	R	8.52	.76	.96	1.72	2.09	2.06				16.64
7045	do	Columbia Soluble Bone	Seven Springs	R	8.02	.94	.62	**1.56**	1.89	2.02				**15.52**
7227	Craven Chemical Co., New Bern, N. C.	Elite Cotton Grower	Clinton	R	**7.80**	.98	1.18	2.16	2.62	4.15				20.01
7123	Farmers Cotton Oil Co., Wilson, N. C.	Farmers' Special Guano	Dunn	D	**7.44**	.60	1.24	1.84	2.23	2.50				16.62
7479	Farmers Guano Co., Raleigh, N. C.	State Standard Guano	Franklinton	R	**7.50**	.74	.92	1.66	2.02	2.14				**15.58**
7376	Hampton Guano Co., Norfolk, Va.	Shirley Superphosphate	Maiden	S	8.98	1.22	.56	1.78	2.16	2.15				17.39

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Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	MIXED FERTILIZERS.													
	Brands claiming				**8.00**			**1.65**	**2.00**	**2.00**				**$15.82**
7346	Harrell, D. B. & Co., Norfolk, Va.	Harrell's Champion Cotton and Peanut Grower.	Edenton	S	8.18	1.16	.72	1.68	2.04	2.07				16.19
7402	Holmes & Dawson, Norfolk, Va.	Triumph Guano	Windsor	S	**7.95**	1.14	.70	1.84	2.23	**1.86**				16.49
6978	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Exchange Guano	New Bern	R	8.35	1.06	.76	1.82	2.21	2.52				17.38
7064	Imperial Co., Norfolk, Va.	Imperial Champion Guano	Dunn	R	**7.81**	1.18	1.28	2.46	2.99	2.11				18.94
7628	---do	Peanut and Corn Guano	Palmyra	R	**7.81**	.82	.98	1.80	2.19	2.07				16.32
7147	---do	Standard Premium Guano	Washington	R	8.15	.66	1.06	1.72	2.09	2.35				16.63
7370	Martin, D. B., Co., Richmond, Va.	Martin's Carolina Cotton Fertilizer.	Spring Hope	R	8.17	1.44	.44	1.88	2.28	2.00				16.88
7380	Miller Fertilizer Co., Baltimore, Md.	Ammoniated Dissolved Bone	High Point	R	8.09	1.24	.58	1.82	2.21	2.15				16.74
7492	Navassa Guano Co., Wilmington, N. C.	Occoneechee Tobacco Guano	Catawba	R	8.22	1.00	.72	1.72	2.09	2.03	2.03		4.20	16.34
6927	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Craven County Guano	Edenton	R	**7.45**	.30	1.14	**1.44**	1.75	2.33				**14.88**
7158	Norfolk Fertilizer Co., Norfolk, Va.	Oriana Cotton Grower	Pinetop	S	8.54	.92	1.12	2.04	2.48	2.15				18.01
7411	N. C. Cotton Oil Co., Charlotte, N. C.	Majestic Fertilizer	China Grove	R	**7.79**	.48	1.12	**1.60**	1.94	**1.81**				**15.22**
7121	N. C. Cotton Oil Co., Henderson, N. C.	Vance Cotton Grower	Henderson	R	8.04	.24	1.38	**1.62**	1.97	2.05				**15.87**
7082	N. C. Cotton Oil Co., Wilmington, N. C.	Wilmington Cotton Grower	Spring Hope	D	8.67	.26	1.58	1.84	2.23	2.45				17.67
7469	Ober, G., & Sons Co., Baltimore, Md.	Ober's Special Cotton Compound.	Tunis	R	8.19	.56	1.38	1.94	2.36	2.27				17.43
6956	Pamlico Chemical Co., Washington, N. C.	Pamlico Bone and Fish Guano	Washington	R	8.54	.42	1.26	1.68	2.04	2.67				17.17
7275	Patapsco Guano Co., Baltimore, Md.	Sea Gull Ammoniated Guano	Gastonia	R	8.09	.78	1.02	1.80	2.19	2.25				16.77
7185	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Red Leaf Tobacco Guano.	Nashville	R	8.60	.98	.74	1.72	2.10	2.01	2.01		5.50	16.66
7150	---do	Piedmont Special for Cotton, Corn and Peanuts.	Hertford	S	8.16	.52	1.30	1.82	2.21	2.07				16.72
7243	---do	Piedmont Special for Cotton, Corn and Peanuts.	Winton	S	8.25	.50	1.30	1.80	2.19	2.56				17.26
7355	Pocahontas Guano Co., Lynchburg, Va.	Carrington's Banner Brand Guano.	Henderson	S	8.65	1.32	.52	1.84	2.23	2.33				17.52
6985	Powhatan Chemical Co., Richmond, Va.	Magic Cotton Grower	New Bern	S	8.85	.92	.76	1.68	2.04	2.13				16.86
7327	---do	Magic Tobacco Grower	Mebane	R	8.77	.92	.64	**1.56**	1.89	1.82	1.82		5.50	15.98
7333	---do	Magic Tobacco Grower	Mt. Airy	R	8.87	.80	.72	**1.56**	1.89	**1.97**	1.97		5.80	16.23

7430	Rasin Monumental Co., Baltimore, Md.	Rasin Empire Guano	Cherryville	D	8.92	1.06	.60	1.66	2.02	2.04				16.75
7381	Reidsville Fertilizer Co., Reidsville, N. C.	Banner Fertilizer	Thomasville	R	9.02	.44	1.10	1.54	1.87	2.88				17.29
6930	Richmond Guano Co., Richmond, Va.	Premium Brand Fertilizer	Edenton	S	8.80	.94	.82	1.76	2.14	1.70				16.65
6921	Royster, F. S., Guano Co., Norfolk, Va.	Farmers' Bone Fertilizer	Kinston	S	8.08	1.26	.70	1.96	2.38	2.95				18.16
7471	Savage, Son & Co., Norfolk, Va.	Purity Guano	Powellsville	S	8.18	1.06	.74	1.80	2.19	2.05				16.64
7241	Scotland Neck Guano Co., Scotland Neck, N. C.	Scotland Neck's Favorite Cotton-seed Meal Guano.	Scotland Neck	R	9.34	.16	1.60	1.76	2.14	3.22				18.81
7125	Southern Cotton Oil Co., Fayetteville, N. C.	Standard	Fayetteville	R	7.98	.56	1.20	1.76	2.14	2.93				17.27
7474	Southern Cotton Oil Co., Gibson, N. C.	Gloria Standard Fertilizer	Raeford	R	8.08	.14	1.64	1.78	2.16	2.36				16.81
7393	Southern Chemical Co., Roanoke, Va.	Our Favorite	Walnut Cove	R	8.09	.94	.72	1.68	2.04	2.61				16.70
7018	Swift Fertilizer Works, Atlanta, Ga.	Swift's Red Steer Guano, Standard Grade.	Battleboro	D	8.12	.84	.82	1.66	2.02	1.86				15.83
7299	Tuscarora Fertilizer Co., Atlanta, Ga.	Tuscarora Standard	----do	R	7.57	.84	.58	1.54	1.87	1.86				14.86
7348	Union Abattoir Co., Baltimore, Md.	Red Star Brand Cotton Guano	Edenton	S	8.70	1.00	.50	1.59	1.82	1.84				15.70
7000	Union Guano Co., Winston, N. C.	Old Honesty Guano	Mt. Olive	R	8.15	.78	1.12	1.90	2.31	2.00				16.94
7468	Upshur, R. L., Norfolk, Va.	Palmo Cotton Guano	Winton	S	7.94	.80	.92	1.72	2.09	1.95				16.00
7112	----do	Upshur's Grass, Grain and Cotton Guano.	Edenton	R	8.58	.74	.92	1.66	2.02	1.90				16.29
7127	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Anchor Brand Fertilizer.	Dunn	R	7.25	.84	.82	1.66	2.02	1.90				15.09
7063	----do	Charlotte Oil and Fertilizer Co.'s King's Cotton Grower.	Rocky Mount	R	8.09	.58	1.20	1.78	2.16	1.82				16.22
7042	----do	Davie & Whittle's Owl Brand Guano.	Tarboro	D	7.66	.90	.68	1.58	1.92	2.01				15.27
7007	----do	Diamond Dust	Seven Springs	R	8.35	.50	1.36	1.86	2.26	2.36				17.36
7435	----do	Durham Fertilizer Co.'s Progressive Farmer Guano.	Oxford	R	8.94	.30	1.20	1.50	1.82	1.92				16.01
7239	----do	Durham Fertilizer Co.'s Genuine Bone and Peruvian Guano.	Oak City	R	8.18	.74	.80	1.54	1.87	2.34				15.94
7041	----do	Genuine Slaughterhouse Bone	New Bern	S	7.70	1.04	.72	1.76	2.14	2.20				16.21
7319	----do	Lynchburg Guano Co.'s Lynchburg Soluble for Tobacco.	Winston	R	8.54	.72	.96	1.68	2.04	2.11				16.56
7223	----do	Norfolk & Car. Chemical Co.'s Genuine Slaughterhouse Bone Guano.	Benson	R	8.89	.88	.76	1.64	1.99	2.11	2.11		5.30	16.72
6946	----do	Old Dominion Guano Co.'s Farmers' Friend Fertilizer.	Hertford	S	6.97	1.01	1.06	2.07	2.51	2.50				17.09
7251	----do	Old Dominion Guano Co.'s Soluble Tobacco Guano.	Hillsboro	S	8.02	.38	1.30	1.68	2.04	2.22	2.22		5.50	16 21
7066	----do	Powers, Gibbs & Co.'s Cotton-seed Meal, Soluble Ammoniated Guano.	Rocky Mount	R	8.62	.24	1.40	1.64	1.99	2.36				16.75
7085	----do	Powers, Gibbs & Co.'s Eagle Island Ammoniated Guano.	Enfield	R	8.14	.76	1.04	1.80	2.19	1.87				16.40
7086	----do	Tinsley & Co.'s Stonewall Guano.	Spring Hope	R	8.19	.40	1.30	1.70	2.06	2.07				16.28
7051	----do	Travers & Co.'s National Fertilizer.	Warsaw	R	8.47	.52	.98	1.50	1.82	2.04				15.72
7190	----do	Va. State Fertilizer Co.'s Eureka Ammoniated Bone.	Nashville	R	8.64	.80	.60	1.46	1.77	1.92				15.58

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

MIXED FERTILIZERS.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	Brands claiming				**8.00**			**1.65**	**2.00**	**3.00**				**$16 94**
6982	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Fish Compound	New Bern	R	8.64	.32	1.50	1.82	2.21	3.46				18.68
7178	Navassa Guano Co., Wilmington, N. C.	Harvest Time Guano	Farmville	R	8.27	2.70	1.06	3.76	4.56	3.51				25.97
7165	Patapsco Guano Co., Baltimore, Md.	Sea Gull Ammoniated Guano	Rocky Mount	S	8.30	1.08	.80	1.88	2.28	**1.96**				16.96
7225	Pocomoke Guano Co., Norfolk, Va.	Crescent Complete Compound	Rose Hill	S	8.48	.94	.74	1.68	2.04	3.08				17.57
	Brand claiming				**8.00**			**1.65**	**2.00**	**4.00**				**18 02**
7463	Miller Fertilizer Co., Baltimore, Md.	Special Tobacco Grower	Louisburg	R	8.13	1.04	.66	1.70	2.06	**3.93**	3.93		8.30	18.27
	Brand claiming				**8.00**			**1.85**	**2.25**	**4.00**				**18 81**
7267	Pocomoke Guano Co., Norfolk, Va.	Monticello Animal Bone	Walkertown	S	8.73	1.22	.78	2.00	2.43	4.16				20.23
	Brand claiming				**8.50**			**1.65**	**2.00**	**2.00**				**16 27**
7149	Pocomoke Guano Co., Norfolk, Va.	Pocomoke Superphosphate	Edenton	R	8.29	1.58	.76	2.14	2.60	2.37				18.41
	Brand claiming				**8.00**			**2.00**	2.43	**3.00**				**18 30**
7126	Va.-Car. Chemical Co., Richmond, Va.	N. C. Farmers' Alliance Guano	Magnolia	R	**7.71**	.96	.98	**1.94**	2.36	**2.84**				**17 63**
	Brand claiming				**8.00**			**2.06**	2.50	**1.50**				**16 88**
7363	Va.-Car. Chemical Co., Richmond, Va.	Powers, Gibbs & Co.'s Ammoniated Guano.	Lumberton	D	8.36	1.48	.88	2.36	2.87	1.63				18.52
	Brands claiming				**8.00**			**2.06**	**2.50**	**2.00**				**17.43**
7293	Columbia Guano Co., Norfolk, Va.	Columbia Special Tobacco Guano.	Greensboro	S	8.09	1.34	.90	2.24	2.72	2.15	2.15		7.10	18.38
7477	Listers' Agrl. Chemical Works, Newark, N. J.	Listers' Ammoniated Phosphate	Franklinton	S	8.04	1.00	1.20	2.20	2.67	2.00				18.02
7416	Navassa Guano Co., Wilmington, N. C.	Navassa Guano for Tobacco	Louisburg	R	8.43	1.46	.66	2.12	2.57	2.62	2.13	.49	1.60	18.74
7414	Va.-Car. Chemical Co., Richmond, Va.	Royal Crown	do	R	8.77	.84	1.54	2.38	2.89	2.11				19.49
7277	do	Va. State Fertilizer Co.'s Gilt Edge Special Tobacco Guano.	Wilson	R	**7.52**	1.30	.76	**2.00**	2.50	2.15	2.15		1.90	**17 17**
	Brands claiming				**8.00**			**2.06**	**2.50**	**2.50**				**17.98**
7012	Hadley, Harris & Co., Wilson, N. C.	Hadley's Boss Guano	Wilson	S	**7.79**	1.14	1.36	2.50	3.04	2.86				19.92
7036	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' All-Crop Guano	New Bern	S	8.19	.46	1.56	**2.02**	2.45	2.71				18.23
	Brands claiming				**8.00**			**2.06**	**2.50**	**3.00**				**18.53**
7215	Acme Manufacturing Co., Wilmington, N. C.	Tip Top Grower	Mt. Olive	S	**7.99**	1.10	1.00	2.10	2.55	3.25				18.95
7129	Armour Fertilizer Works, Atlanta, Ga.	Armour's Gold Medal for Tobacco.	Farmville	R	**7.72**	1.28	.82	2.10	2.55	**2.72**	2.72		7.90	18.13
7291	Bragaw Fertilizer Co., Washington, N. C.	Truckers' Tobacco Guano	Washington	R	8.78	.92	1.58	2.50	3.04	3.63	3.63		6.60	21.64
7162	Burton, C. J., Guano Co., Baltimore, Md.	Burton's High Grade	Nashville	R	**7.67**	1.36	.72	2.08	2.53	3.14				**18.47**

7170	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Caraleigh Special Tobacco Guano.	Dunn	R	8.66	.78	1.12	**1.90**	2.31	**2.42**	2.42		2.80	**17.87**
7440	Cowell, Swan & McCotter Co., Bayboro, N. C.	Quick Growth Guano	Washington	S	**7.96**	.86	1.26	2.12	2.57	3.90				19.72
7069	Craven Chemical Co., New Bern, N. C.	Marvel Great Crop Grower	La Grange	D	8.23	.72	1.36	2.08	2.53	3.09				18.92
7100	Farmers Cotton Oil Co., Wilson, N. C.	Planters' Friend Guano	Whichard	R	**7.78**	1.02	1.28	2.30	2.79	3.96				20.33
7177	Farmers Guano Co., Raleigh, N. C.	Toco Tobacco Guano	Farmville	R	8.54	.96	1.20	2.16	2.62	3.17	3.17		9.00	19.60
7005	Imperial Co., Norfolk, Va.	Imperial Bright Tobacco Guano	Dunn	S	8.58	.94	1.34	2.28	2.77	3.15	3.15		6.30	20.08
7048	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Onslow Farmers' Reliance	Seven Springs	S	8.52	.50	1.72	2.22	2.70	**2.70**				19.30
7427	N. C. Cotton Oil Co., Wilmington, N. C.	Wilmington Tobacco Grower	Enfield	R	9.62	.44	1.50	**1.94**	2.36	3.34	3.34		7.60	19.90
7160	Pamlico Chemical Co., Washington, N. C.	Farmers' Best Guano	Farmville	S	8.75	.92	1.08	**2.00**	2.43	3.70				19.74
7166	Patapsco Guano Co., Baltimore, Md.	Patapsco Special Tobacco Mixture.	Rocky Mount	R	**7.99**	1.26	.92	2.18	2.59	2.99	2.99		6.40	18.98
7482	do	Unicorn Guano	Wilkesboro	S	**7.80**	.64	1.48	2.12	2.57	3.02				18.61
7186	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Guano for Tobacco	Spring Hope	S	**7.40**	1.50	.82	2.32	2.82	3.10	3.10		8.80	19.12
7335	Pocahontas Guano Co., Lynchburg, Va.	Spot Cash Tobacco Compound	Mt. Airy	R	8.20	1.10	1.02	2.12	2.57	3.31	3.31		9.20	19.29
6984	Powhatan Chemical Co., Richmond, Va.	White Leaf Tobacco Fertilizer	New Bern	R	8.52	1.16	.70	**1.86**	2.26	**2.76**	2.76		6.20	**17.96**
7336	Richmond Guano Co., Richmond, Va.	Tip Top Fertilizer	Mt. Airy	R	**7.83**	1.08	.92	**2.00**	2.43	**2.89**				**18.02**
7078	Roberson, J. H., & Co., Robersonville, N. C.	Roberson's Special for Bright Tobacco.	Robersonville	R	8.90	.88	1.20	2.08	2.53	3.03	3.03		6.70	19.45
7006	Royster, F. S., Guano Co., Norfolk, Va.	Orinoco Tobacco Guano	Seven Springs	S	**7.83**	1.42	.63	**2.05**	2.49	**2.90**	2.90		10.70	**18.23**
6999	Union Guano Co., Winston, N. C.	Union Waterfowl Guano	Mt. Olive	D	**7.97**	1.24	.86	2.10	2.55	**2.79**				**18.43**
7019	Va.-Car. Chemical Co., Richmond, Va.	Blue Star	Edenton	R	**7.97**	.74	1.36	2.10	2.55	3.21				18.89
6945	do	Durham Fertilizer Co.'s N. C. Farmers' Alliance Guano.	Elizabeth City	R	**7.83**	.84	1.36	2.20	2.67	3.19				19.13
7168	do	Old Dominion Guano Co.'s Osceola Tobacco Guano.	Nashville	R	8.49	1.26	.86	2.12	2.57	3.03	3.03		2.30	19.24
7067	do	Powers, Gibbs & Co.'s Carolina Gold Belt Ammoniated Guano for Tobacco.	Tarboro	R	**7.70**	1.14	.90	**2.04**	2.48	**2.98**	2.98		2.30	**18.11**
	Brand claiming				**8.00**			**2.06**	**2.50**	**3.50**				**19.08**
7326	Va.-Car. Chemical Co., Richmond, Va.	N. C. Official Farmers' Alliance Guano.	Mebane	B	**6.64**	.80	2.22	3.02	3.67	3.41				21.50
	Brands claiming				**8.00**			**2.06**	**2.50**	**4.00**				**19.63**
7053	Armour Fertilizer Works, Atlanta, Ga.	Armour's Berry King Fertilizer	Wallace	R	**6.48**	1.06	1.06	2.12	2.57	4.22				**18.74**
7226	Navassa Guano Co., Wilmington, N. C.	Navassa Strawberry Top Dresser.	do	R	8.05	.86	1.30	2.16	2.62	4.30				20.43
	Brands claiming				**8.00**			**2.26**	**2.75**	**2.00**				**18.21**
7075	Farmers Cotton Oil Co., Wilson, N. C.	Wilson High Grade Guano	Farmville	R	**7.35**	.80	1.70	2.50	3.04	2.78				19.42
7165	N. C. Cotton Oil Co., Raleigh, N. C.	Raleigh Standard Guano	Nashville	R	8.90	.74	1.50	**2.24**	2.72	2.07				19.02
7187	Richmond Guano Co., Richmond, Va.	Carolina Cotton Grower	do	R	9.08	1.00	1.18	**2.18**	2.65	2.11				18.99
7062	Va.-Car. Chemical Co., Richmond, Va.	Southern Cotton Grower	Tarboro	R	9.51	.64	1.52	**2.16**	2.62	**1.81**				18.97
	Brand claiming				**8.00**			**2.26**	**2.75**	**2.50**				**18.76**
7188	Va.-Car. Chemical Co., Richmond, Va.	Delta	Nashville	R	8.21	.56	1.56	**2.12**	2.57	3.00				18.96
	Brand claiming				**8.00**			**2.26**	**2.75**	**4.00**				**20.41**
7343	Va.-Car. Chemical Co., Richmond, Va.	Lynchburg Guano Co.'s Solid Gold Tobacco Guano.	Henderson	R	8.86	.18	1.92	**2.10**	2.55	4.07	4.07		5.00	20.64
	Brand claiming				**8.00**			**2.47**	**3.00**	**2.00**				**19.03**
6995	Navassa Guano Co., Wilmington, N. C.	Navassa Special 3 Per Cent Guano.	Wilmington	R	8.21	1.08	1.38	**2.46**	2.09	2.11				19.30

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	MIXED FERTILIZERS.													
	Brand claiming				**8.00**			**2.47**	**3.00**	**2.00**				**$19.03**
7211	Va.-Car. Chemical Co., Richmond, Va.	Charlotte Oil and Fertilizer Co.'s Special 3 Per Cent Guano.	Lumberton	R	**7.46**	.90	1.48	**2.38**	2.89	2.67				**18.93**
	Brands claiming				**8.00**			**2.47**	**3.00**	**2.50**				**19.58**
7122	Acme Mfg. Co., Wilmington, N. C.	Acme Fertilizer	Chadbourn	R	**7.70**	.78	1.68	**2.46**	2.99	**2.47**				**19.24**
7059	do	Acme Fertilizer for Tobacco	Washington	R	**7.68**	.90	1.70	2.60	3.16	2.73	2.73		4.80	20.05
7011	Contentnea Guano Co., Wilson, N. C.	Contentnea Cotton Grower	Wilson	S	**7.55**	1.26	1.38	2.64	3.20	3.22				20.63
7303	N. C. Cotton Oil Co., Wilmington, N. C.	Wilmington Standard	Nashville	R	9.05	.82	1.56	**2.38**	2.89	2.93				20.65
7179	Va.-Car. Chemical Co., Richmond, Va.	Atlas Guano	Farmville	R	8.28	.86	1.54	**2.40**	2.91	2.75				19.84
7320	do	George Washington Plant Food for Tobacco.	Winston	S	8.06	.90	1.60	2.50	3.04	2.67	1.20	1.47	.90	19.94
	Brands claiming				**8.00**			**2.47**	**3.00**	**3.00**				**20.13**
7133	Acme Mfg. Co., Wilmington, N. C.	Pee Dee Special	Faison	R	**7.84**	1.10	1.68	2.78	3.37	3.00				21.20
7196	American Agricultural Chemical Co., New York, N. Y.	Lazaretto Special for Tobacco and Potatoes.	Edenton	S	8.17	1.60	.86	**2.46**	2.99	3.00	3.00		6.00	20.25
7052	American Fertilizer Co., Norfolk, Va.	American Eagle Guano	Wallace	R	8.50	1.00	1.38	**2.38**	2.89	3.25				20.51
7088	Armour Fertilizer Works, Baltimore, Md.	Armour's Cotton Special	Elizabeth City	R	**7.97**	1.52	1.00	2.52	3.06	3.04				20.34
7175	do	Armour's Special Fertilizer	Oak City	R	8.05	1.38	.92	**2.30**	2.79	**2.56**				**19.03**
7130	do	Armour's Special Tobacco Fertilizer.	Farmville	R	8.64	1.16	.84	**2.00**	2.43	**2.28**		2.28		**18.08**
7368	Arps, G. L., Norfolk, Va.	Arps' Tobacco Guano	Roper	S	8.26	1.68	1.06	2.74	3.33	3.07	3.07		7.00	21.50
7389	Atlantic Chemical Co., Norfolk, Va.	Atlantic High Grade Tobacco Guano.	Kinston	S	8.01	1.24	1.26	2.50	3.04	3.11	3.11		7.80	20.38
6950	Baugh & Sons Co., Norfolk, Va.	Baugh's Grand Rapid High Grade Truck Guano.	Elizabeth City	S	10.32	1.44	1.42	2.86	3.47	**2.88**				23.39
6935	do	Baugh's High Grade Tobacco Guano.	Edenton	R	**7.81**	1.80	.94	2.74	3.33	3.66	3.66		6.30	21.94
7135	Berkley Chemical Co., Norfolk, Va.	Berkley Tobacco Guano	Richlands	R	**7.97**	1.86	.96	2.82	3.42	3.15	3.15		7.30	21.63
6937	Bragaw, Wm., & Co., Washington, N. C.	Beaufort County Guano	Washington	R	8.17	.94	1.56	2.50	3.04	3.51				20.96
7437	Burton, C. J., Guano Co., Baltimore, Md.	Burton's Best	Henderson	R	**7.64**	1.34	1.10	**2.44**	2.96	3.07				**19.77**
7136	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Horne's Best	Mt. Olive	R	**7.90**	.62	2.10	2.72	3.30	3.41				21.47
7390	Clayton Oil Mill, Clayton, N. C.	Clayton Guano	Selma	R	**7.75**	.72	1.98	2.70	3.28	3.23				21.06

6923	Columbia Guano Co., Norfolk, Va.	Hyco Tobacco Guano	Kinston	S	**7.32**	1.46	1.04	2.50	3.04	3.06	3.06		8.90	**19.70**
7281	Contentnea Guano Co., Wilson, N. C.	Top Notch Fertilizer	Wilson	R	8.12	.70	1.96	2.66	3.23	3.06				21.05
7282	do	Pink Leaf Tobacco Fertilizer	do	R	8.12	.90	1.92	2.82	3.42	3.26	.66	2.60	1.50	21.89
7441	Cowell, Swan & McCotter, Bayboro, N. C.	Cowell's Great Tobacco Grower	Washington	S	8.85	1.20	1.56	2.76	3.35	**2.14**	2.14		2.80	21.08
7217	Craven Chemical Co., New Bern, N. C.	Duplin Tobacco Guano	Jacksonville	S	**7.76**	.72	1.94	2.66	3.23	**2.75**	2.75		3.30	20.38
7014	do	Foy's High Grade	Battleboro	R	8.06	.70	1.44	**2.14**	2.60	3.01				**19.91**
6970	Farmers Cotton Oil Co., Wilson, N. C.	Golden Gem Guano	Everetts	R	8.27	.72	1.80	2.52	3.06	3.65				21.28
7193	Floradora Guano Co., Laurinburg, N. C.	Oceola	Laurinburg	R	9.01	.36	2.20	2.56	3.11	4.01				22.50
7182	Hampton Guano Co., Norfolk, Va.	Hampton Tobacco Guano	Nashville	R	8.29	2.42	.88	3.30	4.00	3.04	3.04		6.00	23.67
6972	Hubbard, M. P., & Co., Baltimore, Md.	Gold Leaf Guano	Williamston	R	9.37	.26	2.60	2.86	3.47	**2.20**				22 00
6983	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Yellow Wrapper Guano.	New Bern	R	**7.58**	1.18	.80	2.58	3.13	3.97	3.97		10.20	21.25
6973	Imperial Co., Norfolk, Va.	Imperial Tobacco Guano	Williamston	S	**7.57**	1.48	1.16	2.64	3.20	3.33	3.33		6.50	20.77
7015	do	Imperial X. L. O. Cotton Guano	Edenton	R	8.60	1.34	1.14	2.48	3.01	3.20				20.93
6920	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' Gold Leaf Tobacco Guano.	Kinston	R	9.20	.68	1.52	**2.20**	2.67	3.24	3.24		5.40	20.42
7340	Miller Fertilizer Co., Baltimore, Md.	Standard Phosphate	Henderson	R	8.26	1.42	1.08	2.50	3.04	3.06				20.55
7436	do	Tobacco King	Oxford	R	**7.92**	1.48	1.02	2.50	3.04	3.10	3.10		6.70	20.29
6928	Navassa Guano Co., Wilmington, N. C.	Clarendon Tobacco Guano	Hamilton	R	8.02	1.06	1.52	**2.08**	2.53	3.35	3.35		5.60	20.96
7124	do	Navassa High Grade Guano	Trenton	S	**6.62**	1.22	1.30	2.52	3.06	3.65				**19.80**
6942	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Foy's High Grade Fertilizer	Edenton	R	8.00	.82	2.06	2.88	3.50	3.85				22.67
7047	do	Lenoir Bright Leaf Tobacco Grower.	Seven Springs	R	8.36	.58	2.36	2.94	3.57	3.43	3.43			22.76
7197	Norfolk Fertilizer Co., Norfolk, Va.	Oriana	Cisco	R	8.02	1.16	1.40	2.56	3.11	3.00				20.50
7202	N. C. Cotton Oil Co., Wilmington, N. C.	Wilmington High Grade	Spring Hope	R	8.98	.62	1.74	**2.36**	2.87	3.63				21.29
7183	Ober, G., & Sons Co., Baltimore, Md.	Ober's Special Compound for Tobacco.	do	R	8.62	1.62	1.08	2.70	3.28	3.20	3.20		5.20	21.81
7242	Pamlico Chemical Co., Washington, N. C.	Pamlico Success Guano	Clinton	S	8.50	1.04	1.44	2.48	3.01	3.50				21.17
6929	Pamlico Chemical Co., Wilmington, N. C.	Tobacco Growers' Friend	Washington	S	8.95	.96	1.60	2.56	3.11	3.05	3.05		1.20	21.39
7169	Patapsco Guano Co., Baltimore, Md.	Choctaw Guano	Rocky Mount	R	8.26	1.74	.92	2.66	3.23	3.10				21.22
7257	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Levering's Reliable Tobacco Guano.	Burlington	R	8.57	1.24	1.06	**2.30**	2.79	**2.84**	2.84		8.70	**19 81**
7016	do	Piedmont High Grade Ammoniated Bone and Potash.	Edenton	S	8.07	1.48	1.04	2.52	3.06	**2.64**				**19.99**
7334	Pocahontas Guano Co., Lynchburg, Va.	Farmers' Favorite Guano, Apex Brand.	Mt. Airy	S	8.30	1.54	.96	2.50	3.04	3.07				20.60
7493	Pocomoke Guano Co., Norfolk, Va.	Harvey's High Grade Monarch	Troutmore	S	8.37	1.86	.72	2.58	3.13	3.31				21.23
7139	do	Monarch Tobacco Grower	Richlands	R	8.47	1.92	.84	2.76	3.35	3.22	3.22		7.20	21.93
7071	Powhatan Chemical Co., Richmond, Va.	P. C. Co.'s Hustler	Kinston	R	8.27	.62	1.26	2.88	3.50	3.43				22 45
7279	Richmond Guano Co., Richmond, Va.	Gilt Edge Fertilizer	Wilson	S	**7.61**	1.48	.70	**2.18**	2.65	3.08				**18.74**
7475	Robertson Fertilizer Co., Norfolk, Va.	Big Cropper—High Grade	Parkton	R	8.10	1.42	1.00	**2.42**	2.94	**2.78**				**19 79**
6957	Royster, F. S., Guano Co., Norfolk, Va.	Bonanza Tobacco Grower	Greenville	R	**7.31**	1.14	1.20	**2.34**	2.84	3.63	3.63		9.90	**19.70**
7240	Scotland Neck Guano Co., Scotland Neck, N. C.	Josey's C. S. Meal Tobacco Guano.	Scotland Neck	R	9.02	.82	1.80	2.62	3.18	4.28	4.28		7.50	23.04
7083	Southern Cotton Oil Co., Goldsboro, N. C.	Edgerton's Old Reliable	Enfield	R	8.67	1.30	1.60	2.90	3.52	**1.62**				20.89
7429	Southern Cotton Oil Co., Shelby, N. C.	Moon High Grade Fertilizer	Shelby	R	8.74	1.00	1.66	2.66	3.23	**2.50**				20.99
7195	Southern Exchange Co., Maxton, N. C.	Jack's Best Fertilizer	Maxton	S	8.30	1.80	.86	2.66	3.23	3.26				21.43
7491	Statesville Oil and Fertilizer Co., Statesville, N. C.	King Cotton Soluble Guano	Sherrill's Ford	R	**7.15**	.88	1.40	**2.28**	2.77	3.18				20 62

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
					MIXED FERTILIZERS.									
	Brands claiming				**8.00**			**2.47**	**3.00**	**3.00**				**$20.13**
7300	Swift Fertilizer Works, Wilmington, N. C.	Swift's Ruralist High Grade Guano.	Bellehoro	R	8.80	1.36	1.06	**2.42**	2.94	**2.97**				20.62
7347	Union Abattoir Co., Baltimore, Md.	Red Star	Edenton	R	8.40	1.46	.56	**2.02**	2.45	**2.57**				**18.26**
7256	Union Guano Co., Winston, N. C.	Union Homestead Guano	Burlington	D	9.28	1.42	1.10	2.52	3.06	**2.48**				20.89
7415	---do	Victoria High Grade Tobacco Fertilizer.	Louisburg	S	8.17	1.52	.74	**2.26**	2.74	**2.54**	2.54		2.00	**18.96**
7152	Upshur, R. L., Norfolk, Va.	Upshur's Cotton Guano	Edenton	S	8.47	1.24	1.26	2.50	3.01	3.33				21.03
7020	Va.-Car. Chemical Co., Richmond, Va.	Allison & Addison's A. A. Guano	---do	R	**6.81**	1.30	1.52	2.82	3.42	3.78				21.28
6961	---do	Davie & Whittle's Owl Brand Guano for Tobacco.	Greenville	S	8.02	1.06	1.66	2.72	3.30	3.28	3.28		7.00	21.43
7084	---do	Durham Fertilizer Co.'s Gold Medal Brand.	Washington	R	8.22	1.00	1.44	**2.44**	2.96	3.16				20.39
7050	---do	Norfolk & Car. Co.'s Amazon High Grade Manure.	Warsaw	R	**7.99**	1.22	1.08	**2.30**	2.79	3.48				**19.99**
7065	---do	Norfolk & Car. Co.'s Bright Leaf Tobacco Grower.	Washington	R	8.46	.84	1.74	2.58	3.13	**2.91**	2.91		3.30	20.88
7467	---do	Old Dominion Farmers' High Grade Fertilizer.	Winston	S	8.49	2.08	.64	2.72	3.30	**2.94**				21.21
7064	---do	Old Dominion Farmers' Friend Special Tobacco Fertilizer.	Washington	R	9.44	2.12	.38	2.50	3.04	3.20	3.20		2.70	21.77
7106	---do	Powers, Gibbs & Co.'s Old Kentucky High Grade Tobacco Manure.	Robersonville	R	8.42	.86	1.86	2.72	3.30	3.12	3.12		3.80	21.62
6933	---do	Special High Grade Tobacco Fertilizer.	Washington	R	**7.53**	1.12	1.92	3.04	3.69	3.39	3.39		3.50	22.36
7276	---do	Va. State Fertilizer Co.'s Dunnington's Special Formula for Tobacco.	Wilson	D	8.78	1.82	.74	2.56	3.11	3.45	3.45		3.20	21.68
	Brands claiming				**8.00**			**2.47**	**3.00**	**4.00**				**21.23**
6979	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Royal Ensign	New Bern	S	8.45	1.50	.80	**2.30**	2.79	4.32				21.33
7017	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Privott's Guano 3-8-4	Edenton	R	8.68	1.00	1.36	**2.36**	2.87	**3.46**				**21.02**
6958	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Lion High Grade Tobacco Fertilizer.	---do	R	8.38	.74	1.68	**2.42**	2.99	**3.65**	3.65		5.90	**20.99**

	Brand claiming			8.00			2.47	3.00	5.00					22.33
7280	Contentnea Guano Co., Wilson, N. C.	Howard & Williams' Special for Cotton.	Wilson	R	8.99	1.12	1.48	2.60	3.16	5.07				23.81
	Brands claiming			8.00			2.47	3.00	1000					27 83
7091	Armour Fertilizer Works, Baltimore, Md.	Armour's Truck and Berry Special Fertilizer.	Elizabeth City	R	7.48	1.38	1.12	2.50	3.04	9 87				27 34
6993	Baugh & Sons Co., Norfolk, Va.	Baugh's Fruit and Berry Guano.	Chadbourn	R	8.85	1.42	1.38	2.80	3.40	9 50				29.33
	Brand claiming			8.00			2 87	3.48	7.50					28 64
7205	Camp, W. H., Petersburg, Va.	Camp's Prepared Chemicals, Yellow Head.	Washington	S	9.73	2.54	.52	3.06	3.71	7.50				28.94
	Brand claiming			8.00			3.29	4.00	3.00					23 37
6962	Va.-Car. Chemical Co., Richmond, Va.	Travers & Co.'s Capital Tobacco Fertilizer.	Greenville	R	7.96	1.90	1.76	3.66	4.44	3.15	3.15		5.00	23.53
	Brands claiming			8.00			3.29	4 00	4.00					24 47
7134	Acme Manufacturing Co., Wilmington, N. C.	Quick Step Fertilizer	Faison	R	8.41	1.62	1.72	3.34	4.05	3 92				24.91
7344	American Fertilizer Co., Norfolk, Va.	N. C. and S. C. Cotton Grower	Edenton	R	8.65	2.10	1.40	3.50	4.25	4.71				26.61
6992	Armour Fertilizer Works, Atlanta, Ga.	Armour's Special Truckers' Fertilizer.	Wilmington	R	7.03	1.60	1.72	3.32	4.03	4.01				23 68
7035	Baugh & Sons Co., Norfolk, Va.	Baugh's Fish, Bone and Potash.	New Bern	D	9.06	1.90	1.50	3.40	4.13	4.62				26.50
7137	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Special	Mt. Olive	S	8.39	1.98	1.38	3.36	4.08	4.34				25.43
7216	Craven Chemical Co., New Bern, N. C.	Hanover Standard Guano	Clinton	S	8.13	1.82	1.44	2.86	3.47	4.90				23.86
7325	Floradora Guano Co., Laurinburg, N. C.	Floradora	Maxton	R	8.90	1.52	1.84	3.36	4.08	4.42				25.98
7629	Imperial Co., Norfolk, Va.	Snow Flake Cotton Guano	Palmyra	R	7.89	2 74	.82	3.56	4.32	3.81				25.17
6918	Martin, D. B., Co., Baltimore, Md.	Martin's Red Steer Brand Fertilizer.	Goldsboro	S	7.66	2.80	.52	3.32	4 03	4.00				24.24
7060	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' Ideal Tobacco Guano	Greenville	R	8.13	2.02	1.38	3.40	4.13	4.20	4.20		3.60	25.18
7028	Miller's Fertilizer Co., Baltimore, Md.	Miller's Irish Potato	Elizabeth City	R	7.66	1.60	1.58	3 18	3.86	4.30				24 03
6996	Navassa Guano Co., Wilmington, N. C.	Navassa Special Truck Guano	Wilmington	R	8.68	2.78	.30	3.08	3.74	4.23				24.47
7210	do	Tobacco Guano	Whiteville	R	8.17	2.08	1.02	3 10	3.76	4.11	4.11		5.20	23 96
7138	do	Coree Tobacco Guano	Rose Hill	R	8.52	2.86	.36	3.22	3.91	3.66	3 66		6.10	24 25
7046	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Oriole Tobacco Grower	Seven Springs	R	8.40	1.27	2.17	3.44	4.18	3 88	1 06	2.82	0.80	25.24
7362	Planters Fertilizer and Phosphate Co., Charleston, S. C.	Planters' Special Cotton Fertilizer.	Boardman	R	7.76	1.94	1.38	3.32	4.03	3.94				24 27
7072	Powhatan Chemical Co., Richmond, Va.	North State Special	Kinston	S	8.52	2.22	.90	3 12	3.79	3.77				23 99
7498	Royster, F. S., Guano Co., Norfolk, Va.	Truckers' Delight	Greensboro	S	7.85	1.72	1.28	3.00	3.64	3 55				22 67
7473	Southern Cotton Oil Co., Gibson, N. C.	Conquerors' High Grade Fertilizer.	Raeford	R	7 25	1.40	1.70	3.10	3.76	3.32				22 27
7449	Southern Cotton Oil Co., Fayetteville, N. C.	Special Mixture	Fayetteville	R	8.12	1.54	1.64	3.18	3.86	4.57				24.74
7054	Swift Fertilizer Works, Wilmington, N. C.	High Grade Monarch Vegetable Grower.	Burgaw	R	8.22	.84	2.32	3.16	3.84	3 98				24.10
7001	Union Guano Co., Winston-Salem, N. C.	Union Premium Guano	Mt. Olive	R	8.34	3.62	.24	3 86	4.69	3 99				26.95
6960	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Special	Edenton	R	8.18	1.48	2.04	3.52	4.27	3 94				25.42
7140	do	do	Faison	R	8.50	1.88	1.36	3 24	3.93	3 64				24 29

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ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
			MIXED FERTILIZERS.											
	Brand claiming				**8.00**			**3.30**	**4.00**	**7 00**				**$27.69**
6980	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Blood, Bone and Potash.	New Bern	R	**7.47**	1.74	1.24	**2.98**	3.62	**6.71**				**25.72**
	Brand claiming				**8.00**			**3.29**	**4.00**	**5 00**				**25.57**
6947	Va.-Car. Chemical Co., Richmond, Va.	Powers, Gibbs & Co.'s Truck Farmers' Special Ammoniated Guano.	Elizabeth City	S	8.92	2.68	1.06	3.74	4.54	**4 98**				28.09
	Brand claiming				**8.00**			**3.70**	**4.50**	**7.00**				**29.33**
7101	Farmers Cotton Oil Co., Wilson, N. C.	Dean's Special Guano	Everetts	R	**7 95**	2.26	2.26	4.52		**6 40**				31.82
	Brand claiming				**8 00**			**4 12**	**5 00**	**3 00**				**26.57**
7207	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s Special Plant and Truck Fertilizer.	Elizabeth City	D	8.67	2.86	1.34	4 20	5.10	3.21				27.71
	Brands claiming				**8 00**			**4 12**	**5 00**	**5 00**				**28.77**
7037	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' LaBoss Guano	New Bern	R	8.47	2.68	1.28	**3 96**	4.81	5.08				**28 65**
7350	Va.-Car. Chemical Co., Richmond, Va.	Electric Truck Grower, Top Dresser.	Edenton	S	**7.59**	2.86	1.14	**4 00**	4.86	5.35				**28 29**
	Brands claiming				**8 00**			**4 12**	**5.00**	**7 00**				**30 97**
7090	Armour Fertilizer Works, Baltimore, Md.	Armour's Bone, Blood and Potash Fertilizer.	Elizabeth City	R	8.09	2.54	2.00	4.54	5.27	**6 92**				31.82
7030	Pamlico Chemical Co., Washington, N. C.	Cowell's Great Potato Grower	Washington	R	**7 96**	2.26	1.90	4.16	5.05	7.80				31.97
6998	Southern Exchange Co., Maxton, N. C.	McKinnon's Special Truck Formula.	Wilmington	S	8.54	3.28	.86	4.14	5.03	**6 81**				31.32
	Brand claiming				**8 00**			**4 91**	**5 96**	**6 00**				**32 95**
7114	Va.-Car. Chemical Co., Richmond, Va.	Tinsley's Irish Potato Guano	Edenton	R	**6.82**	3.46	1.64	5.10	6.19	6.43				33.10
	Brand claiming				**8.50**			**1.65**	**2.00**	**1.50**				**15.74**
7423	American Fertilizer Co., Norfolk, Va.	Peruvian Mixture	Thomasville	S	9.88	.72	1.00	1.72	2.09	1.67				17.44
	Brand claiming				**8.50**			**1.65**	**2.00**	**2.00**				**16.27**
7224	Pocomoke Guano Co., Norfolk, Va.	Pocomoke Superphosphate	Wilmington	R	9.27	1.30	.60	1.90	2.31	2.26				18.24
	Brand claiming				**8.50**			**2.00**	**2.43**	**2 50**				**18 20**
7302	Pocomoke Guano Co., Norfolk, Va.	Cinco Tobacco Guano	Battleboro	R	8.63	1.24	.84	2.08	2.53	2.55	2.55		6.40	18.68
	Brand claiming				**8.50**			**2.26**	**2.74**	**2.00**				**18 66**
7189	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Anchor Brand Tobacco Fertilizer.	Nashville	R	9.04	1.62	.76	2.38	2.89	**1.61**	1.47	.61	1.10	19.19
	Brands claiming				**9.00**			**82**	**1.00**	**2 00**				**13.50**
7255	Ober, G., & Sons Co., Baltimore, Md.	Ober's Farmers' Mixture	Hillsboro	S	10.22	.56	.44	1.00	1.21	2.41				15.75

7253	Rasin Monumental Co., Baltimore, Md.	Rasin's Baltimore Special Mixture.	Durham	R	9.19	.02	.82	.84	1.02	2.26				14.03
7382	Reidsville Fertilizer Co., Reidsville, N. C.	Reidsville Hustler	Thomasville	R	10.30	.16	.50	**.66**	.80	2.69				14.80
7229	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Little Giant Grain and Grass Grower.	Winston-Salem	R	9.87	.36	.48	.84	1.02	**1.92**				14.27
	Brands claiming				**9.00**			**.82**	**1.00**	**3.60**				**14.60**
7377	Patapsco Guano Co., Baltimore, Md.	Coon Brand Guano	Cherryville	R	9.02	.56	.66	1.22	1.48	**2.98**				16.15
7358	Va.-Car. Chemical Co., Richmond, Va.	Bigelow's Crop Guano	Lincolnton	D	9.70	.22	.72	.94	1.14	**2.72**				15.39
	Brand claiming				**9.00**			**1.65**	**2.00**	**1.00**				**15.64**
7252	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Star Brand Guano	Durham	R	**8.87**	.28	1.56	1.84	2.23	1.12				16.38
	Brand claiming				**9.00**			**1.65**	**2.00**	**2.00**				**16.73**
7342	Pocahontas Guano Co., Lynchburg, Va.	Yellow Tobacco Special	Creedmoor	S	9.15	.90	.88	1.78	2.16	2.06	2.06		6.20	17.44
	Brand claiming				**9.00**			**1.65**	**2.00**	**4.00**				**18.94**
7080	Hampton Guano Co., Norfolk, Va.	Arlington Animal Bone Fertilizer.	Nashville	R	**9.07**	.36	1.18	**1.56**	1.89	4.00				**18.65**
	Brands claiming				**9.00**			**1.85**	**2.25**	**4.00**				**19.71**
7332	Pocahontas Guano Co., Lynchburg, Va.	High Grade 4 Per Cent Tobacco Compound.	Mt. Airy	R	9.44	.24	1.54	**1.78**	2.16	4.21	4.21		8.60	20.07
7301	Pocomoke Guano Co., Norfolk, Va.	Monticello Animal Bone Fertilizer.	Whitakers	R	9.10	1.26	.78	2.04	2.48	4.27				20.84
	Brand claiming				**9.00**			**2.06**	**2.50**	**2.00**				**18.33**
7394	Va.-Car. Chemical Co., Richmond, Va.	Davie & Whittle's Owl Brand Special Tobacco Guano.	Stoneville	S	9.25	.90	1.16	2.06	2.50	2.72	2.72		4.30	19.35
	Brand claiming				**9.00**			**2.06**	**2.50**	**3.00**				**19.43**
7079	Va.-Car. Chemical Co., Richmond, Va.	Norfolk and Carolina Chemical Co.'s Cooper's Special Bright Tobacco Fertilizer.	Farmville	D	**7.20**	.70	1.82	2.52	3.06	**2.75**	2.75		5.00	**19.33**
	Brand claiming				**9.00**			**2.06**	**2.50**	**5.00**				**21.63**
7222	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Sun Brand Guano	Benson	R	9.09	2.08	.44	2.52	3.06	**4.94**				23.86
	Brands claiming				**9.00**			**2.26**	**2.75**	**2.00**				**19.16**
6922	Acme Manufacturing Co., Wilmington, N. C.	Acme Cotton Grower	Goldsboro	R	**8.80**	1.34	1.62	2.96	3.59	2.58				22.30
7098	Baugh & Sons Co., Norfolk, Va.	Hassell's Tobacco Guano	Williamston	R	9.38	.90	1.50	2.40	2.91	2.42	2.42		6.10	20.46
7203	Bragaw Fertilizer Co., Washington, N. C.	Farmers' Union Meal Mixture	Washington	R	9.32	1.20	1.60	2.80	3.40	2.57				22.13
7068	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Pacific Tobacco and Cotton Grower.	LaGrange	R	**8.64**	1.02	1.40	2.42	2.94	3.22	3.22		3.30	20.76
7026	Imperial Co., Norfolk, Va.	Imperial Martin County Special Crop Grower.	Edenton	R	9.60	.84	1.54	2.38	2.89	2.25				20.39
7472	MacMurphy Co., Charleston, S. C.	Wilcox, Gibbs & Co.'s Star Guano.	Maxton	D	9.77	.78	1.66	2.44	2.96	2.27				20.80
7159	Norfolk Fertilizer Co., Norfolk, Va.	Oriana Crop Grower	Pinetop	S	9.44	.78	1.38	**2.16**	2.62	2.54				19.71
6955	Pamlico Chemical Co., Washington, N. C.	Prosperity Cotton Grower	Washington	R	9.05	2.34	1.38	2.72	3.30	2.50				21.50
7077	Roberson, J. H., Co., Robersonville, N. C.	Roberson's Cotton Grower	Robersonville	R	10.18	.80	1.66	2.46	2.99	2.17				21.14
7131	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Meal Mixture	Parmele	R	9.56	.72	1.62	2.34	2.84	2.15				20.08
7103	Southern Cotton Oil Co., Goldsboro, N. C.	Best and Thompson's Special Cotton Grower.	Williamston	R	9.05	.58	1.80	2.38	2.89	2.28				19.83
6959	Va.-Car. Chemical Co., Richmond, Va.	Prolific Cotton Grower	Edenton	R	9.10	.70	1.72	2.42	2.94	2.06				19.62
6969	do	White Stem	Williamston	R	9.41	.64	1.50	**2.14**	2.60	2.07				**19.09**

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Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	MIXED FERTILIZERS.													
	Brand claiming				**9 00**			**2 26**	**2 75**	**3 00**				**$20 26**
7337	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Star Brand Special Tobacco Manure.	Mt. Airy	R	9.17	1.06	1.28	2.34	2.84	**2 01**	2.01		6.00	**19.59**
	Brands claiming				**9 00**			**2 47**	**3 00**	**3 00**				**21.03**
7214	Armour Fertilizer Works, Wilmington, N. C.	African Cotton Grower	Benson	D	**8 85**	1.30	1.00	**2 30**	2.79	**2 95**				**20.18**
7120	N. C. Cotton Oil Co., Henderson, N. C.	Franklin Tobacco Fertilizer	Henderson	D	9.07	.92	1.54	**2 46**	2.99	**2.16**	.40	1.76	.30	**20.13**
7341	---do	Uneedit Fertilizer	---do	D	9.19	1.18	1.16	**2.34**	2.84	**2.95**				**20.64**
6967	Patapsco Guano Co., Baltimore, Md.	Patapsco Tobacco Fertilizer	Bethel	R	9.34	1.78	.98	2.76	3.35	3.01	3.01		6 00	22.48
7356	Pocahontas Guano Co., Lynchburg, Va.	Special Pocahontas Tobacco Fertilizer.	Henderson	S	9.65	1.58	1.02	2.60	3.16	3.01	3.01		5.70	22.13
7395	Va.-Car. Chemical Co., Richmond, Va.	Lynchburg Guano Co.'s Bright Belt Guano.	Winston-Salem	R	**8.84**	1.54	1.22	2.76	3.35	**1.89**	1.33	.56	1.00	**20.80**
	Brand claiming				**9.00**			**2.88**	**3 50**	**5.00**				**24.80**
6965	American Fertilizing Co., Norfolk, Va.	Pitt County Special Fertilizer	Greenville	R	**8 79**	2.00	1.46	3.46	4.20	6.11				28 12
	Brand claiming				**9 00**			**2 88**	**3 50**	**9 00**				**29 20**
7023	American Fertilizing Co., Norfolk, Va.	Strawberry and Asparagus Guano.	Elizabeth City	R	**8 86**	1.96	.96	2.92	3.54	9.75				30.09
	Brand claiming				**9 25**			**2 06**	**2 50**	**2 00**				**18.56**
7164	Patapsco Guano Co., Baltimore, Md.	Patapsco Guano	Nashville	R	9.58	1.28	.88	2 16	2.62	2.13				19.39
	Brand claiming				**7 00**			**2 00**	**2.43**	**5.00**				**19.60**
6971	Hubbard, M. P., & Co., Baltimore, Md.	Hobgood's Special Cotton and Corn Fertilizer.	Williamston	R	8.60	.30	1.44	**1.74**	2.11	5.25				20.30
	Brand claiming				**7.00**			**2 47**	**3 00**	**5.00**				**21.43**
7417	Martin, D. B., & Co., Richmond, Va.	Martin's Claremont Vegetable Guano.	Louisburg	R	8.87	1.54	.58	**2.12**	2.57	**4.14**				**20.80**
					7.00			**2.55**	**3.10**	**3.20**				**19.78**
	Brand claiming													
7278	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Formula 44 Tobacco Fertilizer.	Wilson	S	7.47	1.64	1.06	2.70	3.28	3.37	2.80	.57	2.10	20.96
	Brands claiming				**7.00**			**3.30**	**4.00**	**4.00**				**23.57**
7388	American Fertilizing Co., Norfolk, Va.	American Fish Scrap Guano	Ayden	R	**6.42**	.88	1.94	**2.82**	3.42	**3.77**				**20.92**
6997	Pocomoke Guano Co., Norfolk, Va.	Faultless Ammoniated Superphosphate.	Wilmington	S	7.22	2.24	1.12	3.36	4.08	**3.93**				23.92
	Brand claiming				**7.00**			**3.30**	**4.00**	**5.00**				**24.67**
7167	Union Guano Co., Winston, N. C.	Union Guano Co.'s Truck Guano	Nashville	R	7.85	1.74	1.18	**2.92**	3.54	**3 65**				**22.49**

	Brand claiming				**7.00**			**3.70**	**4.50**	**8.00**					**27.33**
7219	Patapsco Guano Co., Baltimore, Md.	Money Maker Guano	Mt. Olive	R	7.43	2.60	1.24	3.84	4.66	6.11					28.38
	Brand claiming				**7.00**			**3.36**	**4.08**	**8.00**					**28.24**
6953	Baugh & Sons Co., Norfolk, Va.	Glover's Special Potato Guano	Elizabeth City	R	7.92	1.58	1.92	3.50	4.25	8.68					30.22
	Brands claiming				**7.00**			**4 12**	**5.00**	**5.00**					**27.87**
7108	American Agricultural Chemical Co., New York, N. Y.	Lazaretto Early Trucker	Elizabeth City	S	7.55	2.90	1.60	4.50	5.46	5.25					30.12
7013	American Fertilizer Co., Norfolk, Va.	American Irish Potato Grower	Elizabeth City	S	7.22	2.66	1.34	**4.00**	4.86	5.00					**27.59**
7107	Atlantic Guano Co., Norfolk, Va.	Atlantic Potato Guano	Hertford	R	7.20	1.98	2.20	4.18	5.07	5.18					28.48
6974	Hubbard, M. P., & Co., Baltimore, Md.	Hubbard's Maryland Special Vegetable Grower.	Williamston	R	7.32	2.25	2.16	4.41	5.35	**3.80**					29.76
7061	Pamlico Chemical Co., Washington, N. C.	Pamlico Favorite Potato Guano	Washington	R	7.75	2.20	1.90	4.10	4.98	5.37					28.87
7029	Pocomoke Guano Co., Norfolk, Va.	Standard Truck Guano	Edenton	R	7.39	2.86	1.56	4.42	5.37	5.26					29.67
7470	Swift Fertilizer Works, Wilmington, N. C.	Swift's Early Trucker	Scotland Neck	R	**6.58**	2.48	1.50	**3.98**	4.83	5.81					**27.83**
7096	Va.-Car. Chemical Co., Richmond, Va.	Konqueror High Grade Truck Fertilizer.	Elizabeth City	D	7.21	2.48	1.78	4.26	5.17	5.28					28.91
	Brand claiming				**7.00**			**4 12**	**5.00**	**6.00**					**28.97**
7031	Upshur, R. L., Norfolk, Va.	Upshur's Farmers' Favorite Guano.	Edenton	R	**6.81**	2.12	2.18	4.30	5.22	7.05					30.65
	Brands claiming				**7.00**			**4.12**	**5.00**	**7.00**					**30.07**
7218	Craven Chemical Co., New Bern, N. C.	Pantego Potato Guano	Mt. Olive	R	7.42	2.76	1.56	4.35	5.28	**6.75**					31.07
6943	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Ives' Irish Potato Guano	Edenton	S	7.64	1.56	2.44	**4.00**	4.86	7.26					30.46
	Brand claiming				**7.00**			**6.58**	**8.00**	**5.00**					**37.46**
6938	Dixie Agricultural Co., Washington, N. C.	Honeypod Special Trucker	Washington	R	7.43	3.14	1.24	**4.38**	5.32	8.39					**33.25**
	Brands claiming				**7.00**			**4 12**	**5.00**	**8.00**					**31.13**
7039	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' Great Potato Guano	New Bern	S	7.64	2.54	1.50	**4.04**	4.90	**7.68**					31.28
7111	Upshur, R. L., Norfolk, Va.	Upshur's Special Truck Guano	Elizabeth City	R	7.07	2.12	2.46	4.58	5.56	8.84					33.98
7021	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Co.'s Potato Manure.	Hertford	R	**6.85**	3.34	1.08	4.42	5.37	8.09					32.30
	Brand claiming				**7.00**			**4.94**	**6.00**	**5.00**					**31.07**
7102	Richmond Guano Co., Richmond, Va.	Special for Truck	Robersonville	S	7.29	1.50	3.26	**4.76**	5.78	5.27					**30.92**
	Brand claiming				**7.00**			**4.71**	**5.72**	**8.00**					**33.47**
7288	Imperial Co., Norfolk, Va.	High Grade Irish Potato Guano	Washington	R	**6.38**	3.96	2.16	6.12	7.43	**7.75**					38.13
	Brands claiming				**7.00**			**5.76**	**7.00**	**7.00**					**36.46**
6964	American Fertilizing Co., Norfolk, Va.	American 7-7-7 for Irish Potatoes	Greenville	R	7.22	4.32	1.26	**5.58**	6.77	7.27					**36.06**
7290	Imperial Co., Norfolk, Va.	Imperial 7-7-7 Potato Guano	Washington	R	7.40	4.24	1.64	5.88	7.14	7.25					37.57
7286	Pamlico Chemical Co., Washington, N. C.	Pamlico 7-7-7 Guano	----do	R	7.14	2.44	1.94	**4.38**	5.32	8.65					**33.02**
7038	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' Great Cabbage Guano	New Bern	S	**6.98**	4.06	1.20	**5.26**	6.39	7.34					**34.87**
7104	Va.-Car. Chemical Co., Richmond, Va.	Atlantic and Va. Fertilizer Co.'s Carolina Trucker.	Robersonville	R	7.50	2.06	3.24	**5.30**	6.43	7.19					**35.33**
7238	----do	Durham Fertilizer Co.'s Best Potato Manure.	Oak City	S	7.07	2.54	3.18	**5.72**	6.94	7.67					37.11
7105	----do	Old Dominion Guano Co.'s 7-7-7 Truck Guano.	Oakley	R	7.24	2.72	2.62	**5.34**	6.48	9.20					37.46

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
	MIXED FERTILIZERS.													
	Brand claiming				7.00			6 15	7 47	10 00				$41 28
7204	Camp, W. H., Petersburg, Va.	Extra Special for Irish Potatoes.	Washington	R	7 62	5.26	.40	5 66	6.87	9 83				39.77
	Brand claiming				6 00			1 65	2.00	6 00				18.43
7418	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Guano Co.'s Special Sweet Potato Guano.	Wilkesboro	R	8.49	.70	.86	1.56	1.89	4.68				18.87
	Brand claiming				6 00			2.47	3.00	7.00				22.73
7371	Ober, G., & Sons Co., Baltimore, Md.	Ober's Special Potash Compound for Tobacco.	Greenville	R	6.94	1.66	1.04	2.70	3.28	8.10	8.10	11.50		25.69
	Brand claiming				6 00			3.30	4.00	4.00				22.67
7056	Va.-Car. Chemical Co., Richmond, Va.	Tinsley & Co.'s Strawberry Grower.	Wallace	R	6.05	1.42	1.88	3.30	4.00	4.29				23.03
	Brand claiming				6.00			3.30	4.00	7 00				25 97
7289	Martin, D. B., Co., Richmond, Va.	Martin's Early Truck and Vegetable Grower.	Washington	N	8.05	3.42	.42	3.84	4.66	6.03				28.85
	Brands claiming				6.00			3.30	4.60	8.00				27 07
6990	Acme Manufacturing Co., Wilmington, N. C.	Acme Truck Grower	Chadbourn	R	6.28	1.40	1.64	3.04	3.69	7.32				25 56
7439	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Vegetable Compound	Elizabeth City	R	6.59	1.72	1.16	2.88	3.50	9.12				27.19
	Brand claiming				6.00			3.30	4.00	10 00				29 27
6977	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Special Potato Guano.	New Bern	R	6.36	2.54	.66	3.20	3.88	10 08				29.29
	Brands claiming				6.00			4.12	5.00	5.00				26.97
6951	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano Substitute for Potatoes, etc.	Elizabeth City	R	6.87	2.14	2.06	4.20	5.10	7.01				30.27
7156	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's 5 Per Cent Royal Seal Compound for Potatoes.	Bethel	R	6.03	2.92	.74	3 86	4.44	5.55				25.80
	Brands claiming				6.00			4.12	5.00	7.00				29.17
6994	Baugh & Sons Co., Norfolk, Va.	Baugh's Peruvian Guano Substitute for Potatoes.	Chadbourn	R	6.67	2.18	2.10	4.28	5.20	7.02				30.42
7024	Imperial Co., Norfolk, Va.	5-6-7 Potato Guano	Edenton	R	6.42	2.14	2.20	4.34	5.27	7.00				30.40
7027	Miller Fertilizer Co., Baltimore, Md.	Miller's High Grade Potato	Elizabeth City	D	6.46	3.16	1.88	4.04	4.90	7.02				29.29
7206	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Early Vegetable Manure.	----do	R	6.92	2.56	1.20	3.76	4.56	6.83				28.40
7221	Swift Fertilizer Works, Wilmington, N. C.	Swift's Special Potato Grower	Mt. Olive	R	6.90	1.04	3.12	4.16	5.05	7.08				30.22

7097	Va.-Car. Chemical Co., Richmond, Va.	Va.-Car. Special Truck Fertilizer.	Elizabeth City	R	**5.95**	2.60	1.40	**4.00**	4.86	**7.95**					29.70
	Brands claiming				**8.00**			**5.78**	**7.00**	**5.00**					**33.40**
6934	American Agricultural Chemical Co., New York, N. Y.	Lazaretto Truckers' Favorite	Washington	R	6.51	4.52	1.44	5.94	7.21	5.34					34.89
7089	Armour Fertilizer Works, Baltimore, Md.	Armour's 7 Per Cent Trucker Fertilizer.	Elizabeth City	R	**5.73**	4.42	1.18	**5.60**	6.80	**4.89**					**32.37**
6949	Baugh & Sons Co., Norfolk, Va.	Baugh's 7 Per Cent Guano	do	R	6.79	4.34	1.56	5.90	7.16	5.21					34.85
7099	Bragaw Fertilizer Co., Washington, N. C.	Riverview Trucker	Oakley	R	6.84	3.52	2.08	**5.60**	6.80	5.00					33.50
7429	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Special Truck Fertilizer.	Hobgood	R	7.02	3.54	1.46	**5.00**	6.07	6.03					**32.45**
7110	Pocomoke Guano Co., Norfolk, Va.	Seaboard Popular Trucker	Elizabeth City	R	6.39	4.40	1.60	6.00	6.07	5.25					34.92
7076	Roberson, J. H., Robersonville, N. C.	Roberson's Potato Grower	Robersonville	R	**5.55**	3.60	2.42	6.02	7.31	5.70					34.74
7113	Upshur, R. L., Norfolk, Va.	Upshur's 7 Per Cent Irish Potato Guano.	Elizabeth City	S	**5.72**	3.16	2.52	**5.68**	6.90	5.51					**33.36**
7351	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Guano Co.'s 6-7-5 Truck Guano.	Edenton	R	6.84	4.14	1.52	**5.66**	6.87	6.38					35.25
	Brand claiming				**6.40**			**2.13**	**2.60**	**3.00**					**17.37**
7192	Floradora Guano Co., Laurinburg, N. C.	Scotland Special	Laurinburg	S	7.59	.24	1.96	2.20	2.67	3.95					19.75
	Brand claiming				**5.00**			**4.12**	**5.00**	**5.00**					**26.07**
6952	Baugh & Sons Co., Norfolk, Va.	Baugh's 5-6-5 Guano	Elizabeth City	R	7.52	1.98	2.28	4.26	5.17	6.29					30.20
	Brand claiming				**5.00**			**5.76**	**7.00**	**5.00**					**32.46**
7081	Imperial Co., Norfolk, Va.	Imperial Special 7 Per Cent for Potatoes and Early Truck.	Washington	R	5.05	3.69	2.27	5.96	7.24	5.40					34.27
	Brand claiming				**5.00**			**8.25**	**10.00**	**2.50**					**39.43**
7287	Pamlico Chemical Co., Washington, N. C.	Cowell's Great Cabbage Grower	Washington	S	5.15	6.24	2.16	8.40	10.20	**2.44**					40.08
	Brand claiming				**4.00**			**8.25**	**10.02**	**4.00**					**43.17**
6981	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's 10 Per Cent Trucker Guano.	New Bern	R	5.09	5.24	2.14	**7.38**	8.96	**3.96**					**38.26**
	Brand claiming				**4.00**			**3.29**	**4.00**	**6.00**					**22.99**
7025	Imperial Co., Norfolk, Va.	Imperial Laughinghouse Special	Edenton	R	4.77	1.36	2.12	3.48	4.22	6.20					24.68
	Brand claiming				**4.00**			**2.47**	**3.00**	**5.00**					**18.73**
7157	Imperial Co., Norfolk, Va.	Cubanola Tobacco Guano	Stokes	R	4.72	1.26	1.36	2.62	3.18	5.27	5.27		5.20		20.37
	Brand claiming				**10.00**			**.82**	**1.00**	**1.00**					**14.00**
7372	Richmond Guano Co., Richmond, Va.	Bone Mixture	Edenton	R	10.29	1.02	.68	1.70	2.06	.98					16.97
	Brand claiming				**10.00**			**2.47**	**3.00**	**7.00**					**26.33**
7324	Floradora Guano Co., Laurinburg, N. C.	Rocky Ford	Laurinburg	R	10.32	1.90	.60	2.50	3.04	7.96					27.79
	Brands claiming				**8.00**					**4.00**					**11.60**
7268	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Buncombe Corn Grower	Walkertown	R	9.44					4.12					13.03
7295	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	Greensboro	R	**7.79**					4.50					11.96
7385	Farmers Guano Co., Raleigh, N. C.	Special Bone and Potash Mixture.	Thomasville	D	9.77					**3.69**					12.85
7266	Pocomoke Guano Co., Norfolk, Va.	Pocomoke Defiance Bone and Potash.	Walkertown	R	8.83					4.45					12.86
7399	Swift Fertilizer Works, Atlanta, Ga.	Standard Grade Plantation Potash.	Winston	R	8.16					**3.67**					11.38

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp Y—lumpy; W—wet.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
					MIXED FERTILIZERS.									
	Brands claiming				**8 00**					**4 00**				**$11.60**
7485	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s Carr's Special Wheat Grower.	Elkin	R	8.96					3 56				11.98
7265	do	Jones' Grain Special	Walkertown	R	9.99					2 93				12.21
7311	do	Old Dominion Guano Co.'s Miller's Special Wheat Mixture.	Winston	R	9.24					3 12				11.75
7484	do	Southern Chemical Co.'s Click's Special Wheat Compound.	Elkin	S	9.04					3.98				12.51
7397	do	Travers & Co.'s Special Wheat Compound.	Mt. Airy	R	9.04					4 03				12.57
7338	do	Va. State Fertilizer Co.'s Gilt Edge Dissolved Bone and Potash.	Mt. Airy	R	10.16					4.00				13.54
	Brands claiming				**10 00**					**2.00**				**11 20**
7404	American Fertilizer Co., Norfolk, Va.	Dissolved Bone and Potash for Corn and Wheat.	Windsor	D	**9 81**					2.04				**11.07**
7095	Armour Fertilizer Works, Baltimore, Md.	Armour's Phosphate and Potash	Elizabeth City	D	**9.53**					**1 90**				**10.67**
7487	Baugh & Sons Co., Norfolk, Va.	Baugh's Alkaline Superphosphate.	Siloam	R	11.55					**1.99**				12.40
7174	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Electric Bone and Potash Mixture.	Dunn	R	12.55					1.76				13.23
7445	Columbia Guano Co., Norfolk, Va.	Soluble Bone and Potash Mixture.	Kings Mountain	R	**9.75**					**1.93**				**10.90**
7384	Farmers Guano Co., Raleigh, N. C.	Century Bone and Potash Mixture.	Thomasville	D	10.75					2.07				11.95
7379	Hampton Guano Co., Norfolk, Va.	Dauntless Potash Mixture	Maiden	R	11.15					**1.98**				12.23
7353	Imperial Co., Norfolk, Va.	Imperial Bone and Potash	Edenton	R	10.17					2.11				11.47
7392	Navassa Guano Co., Wilmington, N. C.	Navassa Dissolved Bone and Potash.	Kinston	R	10.42					2.45				12.07
7495	Pocomoke Guano Co., Norfolk, Va.	10-2 Potash Mixture	Catawba	R	10.24					**1.98**				11.39
7407	Powhatan Chemical Co., Richmond, Va.	Bone and Potash Mixture	China Grove	R	10 54					**1.73**				11.39
7132	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Bone and Potash Mixture.	Parmele	R	**9.62**					2.18				**11.08**

7398	Swift Fertilizer Works, Atlanta, Ga.	Swift's Standard Grade Field and Farm Phosphate and Potash.	Winston	R	**7.85**					2.62				**9 95**
7329	Union Guano Co., Winston, N. C.	Union Bone and Potash	Graham	R	10.16					2.00				11.34
7297	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s McGavock's Special Potash Mixture.	Gibsonville	R	10.42					2.09				11.68
7259	do	Davie & Whittle's Owl Brand Acid Phosphate with Potash.	Burlington	R	10.44					2.20				11.82
7128	do	Durham Fertilizer Co.'s Bone and Potash Mixture.	Dunn	R	10.49					2.25				11.91
7312	do	Old Dominion Alkaline Bone and Potash.	Winston	R	10.74					**1.83**				11.68
7310	do	Powers, Gibbs & Co.'s Dissolved Bone and Potash.	do	R	10.88					**1.40**				11.33
7360	do	Southern Chemical Co.'s Mammoth Corn Grower.	Lincolnton	R	10.14					2.04				11.37
7483	do	do	Elkin	R	10.23					2.05				11.46
7231	do	Tinsley's Bone and Potash Mixture.	Winston	R	10.33					**1.76**				11.23
7396	do	Travers Capital Bone and Potash.	Mt. Airy	R	10.60					**1.76**				11.48
7354	do	V.-C. C. Co.'s Dissolved Bone and Potash.	Edenton	S	10.01					**1.97**				**11 17**
	Brands claiming				**10.50**					**1.50**				**11.10**
7262	Union Guano Co., Winston, N. C.	Liberty Bell Crop Grower	Burlington	R	10.69					1.60				11.38
7258	Va.-Car. Chemical Co., Richmond, Va.	Durham Fertilizer Co.'s Wheat and Corn Grower.	do	R	11.92					**1.32**				12.18
	Brands claiming				**10 00**					**4 00**				**13 40**
7499	Baugh & Sons Co., Norfolk, Va.	Baugh's High Grade Potash Mixture.	Greensboro	R	10.04					4.19				13.64
7269	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Special Bone and Potash Mixture.	Walkertown	R	**9.28**					4.58				**13.39**
7378	Columbia Guano Co., Norfolk, Va.	Columbia Bone and Potash Mixture.	Cherryville	R	**9.86**					**3 88**				**13.34**
7352	Hampton Guano Co., Norfolk, Va.	Hampton's Crop Grower	Edenton	S	10.44					**3.97**				13.76
7444	Navassa Guano Co., Wilmington, N. C.	Navassa Wheat and Grass Grower.	Kings Mountain	R	10.82					**3.62**				13.72
7409	Powhatan Chemical Co., Richmond, Va.	Magic Bone and Potash Mixture.	China Grove	D	11.14					**2.59**				**12.87**
7449	Reidsville Fertilizer Co., Reidsville, N. C.	Bone and Potash	Wilkesboro	R	10.82					4.44				14.62
7450	Royster, F. S., Guano Co., Norfolk, Va.	Royster's 10-4 Bone and Potash	Smithfield	R	**9.44**					**2.06**				**10.76**
7486	Swift Fertilizer Works, Wilmington, N. C.	Swift's Farmers' Home Phosphate and Potash.	Elkin	R	**9.85**					**3.99**				**13.25**
7313	Union Guano Co., Winston, N. C.	Quaker Grain Mixture	Salem	R	10.76					**3 90**				13.97
7431	Va.-Car. Chemical Co., Richmond, Va.	Old Dominion Obelisk Bone and Potash.	Cherryville	R	10.42					**3.59**				**13.33**
7458	do	Southern Chemical Co.'s Winner Grain Mixture.	Salisbury	R	10.03					4.25				13.70

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—limpy; W—wet.

ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Potash from Muriate.	Potash from Sulphate.	Chlorine.	Relative Value per Ton at Factory.
			MIXED FERTILIZERS.											
	Brands claiming				10.00					4.00				$13.40
7260	Va.-Car. Chemical Co., Richmond, Va.	V.-C. C. Co.'s Special Potash Mixture.	Burlington	R	9.61					3.25				12.22
7230	do	Va. State Fertilizer Co.'s XX Potash Mixture.	Winston	R	10.83					3.34				13.42
	Brands claiming				10.00					5.00				14.50
7296	Armour Fertilizer Works, Wilmington, N. C.	Armour's Phosphoric Acid and Potash.	Gibsonville	S	8.93					4.23				12.89
7410	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont Special Potash Mixture.	Landis	R	9.22					4.52				13.27
7261	Union Guano Co., Winston, N. C.	Union Bone and Potash	Burlington	R	11.14					4.01				14.44
	Brands claiming				11.00					5.00				15.40
7451	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Horne & Son's High Grade Bone and Potash.	Dunn	R	10.88					5.53				15.90
7220	Patapsco Guano Co., Baltimore, Md.	Patapsco High Grade Bone and Potash.	Benson	R	11.05					4.30				14.67
7406	Va.-Car. Chemical Co., Richmond, Va.	Southern Chemical Co.'s Quick Step Bone and Potash.	China Grove	R	10.69					5.24				15.38
	Brand claiming				12.00					4.00				15.20
7494	Navassa Guano Co., Wilmington, N. C.	Navassa Special Wheat Mixture.	Newton	D	12.06					2.96				14.11
	Brand claiming				12.00			1.65	2.00					17.25
7143	Home Fertilizer and Chemical Co., Baltimore, Md.	Boykin's Dissolved Animal Bone.	Edenton		12.87	1.72	.42	2.14	2.60					19.93
	Brand claiming				13.00			2.05	2.50					19.73
7314	Baugh & Sons Co., Norfolk, Va.	Baugh's Pure Dissolved Animal Bone.	Winston	S	14.73			2.14	2.60					21.60
	Brand claiming							7.43	9.00	3.00				32.25
7144	Home Fertilizer and Chemical Co., Baltimore, Md.	Cerealite Top Dressing	Edenton	B				7.96	9.66	3.92				35.36

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ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100.						Relative Value per Ton at Factory.
					Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	
	RAW OR UNMIXED FERTILIZER MATERIALS.										
	Brands claiming				**12.00**						**$ 9.60**
7235	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Staple Acid Phosphate	Winston-Salem	D	14.60						11.68
7498	Navassa Guano Co., Wilmington, N. C.	Navassa Acid Phosphate	Catawba	R	12.17						9.74
7317	Union Guano Co., Winston, N. C.	Union 12 Per Cent Acid Phosphate.	Winston-Salem	R	12.83						10.26
7234	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s Standard Acid Phosphate.	----do	D	12.75						10.20
7263	----do	Durham Fertilizer Co.'s Durham Acid Phosphate.	Burlington	R	13.03						10.42
7318	----do	Old Dominion Guano Co.'s Royster's Acid Phosphate.	Winston-Salem	D	12.65						10.12
7233	----do	Powers, Gibbs & Co.'s Almont Acid Phosphate.	----do	D	12.30						9.84
7237	----do	J. G. Tinsley's Stonewall Acid Phosphate.	----do	D	12.30						9.84
	Brands claiming				**13.00**						**10.40**
7448	American Fertilizer Co., Norfolk, Va.	Eagle Brand Acid Phosphate	Charlotte	N	13.91						11.13
7228	Armour Fertilizer Works, Wilmington, N. C.	Armour's Acid Phosphate	Wilmington	R	13.21						10.57
7462	Ashepoo Fertilizer Co., Charleston, S. C.	Standard Ashepoo X-X-X Acid Phosphate.	Lexington	R	14.49						11.59
7425	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Sterling Acid Phosphate	----do	D	14.29						11.43
7386	Farmers Guano Co., Raleigh, N. C.	Farmers' Acid Phosphate	Thomasville	D	13.44						10.75
7460	Imperial Co., Norfolk, Va.	Imperial Acid Phosphate	Lexington	R	14.09						11.27
7298	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Dissolved Bone	Greensboro	R	**12.58**						**10.06**
7400	Swift Phosphate and Fertilizer Works, Wilmington, N. C.	Standard Grade Swift's Harrow Acid Phosphate.	Winston-Salem	R	13.16						10.53
7421	Union Guano Co., Winston-Salem, N. C.	Union Dissolved Bone	Wilkesboro	R	13.71						10.97

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ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Relative Value per Ton at Factory.
	RAW OR UNMIXED FERTILIZER MATERIALS.										
	Brands claiming				**13 00**						**$10 40**
7424	Va.-Car. Chemical Co., Richmond, Va.	A. & A.'s 1-X-L Acid Phosphate.	Lexington	D	13.40						10 72
7459	do	Durham Fertilizer Co.'s Double Bone Phosphate—Extra Strong.	Salisbury	R	14.94						11.95
7489	do	Norfolk and Carolina Chemical Co.'s Norfolk Best Acid Phosphate.	Elkin	R	13.13						10.50
7232	do	J. G. Tinsley & Co.'s Dissolved S. C. Bone.	Winston-Salem	R	13.62						10.90
7488	do	Va. State Fertilizer Co.'s Clipper Brand Acid Phosphate.	Elkin	R	13.14						10.51
	Brands claiming				**14 00**						**11 20**
7008	Acme Manufacturing Co., Wilmington, N. C.	Acme High Grade Acid Phosphate.	Fayetteville	D	14.49						11.59
7022	American Fertilizing Co., Norfolk, Va.	High Grade Acid Phosphate	Elizabeth City	S	**11 90**						**9 52**
7115	American Agricultural Chemical Co., New York, N. Y.	Lazaretto Dissolved Bone Phosphate.	do	R	14 21						11.37
7208	Armour Fertilizer Works, Baltimore, Md.	Armour's Star Phosphate	Edenton	D	**13 68**						**10.94**
7093	Arps, George L., Norfolk, Va.	14 Per Cent Acid Phosphate	do	D	**13.34**						**10.67**
7461	Ashepoo Fertilizer Co., Charleston, S. C.	High Grade Ashepoo Acid Phosphate.	Lexington	R	14.99						11.99
7116	Baugh & Sons Co., Philadelphia, Pa.	Baugh's High Grade Acid Phosphate.	Edenton	R	14 79						11 83
7236	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Climax Dissolved Bone	Winston-Salem	D	14.02						11.22
7309	Columbia Guano Co., Norfolk, Va.	Columbia 14 Per cent Acid Phosphate.	Whitakers	R	14.26						11.41
7002	Craven Chemical Co., New Bern, N. C.	Jewel Acid Phosphate	Mount Olive	D	**13.97**						**11.18**

7464	Hampton Guano Co., Norfolk, Va.	Hampton Acid Phosphate	Louisburg	R	14.12								11.30
7200	Harrell, S. B., & Co., Norfolk, Va.	Harrell's Acid Phosphate	Edenton	D	**13.75**								**11.00**
6989	Hubbard Fertilizer Co., Baltimore, Md.	Hubbard's Soluble Bone Phosphate.	New Bern	N	14.43								11.54
6975	Hubbard, M. P., & Co., Baltimore, Md.	Hubbard's Soluble S. C Phosphate.	Williamston	D	15.10								12.08
7032	Imperial Co., Norfolk, Va.	Imperial High Grade Acid Phosphate.	Edenton	N	**13.04**								**10.43**
7405	Martin, D. B., Co., Baltimore, Md.	Abattoir Products Acid Phosphate.	Ahoskie	D	**13.55**								**10.84**
7117	do	Martin's Acid Phosphate	Mackeys Ferry	D	**13.21**								**10.57**
7044	Meadows, E. H. & J. A., Co., New Bern, N. C.	Meadows' Diamond Acid Phosphate.	New Bern	D	14.08								11.26
7375	Navassa Guano Co., Wilmington, N. C.	Navassa 14 Per Cent Acid Phosphate.	Edenton	N	14.98								11.98
6939	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	14 Per Cent Acid Phosphate	do	R	14.81								11.84
7198	Norfolk Fertilizer Co., Norfolk, Va.	Oriana High Grade Acid Phosphate.	Cisco	D	14.05								11.24
7283	Pamlico Chemical Co., Washington, N. C.	Pamlico Bone Phosphate	New Bern	S	**13.40**								**10.72**
7151	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Piedmont High Grade S. C. Bone.	Hertford	R	**13.54**								**10.83**
7033	Pocomoke Guano Co., Norfolk, Va.	Peerless Acid Phosphate	Edenton	D	14.29								11.43
7339	Powhatan Chemical Co., Richmond, Va.	High Grade Acid Phosphate	Mt. Airy	N	14.50								11.60
7434	Rasin-Monumental Co., Baltimore, Md.	Rasin's Acid Phosphate	Cherryville	D	14.09								11.27
7155	Richmond Guano Co., Richmond, Va.	High Grade Acid Phosphate	Washington	R	15.07								12.06
7273	Royster, F. S., Guano Co., Norfolk, Va.	Royster's 14 Per Cent Acid Phosphate.	Gastonia	R	14.55								11.64
7058	Swift Fertilizer Works, Wilmington, N. C.	Swift's High Grade Acid Phosphate.	Burgaw	N	16.96								13.56
7330	Union Guano Co., Winston-Salem, N. C.	Union High Grade Acid Phosphate.	Graham	D	**13.69**								**10.95**
7153	Upshur, R. L., Norfolk, Va.	Upshur's High Grade Acid Phosphate.	Edenton	D	14.43								11.54
7264	Va.-Car. Chemical Co., Richmond, Va.	Davie & Whittle's Owl Brand High Grade Dissolved Bone.	Burlington	R	14.29								11.43
7212	do	Durham Fertilizer Co.'s Excelsior Dissolved Vegetable Bone Phosphate.	Lumberton	R	**13.34**								**10.67**
7246	do	Old Dominion Guano Co.'s High Grade Acid Phosphate.	Charlotte	D	15.04								12.03
7361	do	Southern Chemical Co.'s Red Cross 14 Per Cent Acid Phosphate.	Lincolnton	D	14.62								11.70
6954	do	Va.-Car. Chemical Co.'s 14 Per Cent Acid Phosphate.	Elizabeth City	D	**13.20**								**10.56**

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Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Relative Value per Ton at Factory.
	RAW OR UNMIXED FERTILIZER MATERIALS.										
	Brand claiming				**14 00**						**$11.20**
7250	Va.-Car. Chemical Co., Richmond, Va.	Va. State Fertilizer Co.'s Gilt Edge Brand Acid Phosphate.	Charlotte	D	14.37						11.50
	Brands claiming				**16 00**						**12.80**
7245	American Fertilizer Co., Norfolk, Va.	American High Grade Acid Phosphate.	Charlotte	D	17.09						13.67
7249	Armour Fertilizer Works, Wilmington, N. C.	16 Per Cent Acid Phosphate	do	R	16.35						13.08
7428	Arps, Geo. L., Norfolk, Va.	do	Roxobel	D	**15.29**						**12.23**
7387	Baugh & Sons Co., Philadelphia, Pa.	Baugh's 16 Per Cent Acid Phosphate.	High Point	R	**15.66**						**12.53**
7452	Berkley Chemical Co., Norfolk, Va.	Resolute Acid Phosphate	Dunn	R	16.59						13.27
7173	Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.	Caraleigh Acid Phosphate	do	D	16.42						13.14
7454	Dunn Oil Mills Co., Dunn, N. C.	Acid Phosphate	do	R	16.87						13.50
7307	Farmers Cotton Oil Co., Wilson, N. C.	16 Per Cent Acid Phosphate	Enfield	R	**11.53**						**9.22**
7625	Imperial Co., Norfolk, Va.	Imperial High Grade Tennessee Acid Phosphate.	Palmyra	D	16.26						13.01
7180	do	do	Hobgood	S	16.87						13.50
7141	Martin, D. B., Co., Baltimore, Md.	Martin's Acid Phosphate	Faison	R	16.30						13.04
7412	Navassa Guano Co., Wilmington, N. C.	Navassa Acid Phosphate	China Grove	D	16.21						12.97
7209	Ober, G., & Sons Co., Baltimore, Md.	High Grade Acid Phosphate	Spring Hope	N	17.92						14.34
7490	Patapsco Guano Co., Baltimore, Md.	Florida Soluble Phosphate	N. Wilkesboro	R	**15.62**						**12.50**
7408	Powhatan Chemical Co., Richmond, Va.	Magic Dissolved Bone Phosphate.	China Grove	D	16.04						12.83
7010	Richmond Guano Co., Richmond, Va.	Rex Dissolved Bone Phosphate.	Dunn	N	16.23						12.98
7172	Royster, F. S., Guano Co., Norfolk, Va.	Royster's Acid Phosphate	Smithfield	D	16.52						13.22
7433	Southern Cotton Oil Co., Shelby, N. C.	Southern Cotton Oil Co.'s 16 Per Cent Acid Phosphate.	Shelby	R	**15.55**						**12.44**
7465	Swift Fertilizer Works, Wilmington, N. C.	High Grade Swift's Special Acid Phosphate.	Louisburg	N	16.85						13.48
7359	Va.-Car. Chemical Co., Richmond, Va.	Atlantic and Va. Fertilizer Co.'s Eureka Acid Phosphate.	Lincolnton	D	16.63						13.30

7446	....do	Davie & Whittle's Owl Brand High Grade Acid Phosphate.	Charlotte	D	16.24							12.99
7271	....do	Durham Fertilizer Co.'s Best Acid Phosphate.	Gastonia	D	**15.92**							**12.74**
7213	....do	Va.-Car. Chemical Co.'s 16 Per Cent Acid Phosphate.	Lumberton	D	16.66							13.33
7244	....do	Va. State Fertilizer Co.'s Bull Run Acid Phosphate.	Charlotte	D	16.03							12.82
	Brands claiming										**12.00**	**12.00**
7009	Acme Manufacturing Co., Wilmington, N. C.	Pure German Kainit	Fayetteville	S							12.10	12.10
7373	American Fertilizer Co., Norfolk, Va.	Genuine German Kainit	Edenton	S							13.20	13.20
7199	Armour Fertilizer Works, Wilmington, N. C.	....do	....do	S							**10.40**	**10.40**
7092	Arps, George L., Norfolk, Va.	....do	....do	B							12.42	12.42
7118	Baugh & Sons Co., Baltimore, Md.	....do	....do	S							12.10	12.10
7308	Craven Chemical Co., New Bern, N. C.	....do	Battleboro	B							12.60	12.60
7453	Dunn Oil Mills Co., Dunn, N. C.	....do	Dunn	S							**11.82**	**11.82**
7274	Farmers Cotton Oil Co., Wilson, N. C.	....do	Gastonia	S							13.10	13.10
6988	Hubbard Fertilizer Co., Baltimore, Md.	Pure German Kainit	New Bern	S							12.70	12.70
7034	Imperial Co., Norfolk, Va.	Genuine German Kainit	Edenton	S							12.36	12.36
7119	Martin, D. B., Co., Baltimore, Md.	....do	Mackeys Ferry	S							12.84	12.84
7043	Meadows, E. H. & J. A., Co., New Bern, N. C.	....do	New Bern	S							12.84	12.84
7365	McNair, John F., Laurinburg, N. C.	....do	Red Springs	S							12.80	12.80
7374	Navassa Guano Co., Wilmington, N. C.	....do	Edenton	S							13.18	13.18
7284	Pamlico Chemical Co., Washington, N. C.	....do	New Bern	S							13.10	13.10
7070	Powhatan Chemical Co., New Bern, N. C.	....do	Kinston	S							12.40	12.40
6940	Richmond Guano Co., Norfolk, Va.	....do	Edenton	S							12.60	12.60
6987	Royster, F. S., Guano Co., Norfolk, Va.	....do	New Bern	R							12.70	12.70
7181	....do	....do	Speed	S							12.84	12.84
7432	Southern Cotton Oil Co., Shelby, N. C.	....do	Shelby	S							13.00	13.00
7315	Swift Fertilizer Works, Wilmington, N. C.	Pure German Kainit	Battleboro	S							12.44	12.44
7154	Upshur, R. L., Norfolk, Va.	Genuine German Kainit	Edenton	R							12.62	12.62
6926	Va.-Car. Chemical Co., Richmond, Va.	....do	Goldsboro	S							12.78	12.78
7057	....do	....do	Burgaw	S							13.20	13.20
	Brands claiming										**48.60**	**48.60**
7364	Acme Manufacturing Co., Wilmington, N. C.	Muriate of Potash	Lincolnton	D							49.44	49.44
7305	Peruvian Guano Corporation, Charleston, S. C.	....do	Whitakers	B							49.70	49.70
7447	Royster, F. S., Guano Co., Norfolk, Va.	....do	China Grove	R							50.00	50.00
6924	Va.-Car. Chemical Co., Richmond, Va.	....do	Goldsboro	B							50.08	50.08
	Brands claiming										**49.00**	**49.00**
7248	Coe-Mortimer Co., Charleston, S. C.	....do	Charlotte	S							49.24	49.24
7626	Peruvian Guano Corporation, Charleston, S. C.	....do	Palmyra	B							**48.60**	**48.60**
	Brand claiming										**50.00**	**50.00**
7323	Calder Bros., Wilmington, N. C.	....do	Maxton	B							50.20	50.20

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ANALYSES OF COMMERCIAL FERTILIZERS—SPRING SEASON, 1909—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Name of Brand.	Where Sampled.	Mechanical Condition.	Percentage Composition or Parts per 100. Available Phosphoric Acid.	Water-soluble Nitrogen.	Organic Nitrogen.	Total Nitrogen.	Equivalent to Ammonia.	Total Potash.	Relative Value per Ton at Factory.
	RAW OR UNMIXED FERTILIZER MATERIALS.										
	Brands claiming									50 00	$50 00
7306	Farmers Cotton Oil Co., Wilson, N. C.	Muriate of Potash	Enfield	B						51.36	51.36
7446	Home Fertilizer and Chem. Co., Baltimore, Md.	do	Edenton	B						51.64	51.64
7442	Imperial Co., Norfolk, Va.	do	do	B						49.24	49.24
7201	New Bern Cotton Oil and Fertilizer Co., New Bern, N. C.	Sulphate of Potash	do	B						50.92	50.92
6925	Va.-Car. Chemical Co., Richmond, Va.	do	Goldsboro	N						50.40	50.40
	Brand claiming							14 00	17 00		50 40
7466	Va.-Car. Chemical Co., Richmond, Va.	Nitrate of Soda	Hobgood	B				14.68	17.82		52.84
	Brand claiming							14.76	17.92		53.13
7292	Pamlico Chemical Co., Washington, N. C.	do	Washington	B				15.41	18.74		55.58
	Brand claiming							14 80	17 97		53 28
7191	Calder Bros., Wilmington, N. C.	do	Maxton	B				15.60	18.94		56.16
	Brands claiming							14 83	18 00		53 38
7247	Coe-Mortimer Co., Charleston, S. C.	do	Charleston	B				15.76	19.13		56.74
7148	Nitrate Agencies Co., Savannah, Ga.	do	Washington	B				15.52	18.84		55.88
7455	Swift Fertilizer Works, Wilmington, N. C.	do	Dunn	B				15.28	18.55		55.00
7496	Union Guano Co., Winston, N. C.	do	Newton	B				15.44	18.74		55.58
7504	Va.-Car. Chemical Co., Richmond, Va.	do	Nashville	B				15.36	18.65		55.30
	Brand claiming							14 85	18 03		53 46
7322	Grace, W. R., & Co., New York, N. Y.	do	Laurinburg	S				15.44	18.74		55.58
	Brand claiming							15.22	18 48		54 79
7331	Royster, F. S., Guano Co., Norfolk, Va.	do	Mebane	B				15.48	18.79		55.72
	Brand claiming							15 23	18 49		54.82
7142	Baugh & Sons Co., Philadelphia, Pa.	do	Edenton	B				15.40	18.70		55.44
	Brand claiming							15 50	18.82		55.80
7391	Harvey, L., & Son Co., Kinston, N. C.	do	Kinston	B				15.64	18.99		56.30
	Brand claiming							15 64	19 00		56.30
7087	Imperial Co., Norfolk, Va.	do	Whitakers	B-P				15.76	19.13		56.72
	Brand claiming							15 65	19 00		56.34
7272	Va.-Car. Chemical Co., Richmond, Va.	do	Gastonia	B-P				15 44	18.74		55.58
	Brand claiming							15.67	19 02		56.41
7627	Imperial Co., Norfolk, Va.	do	Palmyra	B				15.52	18.84		55.88

Brand claiming												
7321	Peruvian Guano Corporation, Charleston, S. C.	Genuine Peruvian Guano	Winston	R				2.89	3.50	3.25		
								3.00	3.64	2.78	*a*27.11	
Brands claiming								2.81	3.40	3.25		
7254	Peruvian Guano Corporation, Charleston, S. C.	do	Hillsboro	R				2.44	2.96	2.96	*b*25.28	
7476	do	do	Maxton	R				2.88	3.50	3.31	*c*27.37	
7624	do	do	Palmyra	B				2.70	3.28	3.25	*d*26.42	
Brand claiming								4.13	5.00	2.00		
7285	Peruvian Guano Corporation, Charleston, S. C.	do	Battleboro	R				4.16	5.05	1.84	*e*25.95	
Brand claiming								3.70	4.50			
7270	Baugh & Sons Co., Norfolk, Va.	Baugh's Raw Bone Meal	Madison	D				3.86	4.69		*f*28.41	

N, D, R, S, B, P, Y and W refer to the mechanical condition of fertilizers, as follows: N—fine; D—good; R—fair; S—coarse; B—very coarse; P—damp; Y—lumpy; W—wet.

*a*Total Phosphoric Acid found, 17.65, valued at 3½ cents per pound.
*b*Total Phosphoric Acid found, 17.83, valued at 3½ cents per pound.
*c*Total Phosphoric Acid found, 17.85, valued at 3½ cents per pound.
*d*Total Phosphoric Acid found, 17.60, valued at 3½ cents per pound.
*e*Total Phosphoric Acid found, 11.00, valued at 3½ cents per pound.
*f*Total Phosphoric Acid found, 20.73, valued at 3½ cents per pound.

II.—ANALYSES OF COTTON-SEED MEAL.

Laboratory Number.	Name and Address of Manufacturer.	Where Sampled.	Per Cent Nitrogen Guaranteed.	Equivalent to Ammonia.	Per Cent Nitrogen Found.	Equivalent to Ammonia.
2567	Battleboro Oil Co., Battleboro, N. C.	Battleboro	6.18	7.50	6.70	8.13
2429	....do	....do	6.18	7.50	6.58	7.99
2530	....do	Enfield	6.18	7.50	6.30	7.65
2443	....do	Battleboro	6.18	7.50	6.64	8.06
2433	....do	....do	6.18	7.50	6.18	7.58
2476	....do	....do	6.18	7.50	6.08	**7.38**
2474	....do	....do	6.18	7.50	6.06	**7.36**
2413	....do	....do	6.18	7.50	5.98	**7.26**
2558	Blacksburg Oil Mill, Blacksburg, S. C.		6.18	7.50	6.78	8.23
2569	Chatham Oil Co., Pittsboro, N. C.	Farmville	6.18	7.50	6.42	7.79
2425	Consumers Cotton Oil Co., Tarboro, N. C.	Tarboro	6.18	7.50	6.18	7.50
2440	Dunn Oil Mill Co., Dunn, N. C.	Dunn	6.18	7.50	6.72	8.16
2457	....do	....do	6.18	7.50	6.70	....
2581	Eastern Cotton Oil Co., Hertford, N. C.	Edenton	6.18	7.50	6.68	8.11
4006	....do	Avoca	6.18	7.50	6.20	7.53
2427	....do	Elizabeth City	6.18	7.50	6.12	**7.45**
2479	....do	....do	6.18	7.50	6.08	**7.38**
4009	....do	....do	6.18	7.50	5.94	**7.21**
2465	....do	Edenton	6.18	7.50	5.86	**7.11**
2528	Elba Manufacturing Co., Charlotte, N. C.	Charlotte	6.18	7.50	6.38	7.75
2431	Farmers Cotton Oil Co., Wilson, N. C.	Wilson	6.18	7.50	6.50	7.86
2453	....do	....do	6.18	7.50	6.26	7.60
2584	Farmers Oil Mill, Gaffney, S. C.	Rutherfordton	6.18	7.50	6.82	8.28
2418	Fremont Oil Mill Co., Fremont, N. C.	Fremont	6.18	7.50	6.54	7.94
2451	Havens Oil Co., Washington, N. C.	Elizabeth City	6.18	7.50	6.36	7.72
2518	....do	Edenton	6.18	7.50	6.24	7.58
2423	....do	Hobgood	6.18	7.50	5.88	**7.14**
2412	Kings Mountain Cotton Oil Co., Kings Mtn., N. C.	Kings Mountain	6.18	7.50	7.12	8.64
2562	....do	....do	6.18	7.50	7.06	8.57
2513	Laurinburg Oil Co., Laurinburg, N. C.	Laurinburg	6.18	7.50	6.84	7.87
2404	....do	....do	6.18	7.50	.....	....
2526	....do	....do	6.18	7.50	5.90	**7.16**
4005	Lorene Cotton Oil Mill, Mooresville, N. C.	Mooresville	6.18	7.50	6.76	8.21
2463	Louisburg Cotton Oil Mills, Louisburg, N. C.	Louisburg	6.18	7.50	7.06	8.57
2507	....do	Nashville	6.18	7.50	6.80	8.26
2430	....do	Louisburg	6.18	7.50	6.08	**7.38**
2508	Lumberton Cotton Oil and Ginning Co., Lumberton, N. C.	Lumberton	6.18	7.50	5.94	**7.21**
2515	Morgan Oil and Fertilizer Co., Red Springs, N. C.	Red Springs	6.18	7.50	6.44	7.82
2543	....do	....do	6.18	7.50	6.24	7.58
2579	McCaw Manufacturing Co., Macon, Ga.	Bennehan	6.18	7.50	6.26	7.60
2441	Nashville Cotton Mill Co., Nashville, N. C.	Kenly	6.18	7.50	6.68	8.11
2467	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	Seven Springs	6.18	7.50	6.70	8.13
2466	....do	....do	6.18	7.50	6.62	8.04
2544	....do	Edenton	6.18	7.50	6.36	7.72
2422	....do	New Bern	6.18	7.50	6.38	7.75
2546	North Carolina Cotton Oil Co., Charlotte, N. C.	High Point	6.18	7.50	7.06	8.57
2527	....do	Charlotte	6.18	7.50	6.38	7.75
2420	....do	Durham	6.18	7.50	6.20	7.53
2542	....do Henderson, N. C.	Henderson	6.18	7.50	6.00	**7.28**
2416	....do Wilmington, N. C.	Enfield	6.18	7.50	6.08	**7.38**

ANALYSES OF COTTON-SEED MEAL—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Where Sampled.	Per Cent Nitrogen Guaranteed.	Equivalent to Ammonia.	Per Cent Nitrogen Found.	Equivalent to Ammonia.
2511	North Carolina Cotton Oil Co., Wilmington, N. C.	Chadbourn	6.18	7.50	6.12	**7.43**
2437	----do	Wilmington	6.18	7.50	6.08	**7.38**
2469	----do	Wallace	6.18	7.50	6.34	7.70
2456	----do	Chadbourn	6.18	7.50	6.06	**7.36**
2458	----do	Dunn	6.18	7.50	5.92	**7.19**
2411	Pine Level Oil Mill Co., Pine Level, N. C.	Pine Level	6.18	7.50	6.68	8.11
2549	----do	Mount Olive	6.18	7.50	6.42	7.79
2492	----do	Pine Level	6.18	7.50	6.34	7.70
2407	----do	----do	6.18	7.50	6.18	7.50
2432	Planters Cotton-Seed Oil Co., Rocky Mount, N. C.	Rocky Mount	6.18	7.50	5.96	7.24
2428	Rowland Oil and Fertilizer Co., Rowland, N. C.	Rowland	6.18	7.50	6.22	7.55
2442	Southern Cotton Oil Co., Battleboro, N. C.	Benson	6.18	7.50	6.44	7.82
2525	----do----Charlotte, N. C.	Charlotte	6.18	7.50	6.20	7.55
2575	----do----Concord, N. C.	Concord	6.18	7.50	6.40	7.77
2580	----do----Conetoe, N. C.	State Farm	6.18	7.50	6.70	8.13
2449	----do	Everetts	6.18	7.50	6.54	7.94
2445	----do	Bethel	6.18	7.50	6.16	7.48
2419	Southern Cotton Oil Co., Conetoe, N. C.	Greenville	6.18	7.50	5.54	**6.73**
2460	----do----Fayetteville, N. C.	Fayetteville	6.18	7.50	6.60	8.01
2439	----do	----do	6.18	7.50	6.44	7.82
2545	----do----Gastonia, N. C.	Gastonia	6.18	7.50	6.74	8.18
2560	----do----Gibson, N. C.	Gibson	6.18	7.50	6.36	7.72
2424	----do----Goldsboro, N. C.	Goldsboro	6.18	7.50	6.52	7.92
2414	----do	Severn	6.18	7.50	6.46	7.84
2438	----do	Goldsboro	6.18	7.50	6.36	7.72
2454	----do	----do	6.18	7.50	6.36	7.72
2517	----do	Dudley	6.18	7.50	6.34	7.70
2516	----do----Monroe, N. C.	Monroe	6.18	7.50	6.82	8.28
2573	----do----Rocky Mount, N. C.	Spring Hope	6.18	7.50	6.42	7.79
2514	----do----Selma, N. C.	Smithfield	6.18	7.50	6.50	7.89
2557	----do	Selma	6.18	7.50	6.16	**7.48**
2561	----do----Shelby, N. C.	Shelby	6.18	7.50	6.66	8.09
2470	----do----Tarboro, N. C.	Tarboro	6.18	7.50	6.32	7.67
2421	----do----Union, S. C.	Hendersonville	6.18	7.50	5.90	**7.16**
2415	----do----Wilson, N. C.	Wilson	6.18	7.50	6.04	**7.33**
2509	----do	Hobgood	6.18	7.50	5.98	**7.26**
2510	Speed Milling Co., Speed, N. C.	Speed	6.18	7.50	6.24	7.58
2512	Spring Hope Cotton Oil Co., Spring Hope, N. C.	Spring Hope	6.18	7.50	6.86	8.33
2576	Statesville Oil and Fertilizer Co., Statesville, N. C.	Albemarle	6.18	7.50	6.76	8.21
2559	----do	Statesville	6.18	7.50	6.68	8.11
2452	Tar River Oil Co., Tarboro, N. C.	Washington	6.18	7.50	6.92	8.40
2434	Verner Oil Co., Lattimore, N. C.	Lattimore	6.18	7.50	6.80	8.26
2578	Victor Cotton Oil Co., Gaffney, S. C.	Rutherfordton	6.18	7.50	6.72	8.16
2455	Wilson Oil Mills, Wilson, N. C.	Wilson	6.18	7.50	5.94	**7.22**
2566	Zebulon Cotton Oil Co., Zebulon, N. C.	Zebulon	6.18	7.50	6.42	7.79

III. REGISTRATION OF FERTILIZERS.

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
The Atlantic Chemical Corporation, Norfolk, Va.—			
Nitrate of Soda	----	15.22	----
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Atlantic High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Atlantic 14 Per Cent Acid Phosphate	14.00	----	----
Atlantic Dissolved Bone	13.00	----	----
Atlantic Acid Phosphate	12.00	----	----
Atlantic 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Atlantic Bone and Potash for Grain	10.00	----	3.00
Atlantic Bone and Potash Mixture	10.00	----	2.00
Atlantic 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Atlantic 7 Per Cent Truck Guano	7.00	5.77	7.00
Atlantic Potato Guano	7.00	4.12	5.00
Atlantic Special Truck Guano	8.00	3.30	4.00
Atlantic High Grade Tobacco Guano	8.00	2.47	3.00
Atlantic Tobacco Grower	8.00	2.06	3.00
Atlantic Tobacco Compound	8.00	2.06	2.00
Atlantic Special Guano	9.00	1.65	1.00
Atlantic Special Wheat Fertilizer	8.00	1.65	2.00
Atlantic Meal Compound	9.00	2.27	2.00
Atlantic High Grade Cotton Guano	8.00	2.47	3.00
Atlantic Soluble Guano	8.00	1.65	2.00
Apex Peanut Grower	8.00	1.02	4.00
Perfection Peanut Grower	7.00	----	5.00
Oriental High Grade Guano	8.00	3.30	4.00
Paloma Tobacco Guano	8.00	3.30	4.00
Pure Raw Bone Meal—Total	21.50	3.71	----
Corona Cotton Compound	9.00	1.65	3.00
Atlantic 10 and 5 Bone and Potash Mixture	10.00	----	5.00
Geo. L. Arps & Co., Norfolk, Va.—			
Arps' Potato Guano	6.00	5.76	5.00
Arps' Standard Truck Guano	7.00	4.12	5.00
Arps' Scuppernong Guano for Trucks	6.00	4.12	7.00
Geo. L. Arps & Co.'s Big Yield Guano	8.00	1.65	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Arps' Premium Guano for Cotton, Tobacco and All Spring Crops	8.00	1.65	2.00
Arps' Tobacco Guano	8.00	2.47	3.00
Arps' H. G. 16 Per Cent Acid Phosphate	16.00	----	----
Acme Manufacturing Co., Wilmington, N C.—			
Acme Acid Phosphate	12.00	----	----
Acme Bone and Potash	10.00	----	2.00
Acme Bone and Potash	10.00	----	3.00
Acme Bone and Potash	10.00	----	4.00
Acme Bone and Potash	8.00	----	4.00
Acme Bone and Potash	11.00	----	2.00
Acme High Grade Acid Phosphate	14.00	----	----
Acme Acid Phosphate	16.00	----	----
Acme Standard Guano	8.00	2.06	2.00
Acme High Grade Guano	6.00	4.95	8.00
Acme Strawberry Top Dresser	8.00	1.65	4.00
Acme Truck Grower	6.00	3.30	8.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Acme Cotton Grower	9.00	2.27	2.00
Acme Special Grain	8.00	1.65	2.00
Acme Fertilizer for Tobacco	8.00	2.47	2.50
Acme Fertilizer	8.00	2.47	2.50
Acme Acid Phosphate	13.00	----	----
Gibson's Melon Grower	10.00	3.30	5.00
Acme Corn Guano	6.00	2.47	3.00
Clark's Corn Guano	1.00	6.60	10.00
P. D. Special	8.00	2.47	3.00
Quickstep	8.00	3.30	4.00
Gem Fertilizer	8.00	1.65	2.00
Cotton Seed Meal Guano	8.00	1.65	2.00
Lattimer's Complete Fertilizer	8.00	2.06	2.00
Tiptop Crop Grower	8.00	2.06	3.00
Tiptop Tobacco Grower	8.00	2.06	3.00
Sulphate of Ammonia	----	20.62	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	48.00
Acme Bone and Potash	10.00	----	5.00
Acme Top Dresser	----	7.42	3.00
Gem Tobacco Fertilizer	8.00	1.65	2.00
Acme 6-3-6 Guano	6.00	2.47	6.00
Cottonseed Meal Tobacco Guano	8.00	1.65	2.00
Ashepoo Fertilizer Co., Charleston, S. C.—			
High Grade Eutaw Acid Phosphate	14.00	----	----
High Grade Ashepoo Acid Phosphate	14.00	----	----
High Grade Ashepoo Dissolved Phosphate	16.00	----	----
High Grade Ashepoo Superpotash Acid Phosphate	10.00	----	4.00
High Grade Ashepoo Vegetable Guano	5.00	4.12	5.00
High Grade Ashepoo Truck Guano	7.00	4.12	5.00
High Grade Ashepoo Farmers' Special	8.00	2.06	3.00
High Grade Ashepoo Special Cotton Seed Meal Guano	8.00	2.46	2.00
High Grade Ashepoo Ammoniated Superphosphate	8.00	2.46	2.00
High Grade Ashepoo Bird and Fish Guano	8.00	2.46	3.00
High Grade Ashepoo Meal Mixture	8.00	2.46	3.00
High Grade Ashepoo X Tobacco Fertilizer	8.00	2.46	3.00
High Grade Ashepoo Golden Tobacco Producer	8.00	2.46	3.00
High Grade Ashepoo Guano	8.00	3.29	4.00
High Grade Ashepoo Perfection Guano	8.00	3.29	6.00
High Grade Ashepoo Fruit Grower	8.00	3.91	2.75
High Grade Ashepoo Watermelon Guano	10.00	3.29	5.00
High Grade Eutaw X Golden Fertilizer	8.00	2.46	4.00
High Grade Eutaw Special Cotton-seed Meal Guano	8.00	2.46	4.00
High Grade Carolina XXX Guano	8.00	2.46	3.00
High Grade Taylor's Circle Guano	9.00	1.65	4.00
Standard Eutaw XX Acid Phosphate	12.00	----	----
Standard Eutaw XXX Acid Phosphate	13.00	----	----
Standard Eutaw Potash Acid Phosphate	11.00	----	1.00
Standard Eutaw Acid Phosphate and Potash	12.00	----	1.00
Standard Eutaw Circle Guano	8.00	2.06	2.00
Standard Eutaw XX Guano	8.50	1.65	2.00
Standard Eutaw XXX Guano	9.00	1.65	2.00
Standard Eutaw Fertilizer	9.00	1.85	1.00
Standard Ashepoo Fertilizer	9.00	1.85	1.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Standard Ashepoo Harrow Brand Raw Bone Superphosphate	9.00	1.65	2.00
Muriate of Potash	----	----	45.00
Nitrate of Soda	----	14.81	----
H. G. Ashepoo Bone and Potash	12.00	----	----
H. G. Eutaw Superpotash Acid Phosphate	10.00	----	4.00
Standard Ashepoo Wheat and Oats Special	9.50	1.65	1.00
Standard Ashepoo XXX Guano	8.65	1.65	2.00
Standard Ashepoo XX Guano	8.50	1.65	2.00
Standard Ashepoo Circle Guano	8.00	2.06	2.00
Standard Ashepoo Guano	8.50	2.06	1.00
Standard Ashepoo Special Fertilizer	8.00	1.65	2.00
Standard Ashepoo Acid Phosphate and Potash	12.00	----	1.00
Standard Ashepoo Potash and Acid Phosphate	11.00	----	1.00
Standard Ashepoo Potash Compound	10.00	----	3.00
Standard Ashepoo XXX Acid Phosphate	13.00	----	----
Standard Ashepoo Dissolved Bone	12.00	----	----
Standard Ashepoo XX Acid Phosphate	12.00	----	----
Standard Coomassie Acid Phosphate	12.00	----	----
Standard Coomassie Circle Fertilizer	8.00	1.65	2.00
Standard Carolina Guano	8.00	1.65	2.00
Standard Carolina Acid Phosphate	13.00	----	----
Standard Circle Bone	13.00	----	----
Standard Palmetto Potash Acid Phosphate	11.00	----	1.00
Standard Brownwood Acid Phosphate	8.00	----	4.00
Standard P. D. Fertilizer	8.00	1.65	2.00
German Kainit	----	----	12.00
Standard Enoree Acid Phosphate and Potash	10.00	----	2.00
High Grade Ashepoo XXXX Acid Phosphate	14.00	----	----
Taylor's XX Ammoniated Dissolved Fertilizer	10.00	.82	1.00
High Grade Ashepoo Nitrogenous Top Dressing	3.00	7.00	2.00
H. G. Ashepoo Canteloupe Guano	10.00	2.47	10.00
The Armour Fertilizer Works, Atlanta, Chicago and Wilmington—			
Top Dresser	5.00	8.24	2.00
10 Per Cent Trucker	5.00	8.25	3.00
Manure Substitute	6.00	3.30	4.00
7 Per Cent Trucker	6.00	5.78	5.00
General	8.00	1.65	2.00
Fruit and Root Crop Special	8.00	1.65	5.00
High Grade Potato	8.00	1.65	10.00
King Cotton No. 2	8.00	2.06	2.00
Champion	8.00	2.06	2.50
Gold Medal for Tobacco	8.00	2.06	3.00
Berry King	8.00	2.06	4.00
Cotton Special	8.00	2.47	3.00
Tobacco Special	8.00	2.47	3.00
Truck and Berry Special	8.00	2.47	10.00
All Soluble	8.00	2.88	4.00
Special Trucker	8.00	3.30	4.00
Bone, Blood and Potash	8.00	4.12	7.00
Bone and Dissolved Bone with Potash	9.00	1.65	3.00
African Cotton Grower	9.00	2.47	3.00
10 Per Cent Trucker	5.00	8.24	3.00
Dried Blood	----	13.18	----
Phosphoric Acid with Potash	10.00	----	5.00
Superphosphate and Potash	10.00	----	4.00
M. H. White & Co.'s Special Corn Mixture	10.00	----	2.00
Phosphate and Potash No. 2	8.00	----	5.00
Phosphate and Potash No. 1	10.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
17 Per Cent Acid Phosphate	17.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
13 Per Cent Acid Phosphate	13.00	----	----
12 Per Cent Acid Phosphate	12.00	----	----
Star Phosphate	14.00	----	----
Nitrate of Soda	----	14.83	----
Harvey's Special	4.00	3.30	4.00
10 Per Cent Tankage	2.00	8.24	----
Manure Substitute	6.00	3.30	4.00
Carolina Cotton Grower	8.00	2.47	2.00
Carolina Cotton Special	8.00	1.65	3.00
Kainit	----	----	12.00
King Cotton	8.00	2.06	2.00
Ammoniated Dissolved Bone and Potash	10.00	1.65	2.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Van Lindley's Special	8.00	4.12	2.00
Standard Cotton Grower	8.50	1.65	2.00
Armour's Slaughterhouse Fertilizer	8.00	1.65	2.00
Special Formula for Tobacco	4.00	3.30	4.00
Sweet Potato Special	8.00	2.06	3.00
Armour's Raw Bone Meal Total	22.00	3.70	----
Fertilizer No. 836	8.00	2.47	6.00
Armour's Special Top Dresser	----	7.82	4.00
American Fertilizer Co., Norfolk, Va.—			
10 Per Cent Ammoniated Guano	7.00	8.24	2.50
Standard 7 Per Cent Ammonia Guano	7.00	5.76	5.00
American Irish Potato Grower	7.00	4.12	5.00
American 7-7-7 for Irish Potatoes	7.00	5.76	7.00
American Fish Scrap Guano	7.00	3.29	4.00
American Eagle Guano	8.00	2.47	3.00
American No. 1 Fertilizer	8.00	2.06	3.00
American No. 2 Fertilizer	8.00	1.65	2.00
American Cotton Compound	8.00	1.65	2.00
American Standard Cotton Grower	10.00	1.65	2.00
American Special Potash Mixture for Wheat	8.00	----	4.00
American High Grade Acid Phosphate	16.00	----	----
Special Formula Guano for Yellow Leaf Tobacco	9.00	2.88	5.00
Special Potato Guano	7.00	4.12	7.00
Special Potato Manure	6.00	4.12	7.00
Bone and Peruvian Guano	8.00	1.65	2.00
Bone and Peruvian Guano	8.75	1.65	2.00
A. L. Hanna's Special	8.00	1.65	2.00
Peruvian Mixture	8.50	1.65	1.50
Blood and Bone Compound	8.50	2.06	1.00
Bob White Fertilizer for Tobacco	8.00	2.06	1.50
J. G. Miller & Co.'s Yellow Leaf Fertilizer	8.00	2.47	3.00
Pitt County Special Fertilizer	9.00	2.88	5.00
N. C. and S. C. Cotton Grower	8.00	3.29	4.00
Peruvian Mixture Guano Especially Prepared for Sweet Potatoes	8.00	3.29	5.00
Kale, Spinach and Cabbage Guano	7.00	4.12	4.00
Stable Manure Substitute	7.00	2.47	4.00
Strawberry and Asparagus Guano	9.00	2.88	9.00
Ground Fish Scraps	----	8.24	----
Nitrate of Soda	----	14.83	----
Raw Bone Meal Total	22.50	3.71	----
Muriate of Potash	----	----	49.00
Sulphate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Eagle Brand Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
High Grade Acid Phosphate	14.00	----	----
Dissolved Bone and Potash for Corn and Wheat	10.00	----	2.00
Double Dissolved Bone and Potash	10.00	----	4.00
Cooper's Genuine Eagle Island	8.00	1.65	2.00
Atlantic Fertilizer Co., Baltimore, Md.—			
Farmers' Alkaline Bone	10.00	----	2.00
Big 4, Blood, Bone, Fish and Potash for Early Truck	6.00	2.47	6.00
American Agricultural Chemical Co., New York—			
Holmes & Dawson Productive Cotton and Peanut Grower	9.00	2.26	2.00
Pure Ground Bone Total	20.60	3.70	----
Pure Ground Bone Total	20.60	3.70	----
Fine Ground Bone Total	22.80	2.47	----
Holmes & Dawson Triumph Soluble	8.00	1.65	2.00
Holmes & Dawson Gold Dust Guano	9.00	1.65	2.00
Savage Sons & Co. Purity Guano	8.00	1.65	2.00
Lazaretto Truckers' Favorite	6.00	5.76	5.00
Lazaretto Early Trucker	7.00	4.11	5.00
Lazaretto Challenge Fertilizer	8.00	2.47	3.00
Lazaretto Special for Tobacco and Potatoes	8.00	2.47	3.00
Lazaretto Climax Plant Food	8.00	2.06	3.00
Lazaretto Universal Compound	8.00	2.06	2.00
Lazaretto Crop Grower	8.00	1.65	2.00
Lazaretto High Grade Dissolved Bone and Potash	12.00	----	5.00
Lazaretto Alkaline Bone Phosphate	12.00	----	3.00
Lazaretto Dissolved Bone and Potash	10.00	----	2.00
Lazaretto Acid Phosphate	14.00	----	----
Reese Pacific Guano	8.00	1.65	2.00
Reese Pacific Guano for Tobacco	8.50	2.47	2.50
Canton Chemical Truckers' Special 7 Per Cent	6.00	5.76	5.00
Canton Chemical Excelsior Trucker	7.00	4.11	5.00
Canton Chemical Baker's Tobacco Fertilizer	8.00	2.47	3.00
Canton Chemical Baker's Fish Guano	8.00	1.65	2.00
Canton Chemical Baker's Dissolved S. C. Bone	14.00	----	----
Canton Chemical Baker's Standard High Grade Guano	8.00	2.06	3.00
Canton Chemical Gem Phosphate	12.00	----	----
Canton Chemical Soluble Bone and Potash	10.00	----	2.00
Canton Chemical Soluble Alkaline Bone	12.00	----	3.00
Canton Chemical Game Guano	8.00	1.65	2.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Canton Chemical CCC Special Compound	8.00	2.06	6.00
Canton Chemical Superior High Grade Fertilizer	8.00	2.47	3.00
Detrick's Gold Basis	6.00	5.76	5.00
Detrick's Special Trucker	7.00	4.11	5.00
Detrick's Gold Eagle	6.00	2.47	6.00
Detrick's Quickstep Bone and Potash	8.00	2.47	4.00
Detrick's Special Tobacco Fertilizer	8.00	2.47	3.00
Detrick's Vegetator Ammoniated Superphosphate	8.00	2.06	3.00
Detrick's Kangaroo Komplete Kompound	8.00	1.65	3.00
Detrick's Royal Crop Grower	8.00	1.65	2.00
Detrick's Fish Mixture	8.00	1.65	2.00
Detrick's Victory Alkaline Bone	12.00	----	5.00
Detrick's P. & B. Special	12.00	----	3.00
Detrick's Soluble Bone and Potash Phosphate	10.00	----	2.00
Detrick's XXtra Acid Phosphate	14.00	----	----
Zell's 10 Per Cent Trucker	5.00	8.23	3.00
Zell's 7 Per Cent Potato and Vegetable Manure	6.00	5.76	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Zell's Truck Grower	7.00	4.11	5.00
Zell's Special Compound for Potatoes and Vegetables	8.00	2.47	4.00
Zell's Tobacco Fertilizer	8.00	2.47	4.00
Zell's Bright Tobacco Grower	8.00	2.47	3.00
Zell's Royal High Grade Fertilizer	9.00	2.06	2.00
Zell's Special Compound for Tobacco	8.00	1.65	2.00
Zell's Calvert Guano	8.00	1.65	2.00
Zell's Ammonia Bone Superphosphate	8.00	1.65	2.00
Zell's High Grade Potash Fertilizer	10.00	----	4.00
Zell's Reliance High Grade Manure	8.00	2.47	3.00
Sulphate of Potash	----	----	48.00
Zell's Fish Guano	8.00	1.65	2.00
Zell's Dissolved Bone Phosphate	14.00	----	----
Holmes & Dawson's Crop Worker	8.00	1.65	2.00
Fidelity Crop Grower	8.00	.82	3.00
16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	.12
Nitrate of Soda	----	15.00	----
Zell's Electric Phosphate	10.00	----	2.00
Bull Head Potato and Vegetable Manure	6.00	4.11	7.00
Enterprise Alkaline Phosphate	8.00	----	5.00
Royal Alkaline Bone	10.00	----	4.00
Palmetto Alkaline Phosphate	8.00	----	4.00
Slingluff's Bright Mixture	8.00	2.06	2.50
Pure Ground Bone----------Total	20.61	3.29	----
Muriate of Potash	----	----	50.00
A. A. C. Co.'s 16 Per Cent Superphosphate	16.00	----	----
Detrick's Superior Animal Bone Fertilizer	9.00	1.85	4.00
Lazaretto Retriever Animal Bone Fertilizer	9.00	1.85	4.00
Zell's Victoria Animal Bone Compound	9.00	1.85	4.00
Canton Chemical Virginia Standard Manure	8.00	2.06	2.00
Purity Guano—2-8-2—for S. S. & Co.	8.00	1.65	2.00
Lazaretto Peanut Grower	9.00	.82	3.00
Sulphate of Potash	----	----	48.00
A. D. Adair & McCarty Bros., Atlanta, Ga.—			
Adair's Wheat and Grass Grower	10.00	----	4.00
Adair's Dissolved Bone	12.00	----	----
Adair's High Grade Dissolved Bone	14.00	----	----
Adair's High Grade Dissolved Bone, No. 16	16.00	----	----
Adair's Special Potash Mixture	8.00	----	4.00
Adair's Ammoniated Dissolved Bone	8.00	1.65	2.00
Adair's Soluble Pacific Guano	10.00	1.65	2.00
McCarty's Wheat Special	10.00	.82	3.00
McCarty's Corn Special	10.00	.82	3.00
McCarty's Soluble Bone	10.00	.82	1.00
McCarty's High Grade Corn Grower	10.00	1.65	2.00
McCarty's High Grade Cotton Grower	10.00	1.65	2.00
Planters' Soluble Fertilizer	8.00	1.65	2.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
High Grade Potash Compound	10.00	----	4.00
Golden Grain Compound	8.00	.82	3.00
A. & M. 13-4	13.00	----	4.00
David Harum High Grade Guano	10.00	3.30	4.00
Adair's H. G. Blood and Bone	10.00	2.47	3.00
Special Wheat Compound	10.00	1.65	4.00
Special Corn Compound	10.00	1.65	4.00
Special Vegetable Compound	10.00	1.65	4.00
Special Potato Compound	10.00	1.65	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Special Tomato Compound	10.00	1.65	4.00
Old Time Fish Scrap Guano	10.00	1.65	2.00
Adair's Wheat and Grass Grower, No. 8	10.00	----	8.00
Adair's Wheat and Grass Grower, No. 6	10.00	----	6.00
Adair's Wheat and Grass Grower, No. 5	10.00	----	5.00
H. G. Potash Compound, No. 8	10.00	----	8.00
H. G. Potash Compound, No. 6	10.00	----	6.00
H. G. Potash Compound, No. 5	10.00	----	5.00
Adair's Special Potash Mixture, No. 5	8.00	----	5.00
Adair's Special Potash Mixture, No. 6	8.00	----	6.00
Adair's Special Potash Mixture, No. 8	8.00	----	8.00
McCarty's Potash Formula	12.00	----	2.00
McCarty's Potash Formula, No. 4	12.00	----	4.00
McCarty's Potash Formula, No. 5	12.00	----	5.00
A & M. 13—2	13.00	----	2.00
Asheville Packing Co., Asheville, N. C.—.			
Asheville Packing Co.'s Extra H. G. Fruit and Potato Special	8.00	1.65	6.00
Asheville Packing Co.'s Special Tobacco and Vegetable Fertilizer	8.00	2.47	3.00
Asheville Packing Co.'s Extra H. G. Vegetable Special	8.00	4.12	5.00
Asheville Packing Co.'s H. G. Muriate of Potash	----	----	52.00
Asheville Packing Co.'s Standard Grade Acid Phosphate	12.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	13.00	----	----
Asheville Packing Co.'s Standard Grade Acid Phosphate	14.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	15.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	16.00	----	----
Asheville Packing Co.'s H. G. Acid Phosphate	17.00	----	----
Asheville Packing Co.'s H, G. Acid Phosphate	18.00	----	----
Asheville Packing Co.'s Pure Bone Meal—Total	18.00	2.47	----
Asheville Packing Co.'s Standard Potato	9.00	.82	2.00
Asheville Packing Co.'s Extra H. G. Potash Mixture	13.00	----	4.00
Asheville Packing Co.'s Celebrated Tankage	10.00	4.12	----
Asheville Packing Co.'s Extra H. G. Fertilizer	10.00	3.30	4.00
Asheville Packing Co.'s Extra H. G. Blood and Bone	10.00	2.47	3.00
Asheville Packing Co.'s H. G. Wheat, Corn and Oat Special	10.00	1.65	2.00
Asheville Packing Co.'s Extra H. G. Cotton Special	10.00	1.65	2.00
Asheville Packing Co.'s Standard Bone and Potash	10.00	.82	1.00
Asheville Packing Co.'s H. G. Special Potash Mixture	10.00	----	4.00
Asheville Packing Co.'s Standard Wheat Grower	10.00	----	2.00
Asheville Packing Co.'s Complete Fertilizer	8.00	1.65	2.00
Asheville Packing Co.'s Corn and Wheat	8.00	.82	3.00
Asheville Packing Co.'s Bone and Potash	8.00	----	4.00
Asheville Packing Co.'s Superior Potato Fertilizer	10.00	----	6.00
Asheville Packing Co.'s XX Acid Phosphate	12.00	----	----
Asheville Packing Co.'s Champion Potato Fertilizer	8.00	1.65	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Baugh & Sons Co., Phila., Pa., and Norfolk, Va.—			
Baugh's 16 Per Cent Acid Phosphate	16.00	----	----
Baugh's 5–6–5 Guano	6.00	4 12	5.00
Baugh's New Process 10 Per Cent Guano	5.00	8.23	2.50
Baugh's Fish Mixture	8.00	1 65	2.00
Baugh's Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Fish, Bone and Potash	8.00	3.30	4.00
Baugh's Animal Bone and Potash Compound for All Crops	8.00	1.65	2.00
Baugh's Complete Animal Bone Fertilizer	8.00	1.65	5.00
Baugh's Peruvian Guano Substitute for Potatoes and All Vegetables	6.00	4.12	7.00
Baugh's Grand Rapids High Grade Truck Guano	8.00	2.47	3.00
Baugh's Special Tobacco Guano	8.00	2.47	5.00
Baugh's Fruit and Berry Guano	8.00	2.47	10.00
Baugh's 7 Per Cent Potato Guano	6.00	5.76	5.00
Baugh's Soluble Alkaline Superphosphate	10.00	----	2.00
Baugh's Special Manure for Melons	10.00	3.30	4.00
Baugh's Sweet Potato Guano for Sweet Potatoes, Peas and Melons	8.00	2.47	3.00
Baugh's Potato and Truck Special	7.00	2.88	7.00
Baugh's Special Potato Manure	5.00	1.65	10.00
Baugh's Fine Ground Fish	6.87	8.23	----
Baugh's Raw Bone Meal, Warranted Pure, Total	21.50	3.70	----
Baugh's High Grade Acid Phosphate	14.00	----	----
Baugh's High Grade Tobacco Guano	8.00	2.47	3.00
Baugh's High Grade Potash Mixture	10.00	----	4.00
Baugh's High Grade Cotton and Truck Guano	10.00	1.65	2.00
Baugh's Pure Animal Bone and Muriate of Potash Mixture	15.00	2.47	5.00
Baugh's Pure Dissolved Animal Bones	13.00	2.06	----
Glover's Special Potato Guano	7.00	3.30	8.00
Fine Ground Blood	----	13.00	----
Genuine German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	48.00
High Grade Sulphate of Potash	----	----	48.00
Baugh's Excelsior Guano	8.00	1.00	3.00
Randolph's Bone and Potash Mixture for All Crops	10.00	----	3.00
Nitrate of Soda	----	15.28	----
Lobos Peruvian Guano ..... Total	14.00	1.65	1.70
Baugh's Cabbage Guano	6.00	5.76	5.00
Baugh's Wheat Fertilizer for Wheat and Grass	8.00	1.65	2.00
Baugh's Animal Bone and Potash Compound for All Crops	8.00	1.65	2.00
Baugh's Special Guano	8.00	3.30	6.00
Hassell's Tobacco Guano	9.00	2.26	2.00
Benthall's Special Guano	8.00	1.65	2.00
Wilson's Special for Tobacco	6.00	2.47	6.00
Baugh's Soluble Top Dresser for All Crops	----	8.23	3.00
J. A. Benton, Ruffin, N. C.—			
Benton's North Carolina Bright Fertilizer	9.00	1.65	2.00
Best & Thompson, Goldsboro, N. C.—			
Pure German Kainit	----	----	12.00
Baltimore Fertilizer Co., Baltimore, Md.			
Honest Ammoniated Bone	8.00	1.60	2.00
Honest Sweet Potato Grower	8.00	2.40	4.00
Honest Dixie Trucker	6.00	4.00	7.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Honest Trucker	6.00	4.00	5.00
Honest Revenue	7.00	2.40	6.00
Honest Bone and Potash	10.00	----	2.00
Honest Acid Phosphate	14.00	----	----
Blackstone Guano Co., Inc., Blackstone, Va.—			
Special Mixture	----	9.88	----
Dissolved Bone	10.00	1.03	1.00
Red Letter for Tobacco	8.00	1.65	2.00
Jim Crow for Tobacco	8.00	2.47	3.00
Alliance for Tobacco	8.00	1.65	2.00
Alliance Guano	8.00	1.65	2.00
B. G. Co., Inc., Acid Phosphate	14.00	----	----
B. G. Co., Inc., Bone and Potash	10.00	----	2.00
Old Bellefonte	8.00	3.30	2.00
Blackstone Special for Tobacco	9.00	2.47	3.00
Bellefonte for Tobacco	8.00	2.47	2.00
Hard Cash for Tobacco	8.00	2.06	2.00
Carolina Special for Tobacco	8.00	1.65	4.00
Peanut Special	8.00	1.03	6.00
Pure Bone and Potash	8.00	----	6.00
B. G. Co., Inc., Bone and Potash	10.00	----	4.00
Tobacco Special	8.00	2.47	3.00
King of Corn Fertilizer	10.00	1.03	2.00
Leader of Tobacco	8.00	1.65	2.00
Prize Winner	8.00	2.47	3.00
King of Tobacco Fertilizer	8.00	3.30	2.00
Wrapper Brand	8.00	2.47	3.00
John L. Bailey Co., Elm City, N. C.—			
Fairmont Guano	8.00	2.47	3.00
Stag Brand Fertilizer	8.00	1.65	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.47	3.00
Bradley Fertilizer Co., Charleston, S. C.—			
High Grade Bradley's Dissolved Phosphate	16.00	----	----
Standard Bradley's Palmetto Acid Phosphate	12.00	----	----
Standard Bradley's XXX Acid Phosphate	13.00	----	----
Standard Bradley's Wheat Grower	10.00	----	2.00
Standard Bradley's Bone and Potash	10.00	----	2.00
Standard Bradley's Cereal Guano	8.00	1.65	2.00
Standard Bradley's X Guano	8.00	1.65	2.00
High Grade Bradley's Guano	8.00	2.46	3.00
High Grade Bradley's Circle Guano	8.00	3.29	4.00
High Grade Bradley's Acid Phosphate	14.00	----	----
Standard Bradley's Acid Phosphate	12.00	----	----
Standard Bradley's Ammoniated Dissolved Bone,	9.00	1 85	1.00
Standard Bradley's Patent Superphosphate	9.00	1.85	1.00
Standard B. D. Sea Fowl Guano	9.00	1.85	1.00
Standard Eagle Ammoniated Bone Superphosphate	9.00	1.85	1.00
German Kainit	----	----	12.00
High Grade Bradley's Potash and Phosphate	10.00	----	4.00
The Berkley Chemical Co., Norfolk, Va.—			
Royal Truck Grower	6.00	5 76	5.00
Mascot Truck Guano	7.00	4.12	5.00
Victory Special Crop Grower	7.00	3.30	4.00
Advance Crop Grower	8.00	2.47	3.00
Berkley Tobacco Guano	8.00	2.47	3.00
Monitor Animal Bone Fertilizer	9.00	1.85	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Select Crop Grower	8.50	2.06	2.50
Brandon Superphosphate	8.00	1.65	2.00
Berkley Plant Food	10.00	----	4.00
Berkley Bone and Potash Mixture	11.00	----	2.00
Berkley Acid Phosphate	14.00	----	----
Superior Bone and Potash	8.00	----	4.00
Laurel Potash Mixture	10.00	----	2.00
Resolute Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Long Leaf Tobacco Grower	8.00	1.65	2.00
Berkley Peanut and Grain Grower	8.00	1.00	4.00
The Leader of the World	5.00	3.30	5.00
Bragaw Fertilizer Co., Washington, N. C.—			
Chocowinity Special Tobacco Guano	5.00	3.29	6.00
Tuckahoe Tobacco Guano	8.00	2.06	3.00
Beaufort County Guano	8.00	2.47	3.00
Old Reliable Premium Guano	8.00	1.65	2.00
Havana Tobacco Guano	8.00	2.47	3.00
Palmetto Acid Phosphate	14.00	----	----
Tar Heel Guano	8.00	1.65	2.00
Long Acre Bone Phosphate	14.00	----	----
Pamlico Trucker	7.00	4.12	8.00
Riverview Potato Grower	6.00	5.76	5.00
Genuine German Kainit	----	----	12.00
Farmers' Union Meal Mixture	9.00	2.26	2.00
Sunrise Tobacco Guano	4.00	2.47	5.00
The W. G. Buie Co., Fontcol, N. C.—			
Nitrate of Soda	----	14.76	----
Columbia Guano Co., Norfolk, Va.—			
Pure Raw Bone Meal—Total	21.50	3.71	----
Columbia High Grade 16 Per Cent Acid Phosphate	16.00	----	----
Columbia 14 Per Cent Acid Phosphate	14.00	----	----
Columbia Dissolved Bone	13.00	----	----
Columbia Acid Phosphate	12.00	----	----
Columbia 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Columbia 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Columbia Bone and Potash for Grain	10.00	----	3.00
Columbia Bone and Potash Mixture	10.00	----	2.00
Columbia Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Columbia Special Truck Guano	8.00	3.30	4.00
Columbia Potato Guano	7.00	4.12	5.00
Columbia C. S. M. Special	9.00	2.27	2.00
Columbia Special 4-8-3	8.00	3.30	3.00
Columbia Special Wheat Fertilizer	8.00	1.65	2.00
Columbia Special Tobacco Guano	8.00	2.06	2.00
Olympia Cotton Guano	8.00	2.47	3.00
Columbia Soluble Guano	8.00	1.65	2.00
Crown Brand Peanut Guano	7.00	----	5.00
Our Best Meal Guano	8.00	2.47	3.00
Spinola Peanut Grower	8.00	1.02	4.00
Crew's Special	5.85	4.49	10.00
Hayes' Special	8.00	3.30	3.00
McRae's Special	9.00	4.12	7.00
McRae's High Grade Guano	8.00	3.30	7.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Hyco Tobacco Guano	8.00	2.47	3.00
Carolina Soluble Guano	9.00	1.65	1.00
Pelican Ammoniated Guano	9.00	3.30	4.00
Sulphate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Nitrate of Soda	----	15.22	----
Trojan Tobacco Guano	8.00	3.30	4.00
Columbia 10-5 Bone and Potash Mixture	10.00	----	5.00
Columbia Top Dresser	----	7.42	3.00
Roanoke Ammoniated Guano	9.00	1.65	3.00
Cumberland Bone and Phosphate Co., Portland, Me., and Charleston, S. C.—			
Standard Cumberland Bone and Superphosphate of Lime	9.00	1.85	1.00
The Coe-Mortimer Co., Charleston, S. C.—			
Thomas Phosphate (Big Slag) Ex. "Zeeburg" Total	14.75	----	----
Nitrate of Soda	----	14.76	----
Genuine Peruvian Guano Ex. S.S. Cela Chincha Island Total	9.00	5.53	2.25
Kainit	----	----	12.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Dried Fish No. 1 Total	6.86	8.64	----
Dried Fish Total	6.86	9.43	----
Thomas' Phosphate (Basic Slag) Ex. Zeeburg No. 2	20.00	----	----
Calder Bros., Wilmington, N. C.—			
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.80	----
Craven Chemical Co., New Bern, N. C.—			
C. E. Foy High Grade Guano (Trade Mark)	8.00	2.47	3.00
Jewel Acid Phosphate	14.00	----	----
Neuse Truck Grower	6.00	4.94	6.00
Pantego Potato Guano	7.00	4.12	7.00
Hanover Standard Guano	8.00	3.29	4.00
Elite Cotton Guano	8.00	1.65	2.00
Marvel Great Truck Grower	8.00	2.06	3.00
Duplin Tobacco Guano	8.00	2.47	3.00
Gaston High Grade Fertilizer	8.00	2.47	3.00
Trent Bone and Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Craven Chemical Co.'s Truck Guano, 5-10-2½	5.00	8.24	2.50
Panama 16 Per Cent Acid Phosphate	16.00	----	----
William H. Camp, Petersburg, Va.—			
Lion and Monkey Bone and Potash	10.00	----	4.00
Camp's Red Head Chemicals	8.00	2.25	2.00
Camp's Green Head Chemicals, Irish Potato	7.00	6.15	10.00
Camp's Yellow Head Chemicals	8.00	2.87	7.50
Lion and Monkey for Tobacco	8.00	2.46	3.00
Lion and Monkey Brand, 8-2-2	8.00	1.65	2.00
Clayton Oil Mill, Clayton, N. C.—			
Clayton Guano	8.00	2.47	3.00
Cotton Queen	8.00	1.65	2.00
Summer Queen	8.00	1.65	2.00
Clayton Special Tobacco Grower	8.00	2.46	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Cowell, Swan & McCotter Co., Bayboro, N. C.—			
Cowell, Swan & McCotter Co.'s Cabbage Guano	5.00	8.25	2.50
Crop Guano	8.00	1.65	2.00
Rust Proof Cotton Guano	8.00	1.65	3.00
Standard Cotton Grower	8.00	3.30	3.00
Quick Grower Guano	8.00	2.06	3.00
Great Cabbage and Potato Guano	7.00	5.77	7.00
Aurora Trucker	7.00	4.12	7.00
Oriental Trucker	7.00	4.12	8.00
High Grade Truck Guano	7.00	4.12	5.00
Potato Favorite Guano	7.00	3.30	7.00
Champion Guano	8.00	2.47	3.00
Bone Phosphate	14.00	----	----
German Kainit	----	----	12.00
Cowell's Great Tobacco Grower	8.00	2.47	3.00
Chickamauga Fertilizer Works, Atlanta, Ga.—			
Chickamauga Complete Fertilizer	8.00	1.65	2.00
Chickamauga High Grade Fertilizer	10.00	1.65	2.00
Chickamauga High Grade Plant Food	10.00	1.65	2.00
Chickamauga Wheat Special	10.00	.82	3.00
Chickamauga Corn Special	10.00	.82	3.00
Chickamauga Standard Corn Grower	8.00	1.65	2.00
Chickamauga Dissolved Bone	12.00	----	----
Chickamauga High Grade Dissolved Bone	14.00	----	----
Chickamauga High Grade Dissolved Bone, No. 16,	16.00	----	----
Chickamauga Bone and Potash	10.00	----	2.00
Chickamauga Alkaline Bone	10.00	----	4.00
Georgia Home Guano	8.00	1.65	2.00
Special Corn Compound	10.00	1.65	4.00
Blood, Bone and Tankage Guano	9.00	.82	2.00
Old Glory Mixture	10.00	.82	1.00
Chickamauga Wheat and Corn Grower	10.00	----	4.00
Cumbahee Fertilizer Co., Charleston, S. C.			
Melon Fertilizer	10.00	3.30	5.00
Canteloupe Fertilizer	10.00	2.46	10.00
Caraleigh Phosphate and Fertilizer Works, Raleigh, N. C.—			
Horne & Son's High Grade Bone and Potash	11.00	----	5.00
Buncombe Wheat Grower	8.00	----	4.00
Buncombe Corn Grower	8.00	----	4.00
Morris & Scarboro's Special Bone and Potash	10.00	----	3.00
Electric Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Climax Dissolved Bone	14.00	----	----
Sterling Acid Phosphate	13.00	----	----
Staple Acid Phosphate	12.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Bone Meal Total	20.00	3.91	----
Bone Meal Total	26.00	2.14	----
Crown Ammoniated Guano	8.00	1.65	2.00
Ely Ammoniated Fertilizer	8.00	1.65	2.00
Eclipse Ammoniated Guano	8.00	2.06	2.00
Planters' Pride	8.00	2.06	3.00
Caraleigh Special Tobacco Guano	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Pacific Tobacco and Cotton Grower	9.00	2.26	2.00
Horne's Best	8.00	2.47	3.00
Caraleigh Top Dresser	3.00	8.24	4.00
Rhamkatte Special Tobacco	8.00	3.29	6.00
Special 8-4-4	8.00	3.29	4.00
Comet Guano	8.00	.82	3.00
W. S. Clark & Son, Tarboro, N. C.—			
Genuine German Kainit	----	----	12.00
W. B. Cooper, Wilmington, N. C.—			
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.00	----
Nitrate of Soda	----	15.00	----
Contentnea Guano Co., Wilson, N. C.—			
Contentnea 16 Per Cent Acid	16.00	----	----
Special Tobacco Formula	8.00	2.06	6.00
Special Formula for Cotton	7.00	2.47	3.25
Contentnea Corn Special	5.00	1.65	5.00
Davis' Best Fertilizer	8.00	3.29	6.00
Special Formula for Tobacco	8.00	2.88	5.00
Special Formula Fertilizer	9.00	2.06	5.00
Special Formula for Tobacco	8.00	3.28	7.00
High Grade 14 Per Cent Acid	14.00	----	----
Nitrate of Soda	----	14.81	----
Pick Leaf	8.00	2.47	3.00
Top Notch	8 00	2.47	3.00
Blood and Bone Cotton Compound	8.00	1.65	2.00
Contentnea Top Dresser	3.00	8.23	5.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone and Potash Mixture	10.00	----	4.00
8-4½-7 for Tobacco	8.00	3.70	7.00
8-4½-7 for Cotton	8.00	3.70	7.00
Contentnea Cotton Grower	8.00	2.47	2.50
German Kainit	----	----	12.00
Special Formula Fertilizer	8.00	3.29	4.00
Woodard's Special Tobacco Fertilizer	7.00	3.90	5.00
Whitehead's Farm Cotton Grower	6.00	2.47	5.00
Howard & Williams' Cotton Special	8.00	2.47	5.00
Howard & Williams' Tobacco Special	6.00	2.47	6.00
C. P. Dey, Beaufort, N. C.—			
Ground Fish Scrap	----	8.24	----
Dixie Guano Co., Durham, N. C.—			
Niagara Soluble Bone	8.00	2.05	2.00
Old Plantation Superphosphate	8.00	1.65	2.00
Dixie Champion for Wheat and Corn	10.50	----	1.50
Dixie 16 Per Cent Acid Phosphate	16.00	----	----
Dixie 14 Per Cent Acid Phosphate	14.00	----	----
Dixie Star Ammoniated	9.00	1.65	1.00
Jeff Davis Special	9.00	2.26	2.00
Radium Brand Guano	8.00	3.28	5.00
Carolina Special Ammoniated	8.00	2.46	3.00
Sulky Plow Brand Guano	8.00	2.46	2.00
Battle's Blood and Bone Fertilizer	8.00	2.05	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Etiwan Fertilizer Co., Charleston, S. C.—			
Plow Brand Ammoniated Fertilizer	8.00	1.65	2.00
Plow Brand Special Tobacco Fertilizer	8.00	3.30	4.00
Plow Brand Acid Phosphate with Potash	11.00	----	1.00
Etiwan Potash Bone	10.00	----	4.00
Etiwan Special Potash Mixture	8.00	----	4.00
Etiwan Soluble Bone with Potash	10.00	----	3.00
Etiwan Acid Phosphate with Potash	11.00	----	1.00
Etiwan Dissolved Bone	13.00	----	----
Etiwan High Grade Acid Phosphate	14.00	----	----
Etiwan Superior Cotton Fertilizer	8.00	3.30	6.00
Etiwan Special Cotton Fertilizer	8.00	3.30	4.00
Etiwan Cotton Compound	8.00	2.47	3.00
Etiwan Ammoniated Fertilizer	8.00	1.65	2.00
Etiwan High Grade Cotton Fertilizer	8.00	2.47	2.00
Diamond Soluble Bone	13.00	----	----
Diamond Soluble Bone with Potash	10.00	----	2.00
XX Acid Phosphate with Potash	10.00	----	2.00
Genuine German Kainit	----	----	12.00
Etiwan Blood and Bone Guano	9.00	2.06	1.00
Plow Brand Raw Bone Superphosphate	9.00	2.06	1.00
Farmers Guano Co., Raleigh, N. C.—			
Farmers' Formula	7.00	2.47	3.25
Special Bone and Potash Mixture	10.00	----	4.00
Century Bone and Potash Mixture	10.00	----	2.00
16 Per Cent Acid Phosphate	16.00	----	----
14 Per Cent Acid Phosphate	14.00	----	----
Farmers' Acid Phosphate	13.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Bone Meal Total	20.00	3.91	----
Nitrate of Soda	----	15.65	----
Special Bone and Potash	8.00	----	4.00
State Standard Guano	8.00	1.64	2.00
Big Crop Guano	8.00	2.06	3.00
Toco Tobacco Guano	8.00	2.06	3.00
Golden Grade Guano	8.00	2.47	3.00
Farmers' Top Dresser	3.00	8.24	4.00
Floradora Guano Co., Laurinburg, N. C.—			
Floradora	8.00	3.29	4.00
Ocelo	8.00	2.47	3.00
Rocky Ford	10.00	2.47	7.00
Scotland Special	6.40	2.13	3.00
North Roberson Special	9.00	1.64	4.00
Fremont Oil Mills, Fremont, N. C.—			
Up-to-date	8.00	1.65	2.00
Nahunta Special	8.00	2.47	3.00
Fremont Prolific Fertilizer	9.00	2.26	2.00
Yelverton Bros.' Plant Food	8.00	2.47	3.00
Fremont Standard Fertilizer	8.00	2.47	3.00
Home Run Guano	8.00	1.65	2.00
Fremont Oil Mill Co.'s Special for Tobacco	8.00	2.47	5.00
Fomco	8.00	3.29	4.00
Nitrate of Soda	----	15.63	----
Kainit	----	----	12.00
Acid Phosphate	16.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Barnes & Flower's Cotton Grower	8.00	1.65	2.00
Wayne County Standard	8.00	2.47	3.00
Carolina C. S. M. Compound	9.00	2.26	2.00
Square Deal	8.00	2.47	3.00
Fremont H. G. Guano	8.00	2.29	4.00
Fremont Tobacco Guano	8.00	2.47	5.00
Acid Phosphate	14.00	----	----
Best Bros. Tobacco Special	8.00	2.47	8.00
Farmers Cotton Oil Co., Wilson, N. C.—			
German Kainit	----	----	12.00
Sulphate of Ammonia	----	20.57	----
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Contentnea Acid Phosphate	13.00	----	----
Bonum Acid Phosphate	14.00	----	----
16 Per Cent Acid Phosphate	16.00	----	----
Xtra Good Bone and Potash	10.00	----	2.00
Crop King Guano	8 00	1.65	2.00
Farmers' Special Guano	8.00	1.65	2.00
Planters' Friend Guano	8.00	2.06	3.00
Carolina Choice Tobacco Guano	8.00	2.06	3.00
Wilson High Grade Guano	8.00	2.27	2.00
J. D. Farrior's Special Guano	8.00	2.47	3.00
Graves' Cotton Grower Guano	8.00	2.47	3.00
Golden Gem Guano	8.00	2.47	3.00
Regal Tobacco Guano	8.00	2.88	5.00
Dean's Special Guano	8.00	3.70	7.00
Perfect Top Dresser	2.00	8.23	5.00
Wilson Top Dresser	2.00	9.05	4.00
Washington's Corn Mixture Guano	10.00	.82	5.00
Newsome's Tobacco Special	8.00	2.47	4.00
Farmers Fertilizer Co., Spartanburg, S. C.—			
Best of All Standard Grade 9-2-2	9.00	1.64	2.00
H. G. Fertilizer 8-3-3	8.00	2.47	3.00
H. G. Fertilizer 8-4-4	8.00	3.29	4.00
W. R. Grace & Co., New York—			
Nitrate of Soda	----	14.85	----
James Garland & Co., Richmond, Va.—			
Bonebase Standard Fertilizer	9.00	1.65	2.00
Griffith & Boyd Co., Baltimore, Md.—			
High Grade Acid Phosphate	14.00	----	----
Spring Crop Grower	6.50	1.65	4.50
Genuine German Kainit	----	----	12.00
Ammoniated Bone Phosphate	8.00	1.65	2.00
7 Per Cent Potash Guano	5.00	5.77	5.00
Early Trucker	7.00	4.12	8.00
Special Grain Grower	10.00	----	2.00
Germofert Manufacturing Co., Charleston, S. C.—			
Germofert Patented Special Cotton Grower	6.00	2.47	3.00
Germofert Patented Tobacco Grower	2.00	3.29	6.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Home Fertilizer and Chemical Co., Baltimore, Md.—			
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
German Kainit	----	----	12.00
Home High Grade Acid Phosphate	14.00	----	----
Home Alkaline Bone	10.00	----	2.00
Home Cereal Fertilizer	8.00	1.65	2.00
Home Dissolved Animal Bone	12.00	1.65	2.00
Home Vegetable Fertilizer	6.00	4.12	6.00
Home Potato Grower	6.00	3.30	4.00
Home Bone and Potash	10.00	----	5.00
Phœnix Crop Grower	8.00	2.48	2.00
Matchless Guano	8.00	1.65	4.00
Home Fertilizer	----	5.77	7.00
Cerealite Top Dressing	----	7.68	3.00
Zancey's Formula for Yellow Leaf Tobacco	8.00	2.48	2.00
Hadley, Harriss & Co., Wilson, N. C.—			
Hadley Boss Guano	8.00	2.26	2.50
German Kainit	----	----	12.00
Daisy Fish Mixture	8.00	1.05	2.00
John Hadley Special High Grade Plant Food	8.00	1.64	2.00
Top Dressing	----	7.38	6.00
Golden Weed Tobacco Grower	8.00	2.47	3.00
S. B. Harrell & Co., Norfolk, Va.—			
Harrell's Acid Phosphate	14.00	----	----
Harrell's Champion Cotton and Peanut Grower	8.00	1.65	2.00
Harrell's Truck Guano	6.00	5.76	5.00
Hampton Guano Co., Norfolk, Va.—			
Virginia Truck Grower	6.00	5.76	5.00
Reliance Truck Guano	7.00	4.12	5.00
Little's Favorite Crop Grower	7.00	3.30	4.00
P. P. P. (Princess Prolific Producer)	8.00	2.47	3.00
Hampton Tobacco Guano	8.00	2.47	3.00
Arlington Animal Bone Fertilizer	9.00	1.85	4.00
Alpha Crop Grower	8.50	2.06	2.50
Shirley's Superphosphate	8.00	1.65	2.00
Hampton Crop Grower	10.00	----	4.00
Hampton Bone and Potash Mixture	11.00	----	2.00
Dauntless Potash Mixture	10.00	----	2.00
Hampton Acid Phosphate	14.00	----	----
Supreme Acid Phosphate	16.00	----	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Genuine German Kainit	----	----	12.00
Excelsior Bone and Potash	8.00	----	4.00
Extra Tobacco Guano	8.00	1.65	2.00
Hampton Special Grain and Peanut Fertilizer	8.00	1.00	4.00
M. P. Hubbard & Co., Baltimore, Md.—			
Hubbard's Bermuda Guano	7.00	5.78	4.00
Hubbard's Special Cotton and Corn Fertilizer	7.00	5.78	4.00
Hubbard's Maryland Special	7.00	4.13	5.00
Hubbard's Gold Leaf Guano	8.00	2.48	3.00
Hubbard's Celebrated Bone Phosphate	8.00	1.66	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Hubbard's S. C. Phosphate	16.00	----	----
Ground Fish	----	8.25	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.60	----
Hubbard Fertilizer Co., Baltimore, Md.—			
Hubbard's Special Potato	6.00	3.29	10.00
Hubbard's 7 Per Cent Royal Seal	6.00	5.76	5.00
Hubbard's 10 Per Cent Trucker Guano	4.00	8.23	4.00
Hubbard's 5 Per Cent Royal Seal	6.00	4.11	5.00
Hubbard's Blood, Bone and Potash	8.00	3.29	7.00
Hubbard's Jersey Trucker	8.00	1.65	10.00
Hubbard's Royal Ensign	8.00	2.47	4.00
Hubbard's Yellow Wrapper	8.00	2.47	3.00
Hubbard's Fish Compound	8.00	1.65	3.00
Hubbard's Exchange Guano	8.00	1.65	2.00
Hubbard's Special Mixture	10.00	----	4.00
Hubbard's Bone and Potash	10.00	----	2.00
Hubbard's Heavy Long Leaf Guano for Tobacco	4.00	3.32	6.00
Hubbard's New Process Top Dresser	----	7.66	3.00
L. Harvey & Son Co., Kinston, N. C.—			
Nitrate of Soda	----	15.50	----
The Imperial Co., Norfolk, Va.—			
Imperial F. and B. Cotton Guano	8.00	2.06	3.00
Imperial Bright Tobacco Guano	8.00	2.06	3.00
Imperial 5-6-7 Potato Guano	6.00	4.11	7.00
Imperial Snowflake Cotton Grower	8.00	3.29	4.00
Imperial Peanut and Corn Guano	8.00	1.65	2.00
Imperial Champion Guano	8.00	1.65	2.00
Imperial X. L. O. Cotton Guano	8.00	2.47	3.00
Imperial Cisco Soluble Guano	8.00	1.65	2.00
Imperial Tobacco Guano	8.00	2.47	3.00
Imperial Laughinghouse Special Tobacco Guano	4.00	3.29	6.00
Imperial Standard Premium	8.00	1.65	2.00
Imperial Cubanola Tobacco Guano	4.00	2.47	5.00
Imperial Martin County Special Crop Grower	9.00	2.26	2.00
Imperial High Grade Acid Phosphate	14.00	----	----
Imperial Genuine German Kainit	----	----	12.00
Imperial Special 7 Per Cent for Potatoes	5.00	5.76	5.00
Imperial 10 Per Cent Guano	5.00	8.23	2.50
Imperial Sweet Potato Guano	6.00	1.65	6.00
Imperial Williams' Special Potato Guano	6.00	4.11	5.00
Imperial Fish and Bone	6.00	3.29	4.00
Imperial 7-7-7 Potash Guano	7.00	5.76	7.00
Imperial Bone and Potash	10.00	----	2.00
Imperial High Grade Irish Potato Guano	7.00	4.11	8.00
Imperial Tennessee Acid Phosphate	16.00	----	----
Imperial Muriate of Potash	----	----	50.00
Imperial Nitrate of Soda	----	15.63	----
Imperial Roanoke Crop Grower	7.00	2.47	2.00
Imperial 17 Per Cent Acid Phosphate	17.00	----	----
Imperial Asparagus Mixture	6.00	4.11	7.00
Imperial Yellow Bark Sweet Potato Guano	8.00	2.47	3.00
Dawson's Cotton Grower	7.00	2.67	2.75
Imperial Top Dresser for Cotton	2.00	8.32	----
Imperial 4-8-4 Tobacco Grower	8.00	3.29	4.00
Conetoe Cotton Grower	4.00	3.29	4.00
Imperial Fish and Bone Grain Guano	8.00	.82	4.00
Special Tobacco Guano	5.00	3.29	9.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
J. T. John, Jr., John's Station, N. C.—			
Nitrate of Soda	----	14.82	----
Lister's Agricultural Chemical Works, Newark, N. J.—			
Lister's Ammoniated Dissolved Bone Phosphate	8.00	2.06	2.00
Lister's Success Fertilizer	8.00	1.65	2.00
Lister's Standard Pure Bone Superphosphate of Lime	9.00	1.65	2.00
American Agricultural Chemical Co.'s Buyers' Choice Acid Phosphate	14.00	----	----
Lister's Bone Meal Total	20.60	3.30	----
A. S. Lee & Sons Co. (Inc.), Richmond, Va.—			
Lee's Bone and Potash	9.00	----	4.00
Lee's Corn Fertilizer	10.00	----	2.00
Lee's Wheat Fertilizer	10.00	----	2.00
E. H. & J. A. Meadows Co., New Bern, N. C.—			
Hookerton Cotton Guano	8.00	1.64	2.00
Meadows' Cotton Guano	8.00	1.64	2.00
Meadows' All Crop Guano	8.00	2.05	2.50
Meadows' Roanoke Guano	8.00	2.05	3.00
Meadows' Gold Leaf Tobacco Guano	8.00	2.47	3.00
Meadows' Lobos Guano	8.00	4.11	5.00
Meadows' Great Potato Guano	7.00	4.11	8.00
Meadows' Great Cabbage Guano	7.00	5.76	7.00
Meadows' 10 Per Cent Guano	6.00	8.23	2.50
Meadows' Sea Bird Guano	9.00	3.29	2.50
Meadows' Dissolved Bone and Potash Compound	10.00	----	2.00
Meadows' German Kainit	----	----	12.00
Meadows' Diamond Acid Phosphate	14.00	----	----
Dixon's High Grade Tobacco Guano	8.00	2.47	3.00
Parker's Special Tobacco Guano	8.00	2.47	4.00
Brooks' Special Tobacco Grower	8.00	2.47	5.00
Meadows' Ideal Tobacco Guano	8.00	3.29	4.00
The Miller Fertilizer Co., Baltimore, Md.—			
Special Tobacco Grower	8.00	1.65	4.00
Standard Phosphate	8.00	2.47	3.00
Ammoniated Dissolved Bone	8.00	1.65	2.00
High Grade Potato	6.00	4.12	7.00
Tobacco King	8.00	2.47	3.00
Profit	8.00	1.65	2.00
Standard Potato	8.00	2.47	3.00
Potato and Vegetable Guano	8.00	1.65	4.00
Trucker	8.00	4.12	5.00
Farmers' Profit	8.00	1.65	2.00
Harmony	8.00	2.06	3.00
Corn and Peanut Grower	10.50	----	2.25
No. 1 Potato and Vegetable Grower	9.00	3.71	7.00
Clinch	10.00	----	2.00
4 Per Cent Tobacco	8.00	3.29	4.00
Miller's 7 Per Cent	7.00	5.77	7.00
Miller's Irish Potato	8.00	3.29	4.00
Miller's 16 Per Cent Acid Phosphate	16.00	----	----
Kainit	----	----	12.00
Acid Phosphate	14.00	----	----
The Miller Fertilizer Co.'s 10 and 4 Per Cent	10.00	----	4.00
Muriate of Potash	----	----	50.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Nitrate of Soda	----	15.05	----
Ground Bone Total	14.00	2.47	----
Dried Blood	----	11.53	----
The Mapes Formula and Peruvian Guano Co., 143 *Liberty Street, New York*—			
Mapes' Economical Potato Manure	4.00	3.29	8.00
Mapes' Vegetable or Complete Manure for Light Soils	6.00	4.94	6.00
Mapes' Corn Manure	8.00	2.47	6.00
Mapes' Complete Manure, "A" Brand	10.00	2.47	2.50
John F. McNair, Laurinburg, N. C.—			
Nitrate of Soda	----	15.58	----
D. B. Martin Co., Richmond, Va.—			
Martin's 7 Per Cent Guano	6.00	5.74	5.00
Martin's Early Truck and Vegetable Grower	6.00	3.28	8.00
Martin's Claremount Vegetable Grower	7.00	2.46	5.00
Martin's Red Star Brand	8.00	3.28	4.00
Martin's Bull Head Fertilizer	8.00	2.46	3.00
Martin's Tobacco Special	8.00	2.46	3.00
Martin's Carolina Cotton Fertilizer	8.00	1.65	2.00
Martin's Old Virginia Favorite	8.00	1.65	2.00
Martin's Corn and Cereal Special	8.00	1.65	2.00
Martin's Gilt Edge Potato Manure	7 00	2.46	10.00
Martin's Animal Bone Potato Guano	6.00	4.10	7.00
Martin's Animal Bone Potato Compound	16.00	1.65	2.50
Martin's Pure Dissolved Animal Bone	12.00	1.65	2.00
Martin's Pure Ground Bone Total	22.90	1.65	2.00
Martin's Raw Bone Meal Total	21.00	3.69	----
Martin's Animal Tankage, Ground Total	16.00	4.92	----
Martin's Acid Phosphate	16.00	----	----
Martin's Potash and Soluble Bone	12.00	----	5.00
Martin's High Grade Blood	----	13.94	----
Martin's Blood	----	12.30	----
Acid Phosphate	14.00	----	----
Potash and Soluble Bone	12.00	----	3.00
Potash and Soluble Bone	10.00	----	5.00
Potash and Soluble Bone	10.00	----	2.00
Nitrate of Soda	----	15.52	----
Sulphate of Ammonia	----	20.50	----
Blood	----	10.66	----
Blood	----	9.84	----
Blood	----	12.30	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	50.00
Pure Ground Bone Total	22.90	2.46	----
Martin's Carolina Special	8.00	1.65	2.00
Martin's Special Potato Guano	8.00	.82	5.00
Marietta Fertilizer Co., Atlanta, Ga.—			
Lion Power Guano	10.00	1.65	2.00
Royal Seal Guano	10.00	1.65	2.00
Cooper's High Grade Guano	10.00	1.65	2.00
Lion H. G. Guano	10.00	1.65	2.00
Lion H. G. Acid Phosphate	16.00	----	----
Lion Special Guano	10.00	.82	3.00
Lion Favorite Guano	8.00	1.65	2.00
Lion Blood and Bone Compound	9.00	.82	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Lion H. G. Dissolved Bone	14.00	----	----
Farmers Special No. 3	7.00	1.65	6.00
Langford's Special	10.00	1.65	4.00
Marsh-Lee & Co., Marshville, N. C.—			
Marsh's High Grade Acid	14.00	----	----
Marsh's Cotton Fertilizer	8.00	1.65	2.00
Marsh's Guano for Corn	8.00	1.65	2.00
Marsh's Special	8.00	2.50	3.00
The MacMurphy Co., Charleston, S. C.—			
Special 8-3-3 Guano	8.00	2.47	3.00
Special 8-2-2 Cotton and Corn Guano	8.00	1.65	2.00
Cotton and Corn Guano, 9-2-2	9.00	1.65	2.00
Wilcox & Gibbs Co.'s Manipulated Guano	9.00	2.26	2.00
Cotton and Corn Guano, 9-3-3	9.00	2.47	3.00
High Grade Acid Phosphate, 14 Per Cent	14.00	----	----
Pure German Kainit	----	----	12.00
Nitrate of Soda	----	14.82	----
Muriate of Potash	----	----	48.00
Acid Phosphate, 13 Per Cent	13.00	----	----
8-4-6 Guano	8.00	3.29	6.00
North Carolina Cotton Oil Co., Wilmington, N. C.—			
Wilmington Tobacco Grower	8.00	2.06	3.00
Wilmington High Grade	8.00	2.47	3.00
Wilmington Cotton Grower	8.00	1.65	2.00
Wilmington Standard	8.00	2.47	2.50
Wilmington Truck Grower	8.00	3.30	4.00
Wilmington Special	8.00	1.65	2.00
Carter's Lifter	8.00	2.47	3.00
Clark's Special	8.00	1.65	3.00
Wilmington Banner	8.00	1.65	3.00
John's Special	8.00	2.47	3.00
McEacheva's Special	7.00	5.77	7.00
North Carolina Cotton Oil Co., Raleigh, N. C.—			
Raleigh Standard Guano	8.00	2.26	2.00
North Carolina Cotton Oil Co., Charlotte, N. C.—			
Majestic	8.00	1.65	2.00
Dixie Standard	8.00	2.48	3.00
North Carolina Cotton Oil Co., Henderson, N. C.—			
Uneedit Cotton Grower	8.00	1.65	2.00
Uneedit Tobacco Fertilizer	9.00	2.47	3.00
Vance Cotton Grower	8.00	1.65	2.00
Pride of Vance	9.00	2.47	3.00
Henderson Cotton Grower	8.00	1.65	2.00
Henderson Tobacco Fertilizer	9.00	2.47	3.00
Franklin Cotton Grower	8.00	1.65	2.00
Franklin Tobacco Fertilizer	9.00	2.47	3.00
New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.—			
Oriole Tobacco Grower	8.00	3.30	4 00
Greene County Standard Fertilizer	8.00	1.65	2.00
Jones County Premium Crop Grower	8.00	2.06	3.00
Onslow Farmers' Reliance Guano	8.00	2.06	3.00
High Grade Fertilizer	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Foy's High Grade Fertilizer	8.00	2.47	3.00
Pitt's Prolific Golden Tobacco Grower	8.00	2.47	3.00
Craven Cotton Guano	8.00	1.65	2.00
Lenoir Bright Leaf Tobacco Grower	8.00	2.47	3.00
Ives' Irish Potato Guano	7.00	4.13	7.00
Dunn's Standard Truck Grower	7.00	5.77	7.00
Pamlico Electric Top Dresser	5.00	8.25	2.50
Special Corn and Peanut Grower	11.00	----	2.00
Carteret Bone and Potash	10.00	----	2.00
14 Per Cent Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Bogue Fish Scrap	----	7.42	----
Nitrate of Soda	----	15.67	----
Sulphate of Ammonia	----	20.62	----
Favorite Cotton Grower C. S. M.	8.00	2.27	2.00
16 Per Cent Acid Phosphate	16.00	----	----
Norfolk Fertilizer Co., Norfolk, Va.—			
Oriana Cotton Guano	8.00	1.65	2.00
Oriana C. S. M. Special	9.00	2.26	2.00
Oriana Tobacco Guano	8.00	2.47	3.00
Oriana 3-8-3 for Cotton	8.00	2.47	3.00
Oriana Crop Grower	8.00	1.65	3.00
Oriana Bone and Potash	10.00	----	2.00
Oriana 14 Per Cent Acid Phosphate	14.00	----	----
Oriana 16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Iola Acid Phosphate	13.00	----	----
Oriana First Step Tobacco Guano	8.00	3.29	4.00
Oriana 4-4-6 High Grade Tobacco Guano	4.00	3.29	6.00
Pine Top Special Crop Grower	5.00	1.65	6.00
Nitrate of Soda Mixture for Top Dressing Cotton	2.00	8 23	----
Habana Special Tobacco Guano	8.00	2.62	3.00
Navassa Guano Co., Wilmington, N. C.—			
Ammoniated Soluble Navassa Guano	8.00	2.06	2.00
Clarendon Tobacco Guano	8.00	2.47	3.00
Occoneechee Tobacco Guano	8.00	1.65	2.00
Coree Tobacco Guano	8.00	3.29	4.00
Harvest King Guano	8.00	1.65	3.00
Mogul Guano	8.00	2.06	3.00
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda	----	14.82	----
Sulphate of Ammonia	----	20.59	----
Orton Guano	8.00	2.47	4.00
Navassa Universal Fertilizer	8.50	2.06	1.00
Navassa Wheat Mixture	10.00	----	2.25
Navassa Wheat and Grass Grower	10.00	----	4.00
Navassa Special Wheat Mixture	12.00	----	4.00
Navassa Gray Land Mixture	12.00	----	4.00
Navassa Dissolved Bone with Potash	10.00	----	2.00
Navassa Acid Phosphate	12.00	----	----
Navassa Dissolved Bone	13.00	----	----
Navassa 14 Per Cent Acid Phosphate	14.00	----	----
Navassa Acid Phosphate	16.00	----	----
Navassa Special Trucker	8.00	3.30	4.00
Navassa Strawberry Top Dressing	8.00	2.06	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Navassa Blood and Meal Mixture	8.00	2.47	5.00
Navassa Creole Guano	6.00	4.12	7.00
Maxim Guano	10.00	2.47	2.00
Navassa Manipulated Guano	9.00	2.26	2.00
Osceola Guano	9.00	1.65	3.00
Corona Guano	10.00	1.65	2.00
Clark's Special Cotton Seed Meal Guano	8.00	1.65	3.00
Navassa Root Crop Fertilizer	7.00	4.12	7.00
Navassa Carib Guano	8.00	2.47	10.00
Navassa Guano for Tobacco	8.00	2.06	2.00
Navassa Grain Fertilizer	8.00	1.65	2.00
Navassa Fruit Growers' Fertilizer	8.00	1.65	6.00
Navassa Cotton Seed Meal Special 3 Per Cent Guano	8.00	2.47	2.00
Navassa Cotton Seed Meal Guano	8.00	1.65	2.00
Navassa Cotton Fertilizer	8.00	1.65	2.00
Navassa Complete Fertilizer	9.00	1.65	1.00
Navassa High Grade Guano	8.00	2.47	3.00
Navassa Dissolved Bone with Potash	8.00	----	4.00
Harvest Queen Fertilizer	9.00	1.65	2.00
Navassa High Grade Tobacco Guano	8.00	2.47	10.00
Navassa Fish Guano	9.00	2.47	3.00
The Nitrate Agencies Co., Savannah, Ga.—			
Nitrate of Soda	----	14.85	----
Ocean Fisheries Co., Wilmington, N. C.—			
Fish Scrap	3.47	5.30	----
G. Ober & Sons Co., Baltimore, Md.—			
Ober's Acid Phosphate with Potash	8.00	----	4.00
Ober's Stag Guano	8.00	.82	4.00
Ober's Complete Fertilizer	6.00	4.12	6.00
Special High Grade Fertilizer	9.00	2.47	3.00
Ober's Special Compound for Tobacco	8.00	2.47	3.00
Ober's Standard Tobacco Fertilizer	8.00	1.65	2.00
Ober's Special Ammoniated Dissolved Bone	9.00	1.65	2.00
Ober's Special Cotton Compound	8.00	1.65	2.00
Ober's Soluble Ammoniated Superphosphate of Lime	8.00	1.65	2.00
Ober's Farmers' Mixture	9.00	.82	2.00
Ober's Dissolved Bone, Phosphate and Potash	10.00	----	2.00
Ober's Acid Phosphate with Potash	8.00	----	2.00
Ober's Standard Potash Compound	12.00	----	5.00
Ober's High Grade Acid Phosphate	16.00	----	----
Ober's Dissolved Bone Phosphate	14.00	----	----
Nitrate of Soda	----	15.50	----
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Pure Raw Bone Meal Total	21 00	3.71	----
Ober's Dissolved Animal Bone	10.00	2.47	----
Ober's Special Potash Compound for Tobacco	6.00	2.47	7.00
Cooper's Pungo Guano	8.00	2.06	2.00
Ober's Standard Potash Compound	12.00	----	5.00
The Pocomoke Guano Co., Norfolk, Va.—			
Garrett's Grape Grower	8.00	3.29	10.00
Coast Line Truck Guano	5.00	8.23	3.00
Freeman's 7 Per Cent Irish Potato Grower	6.00	5.76	5.00
Seaboard Popular Trucker	6.00	5.76	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Standard Truck Guano	7.00	4.12	5.00
Faultless Ammoniated Superphosphate	7.00	3.30	4.00
Harvest High Grade Monarch	8.00	2.47	3.00
Monarch Tobacco Grower	8.00	2.47	3.00
Monticello Animal Bone Fertilizer	9.00	1.85	4.00
Cinco Tobacco Guano	8.50	2.06	2.50
Crescent Complete Compound	8.00	1.65	3.00
Hornthal's Tobacco Guano	8.00	1.65	3.00
L. P. H. Premium	8.00	1.65	2.00
Electric Crop Grower	8.50	1.65	2.00
Pamlico Superphosphate	8.00	1.65	2.00
Pocomoke Superphosphate	8.50	1.65	2.00
Pocomoke Bone and Potash Mixture	10.00	----	4.00
Pure Ground Bone Total	20.00	3.70	----
10-2 Potash Mixture	10.00	----	2.00
Alkali Bone	11.00	----	2.00
Peerless Acid Phosphate	14.00	----	----
Pocomoke Wheat, Corn and Peanut Manure	8.00	1.00	4.00
Smith's Special Formula	4.00	3.30	6.00
Superb Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Pocomoke Defiance Bone and Potash	8.00	----	4.00
Pamlico Chemical Co., Washington, N. C.—			
Pamlico Special Irish Potato Guano	7.00	4.12	7.00
Bull's Eye Tobacco Grower	8.00	3.30	4.00
Pamlico Ground Fish	----	7.42	----
Muriate of Potash	----	----	48.00
Pamlico Special Sweet Potato Guano	7.00	4.12	5.00
Pamlico Cereal Side Dresser	2.50	7.42	2.50
Pamlico Favorite Potato Guano	7.00	4.12	5.00
Pamlico Bone and Fish Guano	8.00	1.65	2.00
Pamlico Potato Guano	7.00	4.12	7.00
Pamlico Cotton Guano	8.00	1.65	2.00
Pamlico 7-7-7 Guano	7.00	5.77	7.00
Pamlico 16 Per Cent Acid Phosphate	16.00	----	----
Pamlico Bone Phosphate	14.00	----	----
Cowell's Great Potato Grower	8.00	4.12	7.00
Cowell's Great Cabbage Grower	5.00	8.25	2.50
Tobacco Growers' Friend	8.00	2.47	3.00
German Kainit	----	----	12.00
Farmers' Best Guano	8.00	2.06	3.00
Pamlico Success Guano	8.00	2.47	3.00
Staton, Taylor & Mayo's Special Cotton Grower	8.00	2.26	2.00
Prosperity Cotton Grower	9.00	2.26	2.00
Pamlico High Grade Tobacco Grower	8.00	2.47	5.00
Pamlico 8-4-4 Guano	8.00	3.30	4.00
Pamlico 6-3-6	6.00	2.47	6.00
Nitrate of Soda	----	14.85	----
Falkland H. G. Tobacco Guano	6.00	2.47	6.00
Dissolved Bone and Potash Compound	10.00	----	2.00
Planters Fertilizer and Phosphate Co., Charleston, S. C.—			
Planters' Bright Tobacco Fertilizer	8.00	3 29	4.00
Planters' Fertilizer	8.00	2 06	2.00
Planters' Soluble Guano	8.00	2.47	3.00
Planters' Standard Fertilizer	8.75	1.65	2.00
Nitrate of Soda	----	14.83	----
Planters' High Grade Acid Phosphate	14.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Planters' Standard Fertilizer	8.00	1.65	2.00
Planters' Soluble Bone	13.00	----	----
Sulphate of Potash	----	----	48.00
Planters' Kainit	----	----	12.00
Planters' Blood, Bone and Potash	8.00	2.06	2.00
Planters' H. G. Top Dresser	4.00	6.18	4.50
Planters' H. G. Tobacco Fertilizer	8.00	2.47	3.00
Planters' Cotton and Truck Fertilizer	8.00	2.47	4.00
Planters' Special Cotton Fertilizer	8.00	3.29	4.00
Planters' Muriate of Potash	----	----	48.00
Planters' Acid and Potash	10.00	----	4.00
Planters' 16 Per Cent Acid Phosphate	16.00	----	----
Planters' Bone and Potash	10.00	----	2.00
Planters' Bone and Potash	12.00	----	1.00
Special Mixture	8.00	4.12	5.00
Peruvian Guano Corporation, Charleston, S. C.—			
Peruvian Guano. Ex. S.S. Celia, No. 1 ----Total	17.00	2.80	3.25
Peruvian Guano, Ex. S.S. Delblair	10.00	2.15	2.25
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 1	9.50	2.40	1.50
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 2	9.00	2.56	2.25
Peruvian Guano, Ex. S.S. Belle of Scotland, No. 3	9.00	2.69	2.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	15.50	----
Sulphate of Ammonia	----	19.00	----
Dried Blood	----	14.00	----
Peruvian Guano, Ex. S.S. Celia ----Total	15.00	2.80	3.00
Peruvian Guano, S.S. Delblair ----Total	15.50	2.13	2.00
Peruvian Guano, S.S. Chincha ----Total	10.00	4.13	2.00
Peruvian Guano, S.S. Belle of Scotland, No. 2, Total	14.50	2.47	2.00
Peruvian Guano, S.S. Belle of Scotland, No. 3, Total	14.00	2.56	2.00
Peruvian Guano, Ex. S.S. Delblair ----Total	13.00	3.31	3.25
Peruvian Guano, Ex. S.S. Celia, No. 1 ----Total	18.00	2.88	3.25
Peruvian Guano, Ex. S.S. Argo Chincha, No. 1 ----Total	11.00	5.76	2.75
Peruvian Guano, Chincha Ex. S.S. Argo, No. 2 ----Total	13.00	4.55	2.75
Top Dresser	8.00	7.03	3.50
Pearsall & Co., Wilmington, N. C.—			
Kainit	----	----	12.00
Pearsall's Uzit	8.00	2.46	3.00
Pearsall's H. G. F. F. G.	8.00	2.46	3.00
Pearsall's Fish and Potash Mixture	8.00	3.24	4.00
Eagle	8.00	1.70	2.00
Pearsall & Co.'s Fish and Potash Compound	8.00	3.40	4.00
Pearsall & Co.'s 6-6-6 Guano	6.00	4.90	6.00
Pacific Guano Co., Charleston, S. C.—			
Standard Soluble Pacific Guano	8.50	1.65	2.00
Standard Pacific Acid Phosphate	12.00	----	----
High Grade Pacific Fertilizer	8.00	2.46	3.00
Powhatan Chemical Co., Richmond, Va.—			
Powhatan Trucker	7.00	4.94	5.00
Powhatan Bone and Potash Mixture	8.00	----	4.00
Powhatan Acid Phosphate	13.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Magic Dissolved Bone Phosphate	16.00	----	----
Magic Peanut Grower	8.00	----	4.00
Magic Grain and Grass Grower	8.00	----	4.00
Magic Bone and Potash Mixture	10.00	----	4.00
Magic Mixture	9.00	1.65	1.00
Magic Cotton Grower	8.00	1.65	2.00
Magic Special Fertilizer	8.00	1.65	2.00
Magic Tobacco Grower	8.00	1.65	2.00
King Brand Fertilizer	8.00	2.06	3.00
White Leaf Tobacco Fertilizer	8.00	2.06	3.00
Economic Cotton Grower	9.00	2.26	2.00
North State Special	8.00	3.29	4.00
Guilford Special Tobacco Fertilizer	9.00	2.47	6.00
Pure Raw Bone Meal Total	20.00	3.29	----
Bone and Potash Mixture	10.00	----	2.00
Pure Animal Bone Total	25.00	2.47	----
Nitrate of Soda	----	15.63	----
Sulphate of Ammonia	----	19.75	----
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	50.00
Pure German Kainit	----	----	12.00
Virginia Dissolved Bone	12.00	----	----
High Grade Acid Phosphate	14.00	----	----
P. C. Co.'s Hustle	8.00	2.47	3.00
Magic Corn Grower	10.00	.82	1.00
Magic Wheat Grower	9.00	.82	2.00
Johnson's Best Fertilizer	9.00	2.06	5.00
Holt's Magic Fertilizer	9.00	2.06	5.00
Magic Peanut Special	8.00	.82	4.00
Magic Crop Grower	10.00	.82	1.00
Magic Fertilizer	8.00	2.47	4.00
Pine Level Oil Mill Co., Pine Level, N. C.—			
Cotton Grower for All Crops	8.00	1.65	2.00
Pine Level High Grade	8.00	2.47	3.00
Hale's Special for Tobacco	8.00	2.47	4.00
H. G. Top Dresser	3.00	6.03	6.00
Patapsco Guano Co., Baltimore, Md.—			
Patapsco Plant Food for Tobacco, Potatoes and Truck	8.00	2.47	5.00
Patapsco Soluble Bone and Potash	10.00	----	2.00
Patapsco High Grade Bone and Potash	11.00	----	5.00
Patapsco 10 and 4 Potash Mixture	10.00	----	4.00
Patapsco 7-7-7 Truck Guano	7.00	5.76	7.00
Patapsco Potato Guano	6.00	4.11	7.00
Patapsco Crop Dresser	4.00	3.30	4.00
Patapsco Trucker for Early Vegetables	7.00	4.11	5.00
Patapsco Tobacco Fertilizer	9.00	2.47	3.00
Patapsco Guano for Tobacco	9.25	2.06	2.00
Patapsco Guano	9.25	2.06	2.00
Patapsco Special Tobacco Mixture	8.00	2.06	3.00
Patapsco Fine Ground Bone Total	20.61	3.29	----
Patapsco Pure Dissolved S. C. Phosphate	14.00	----	----
Coon Brand Guano	9.00	.82	3.00
Choctaw Guano	8.00	2.47	3.00
Planters' Favorite	8.00	1.65	2.00
Seagull Ammoniated Guano	8.00	1.65	2.00
Money Maker Guano	7.00	3.70	6.00
Unicorn Guano	8.00	2.06	3.00
Baltimore Soluble Phosphate	11.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Florida Soluble Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Grange Mixture	8.00	1.65	2.00
Patapsco Crop Dresser	4.00	3.29	4.00
Nitrate of Soda	----	15.00	----
Muriate of Potash	----	----	49.00
Ground Fish	----	8.23	----
Swanson's Gold Leaf Special	8.00	2.06	2.00
Sulphate of Potash	----	----	48.00
Patapsco Cotton and Tobacco Special	8.00	3.29	4.00
Sulphate of Ammonia	----	19.75	----
Parsons & Hardison, Wadesboro, N. C.—			
High Grade Ground Tankage	----	9.10	----
Pocahontas Guano Co., Lynchburg, Va.—			
Imperial Dissolved S. C. Phosphate	14.00	----	----
Carrington's Superior Grain Compound	10.00	----	2.00
Wabash Wheat Mixture	10.00	----	4.00
Cherokee Grain Special	8.00	----	4.00
Farmers' Favorite Apex Brand	8.00	2.47	3.00
Spot Cash Tobacco Compound	8.00	2.06	3.00
Yellow Tobacco Special	9.00	1.65	2.00
High Grade 4 Per Cent Tobacco Compound, Mohawk King Brand	9.00	1.85	4.00
Standard Tobacco Guano, Old Chief Brand	9.00	1.66	2.00
Pocahontas Special Tobacco Fertilizer	9.00	2.47	3.00
A. A. Complete Champion Brand	8.00	1.03	3.00
Carrington's Special Truck Grower, Eagle Mount Brand	8.00	2.06	6.00
Pure Raw Bone Meal Total	20.60	3.69	----
Carrington's S. C. Phosphate, Waukesha Brand	16.00	----	----
Carrington's Banner Brand Guano	8.00	1.65	2.00
Indian Tobacco Grower	8.00	2.47	4.00
Bone Meal Total	22.80	2.46	----
Planters Cotton Seed Oil Co., Rocky Mount, N. C.—			
Tar River Special	8.00	2.47	3.00
Eagle Guano	8.00	1.65	2.00
Royal Cotton Grower	9.00	2.26	2.00
Piedmont-Mt. Airy Guano Co., Baltimore, Md.—			
Piedmont Cultivator Brand	8.00	1.65	2.00
Piedmont Bone and Peruvian Mixture	8.00	1.65	2.00
Piedmont Special Truck	6.00	5.76	5.00
Piedmont Early Vegetable Manure	6.00	4.12	7.00
Piedmont Vegetable Compound	6.00	3.29	8.00
Piedmont Essential Tobacco Compound	9.00	1.65	2.00
Piedmont Guano for Tobacco	8.00	2.09	3.00
Piedmont High Grade Ammoniated Bone and Potash	8.00	2.47	3.00
Piedmont High Grade S. C. Bone Phosphate	14.00	----	----
Levering's Potashed Bone	10.00	----	4.00
Levering's Reliable Tobacco Guano	8.00	2.47	3.00
Piedmont Special Potato Guano	6.00	4.94	7.00
Piedmont Red Leaf Tobacco Guano	8.00	1.65	2.00
Piedmont Early Trucker	6.00	4.12	5.00
Piedmont Potato Producer	5.00	2.47	6.00
Piedmont Farmers' Standard	9.00	1.65	2.00
Piedmont Special for Cotton, Corn and Peanuts	8.00	1.65	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Piedmont Special Farmers' Tobacco Guano	8.40	2.47	4.00
Piedmont Farmers' Bone and Potash	10.00	----	2.00
Piedmont High Grade Guano for Cotton	8.00	2.47	3.00
Haynes' Cultivator Guano	8.00	1.65	2.00
Piedmont Farmers' Favorite	8.00	.82	4.00
Piedmont Farmers' Cotton Grower	9.00	.82	3.00
Piedmont Star Bone and Potash	8.00	----	5.00
Piedmont Unexcelled Guano	8.00	3.29	4.00
Piedmont Bone Meal Total	21.00	3.29	----
Piedmont Special Potash Mixture	10.00	----	5.00
Boykin's Top Dresser	----	7.41	3.00
Levering's Ammoniated Bone	9.00	.82	3.00
Nitrate of Soda	----	15.23	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	50.00
Sulphate of Ammonia	----	20.58	----
Piedmont 16 Per Cent Acid Phosphate	16.00	----	----
Privott's Gilt Edge Guano	7.00	2.47	10.00
Eclipse Top Dresser	----	7.41	3.00
The Quinnepiac Co., Charleston, S. C.—			
Standard Quinnepiac Pine Island Ammoniated Superphosphate	9.00	1.85	1.00
Standard Quinnepiac Acid Phosphate	13.00	----	----
The Robertson Fertilizer Co., Norfolk, Va.—			
Robertson's X-Ray Tobacco Grower	8.00	2.06	2.00
Genuine German Kainit	----	----	12.00
Skyscraper Bone and Potash Compound	10.00	----	4.00
Double Dollar Soluble Guano	8.00	1.65	2.00
Double Dollar Soluble Cotton Grower	8.00	1.65	2.00
Double Dollar Soluble Tobacco Guano	8.00	1.65	2.00
Beaver Brand Soluble Guano	9.00	1.85	4.00
Beaver Brand Soluble Tobacco Guano	9.00	1.85	4.00
Beaver Brand Bright Tobacco Special	9.00	1.85	4.00
Big Cropper High Grade Guano	8.00	2.47	3.00
Robertson's Special Formula for Tobacco	8.00	3.30	4.00
Scepter Brand Acid Phosphate	14.00	----	----
High Peak Acid Phosphate	16.00	----	----
Level Run Dissolved Bone and Potash	10.00	----	2.00
Wood's Winner H. G. Guano	8.00	3.36	4.00
Dried Blood	----	13.20	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	14.85	----
Robertson's Soluble H. G. Guano	8.00	2.47	4.00
Ten Strike Soluble Producer	8.00	.99	4.00
Davidson's Choice H. G. Complete Manure	9.00	2.47	3.00
Robertson's Raw Bone Meal Total	21.00	3.70	----
P. M. C. High Grade Soluble Guano	8.00	4.10	7.00
F. S. Royster Guano Co., Norfolk, Va.—			
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Genuine German Kainit	----	----	12.00
Farmers' Bone Fertilizer	8.00	1.65	2.00
Bonanza Tobacco Guano	8.00	2.47	3.00
Orinoco Tobacco Guano	8.00	2.06	3.00
Special Tobacco Compound	8.00	2.06	2.00
Cobb's High Grade for Tobacco	8.00	3.30	5.00
Humphrey's Special for Tobacco	6.00	2.55	3.20
Eagle's Special Tobacco Guano	8.00	2.47	5.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Royal Potato Guano	7.00	4.12	5.00
Royal Special Potato Guano	7.00	4.12	7.00
Ballentine's Potato Guano	6.00	5.77	7.00
Trucker's Delight	8.00	3.30	4.00
Special Compound	9.00	1.65	1.00
Tomlinson's Special	9.00	2.47	5.00
Williams' Special Guano	8.00	2.06	5.00
Magic Top Dresser	----	7.42	3.00
Royster's Special Sweet Potato Guano	8.00	2.47	3.00
Royster's Potato Guano	5.00	4.94	7.00
Royster's Special 7 Per Cent Truck Guano	7.00	5.77	7.00
Royster's Early Truck Guano	7.00	4.12	8.00
Royster's Special 10 Per Cent Truck Guano	5.00	8.24	3.00
Royster's Special 4-8-3	8.00	3.30	3.00
Royster's 4-9-5 Special	9.00	3.30	5.00
Royster's Special 1-9-2 Guano	9.00	.82	2.00
Royster's 2-6-5 Special	6.00	1.65	5.00
Royster's Meal Mixture	9.00	2.26	2.00
Royster's Special Wheat Fertilizer	8.00	1.65	2.00
Royster's H. G. 16 Per Cent Acid Phosphate	16.00	----	----
Royster's 14 Per Cent Acid Phosphate	14.00	----	----
Royster's Dissolved Bone	13.00	----	----
Royster's XX Acid Phosphate	12.00	----	----
Royster's Bone and Potash Mixture	11.00	----	5.00
Royster's Bone and Potash Mixture	10.00	----	2.00
Royster's Bone and Potash for Grain	10.00	----	3.00
Royster's 8 and 4 Bone and Potash Mixture	8.00	----	4.00
Royster's Peanut Special	7.00	----	5.00
Royster's Complete Guano	8.00	1.65	2.00
Royster's 10 and 4 Bone and Potash Mixture	10.00	----	4.00
Jupiter High Grade Guano	8.00	3.30	4.00
Viking Ammoniated Guano	9.00	1.65	3.00
Royster's Best Guano	8.00	3.71	7.00
Harvey's Cabbage Guano	5.00	6.59	3.00
Marlborough High Grade Cotton Guano	8.00	2.47	3.00
Nitrate of Soda	----	15.22	----
Jumbo Peanut Grower	8.00	1.02	4.00
Watkins' Special	9.00	2.06	5.00
Haynes' Special	9.00	2.06	3.00
Pure Raw Bone Meal—Total	21.50	3.71	----
Milo Tobacco Guano	8.00	3.30	4.00
Royster's Soluble Guano	10.00	1.65	2.00
McDowell's Cotton Grower	6.00	3.30	2.00
Royster's 4-6-4 Special	4.00	4.94	4.00
Webb's Korn King	8.00	1.65	2.00
Royster's 10-5 Bone and Potash Mixture	10.00	----	5.00
Corbett & Moore's Special	8.00	1.65	3.50
Oakley's Special Tobacco Guano	6.00	3.30	4.00
Royster's Irish Potato Guano	6.00	4.12	7.00
Royster's Cabbage Guano	5.00	8.23	2.50
Phillips' Special	5.00	1.65	6.00
Royster's H. G. 17 Per Cent Acid Phosphate	17.00	----	----
Royster's Irish Potato Guano	6.00	4.12	7.00
Oakley's Special Tobacco Guano	6.00	3.30	4.00
Sylvanite	----	----	18.00
Dry Fish—Total	3.50	8.64	----
J. H. Roberson & Co., Robersonville, N. C.—			
Roberson's Potato Guano	6.00	5.77	5.00
Roberson's Cotton Grower	9.00	2.26	2.00
Roberson's Special Potato Grower	7.00	5.77	7.00
Roberson's Special for Bright Tobacco	8.00	2.06	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Richmond Guano Co., Richmond, Va.—			
10 Per Cent Cabbage Guano	6.00	8.23	2.00
Special High Grade for Truck	7.00	4.94	5.00
Southern Trucker	8.00	4.11	5.00
Perfection Special	8.00	3.29	4.00
Gilt Edge Fertilizer	8.00	2.47	3.00
Carolina Cotton Grower	9.00	2.26	2.00
Carolina Bright Special Tobacco Fertilizer	8.00	2.26	2.50
Tip Top Fertilizer	8.00	2.06	3.00
Special Premium Brand for Tobacco	8.00	1.85	2.25
Special Premium Brand for Plants	8.00	1.85	2.25
Carolina Bright for Cotton	8.00	2.06	1.50
Benson's Special Fertilizer	8.00	1.65	6.00
Parker & Hunter's Special Fertilizer	8.00	1.65	2.00
Premium Tobacco Fertilizer	8.00	1.65	2.00
Premium Brand Fertilizer	8.00	1.65	2.00
Bone Mixture	9.00	1.65	1.00
Clark's Special Formula	7.00	4.94	6.00
Carter's Special for Tobacco	4.00	2.47	6.00
Saunders' Special Formula for Bright Tobacco	9.00	2.88	5.00
Burton's Special Tobacco Fertilizer	9.00	2.06	3.00
Hunter & Dunn's Special Ammoniated Fertilizer,	9.00	2.47	2.25
Hunter & Dunn's Ammoniated Fertilizer	8.00	1.65	2.00
Edgecombe Cotton Grower	8.00	1.65	2.00
Premium Bone and Potash Mixture	13.00	----	3.00
Rex Bone and Potash Mixture	10.00	----	4.00
Tip Top Bone and Potash Mixture	8.00	----	4.00
Winter Grain and Grass Grower	8.00	----	4.00
Premium Peanut Grower	8.00	----	4.00
Bone and Potash Mixture	10.00	----	2.00
Rex Dissolved Bone Phosphate	16.00	----	----
High Grade Acid Phosphate	14.00	----	----
High Grade Wheat and Grass Fertilizer	14.00	----	----
Premium Dissolved Bone	13.00	----	----
Bone Mixture	10.00	.82	1.00
Dissolved S. C. Phosphate	12.00	----	----
Hunter & Dunn's Dissolved Bone	12.00	----	----
Pure German Kainit	----	----	12.00
Muriate of Potash	----	----	50.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	19.75	----
Nitrate of Soda	----	15.63	----
Pure Raw Bone Meal Total	20.00	3.29	----
Pure Animal Bone Total	25.00	2.47	----
Premium Corn Grower	10.00	.82	1.00
Premium Wheat Grower	9.00	.82	2.00
Cracker Jack Fertilizer	9.00	1.65	2.00
Premium Peanut Special	8.00	.82	4.00
Premium Cotton Grower	9.00	.82	3.00
Old Homestead Dissolved Bone	12.00	----	----
Carolina Bright Special Tobacco Fertilizer	8.00	2.47	3.00
Rex Tobacco Fertilizer	8.00	1.65	4.00
Carolina Bright Tobacco Fertilizer	8.00	2.47	3.00
Read Phosphate Co., Charleston, S. C.—			
Genuine German Kainit	----	----	12.00
Read's High Grade Acid Phosphate	14.00	----	----
Read's Bone and Potash	10.00	----	4.00
Read's Alkaline Bone	10.00	----	2.00
Read's Special Potash Mixture	8.00	----	4.00
Read's High Grade Tobacco Leaf	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Read's Blood and Bone Fertilizer, No. 1	8.00	1.65	2.00
Read's Soluble Fish Guano	8.00	1.65	2.00
Read's High Grade Cotton Grower	8.00	2.47	3.00
Read's High Grade Dissolved Bone	16.00	----	----
Raisin-Monumental Co., Baltimore, Md.—			
Dixie Guano	9.00	1.65	2.00
Empire Guano	8.00	1.65	2.00
Raisin Gold Standard	8.00	2.47	3.00
Raisin Special Bone and Potash	10.00	----	5.00
Raisin Bone and Potash	10.00	----	2.00
Raisin 13 Per Cent Acid Phosphate	13.00	----	----
Raisin 16 Per Cent Acid Phosphate	16.00	----	----
Raisin 14 Per Cent Acid Phosphate	14.00	----	----
Baltimore Special Mixture	9.00	.82	2.00
Raisin's Indian Brand for Tobacco	8.00	2.47	3.00
Reidsville Fertilizer Co., Reidsville, N. C.—			
Banner Fertilizer	8.00	1.65	2.00
Champion Guano	8.00	1.65	2.00
Broad Leaf Tobacco Guano	8.00	1.85	2.50
Royal Fertilizer	8.00	2.47	3.00
Lion Brand Fertilizer	9.00	2.47	6.00
Bone and Potash	10.00	----	4.00
Reidsville Hustler	9.00	.82	2.00
Reidsville Acid Phosphate	14.00	----	----
Bone and Potash	10.00	----	2.00
Swift Fertilizer Works, Atlanta, Ga., and Wilmington, N. C.—			
High Grade Swift's Strawberry Grower	8.00	2.47	10.00
High Grade Swift's Special Trucker	6.00	5.76	5.00
High Grade Swift's Special 10 Per Cent Blood and Bone Trucker	5.00	8.23	3.00
High Grade Swift's Carolina 7 Per Cent Special Trucker	7.00	5.76	7.00
High Grade Swift's Favorite Truck Guano	6.00	4.94	6.00
High Grade Swift's Special Irish Potato Grower	7.00	4.12	8.00
High Grade Swift's Special Potato Grower	6.00	4.12	7.00
Swift's Carolina Tobacco Grower H. G. Guano	8.00	2.47	3.00
Swift's Cape Fear Truck Guano, H. G.	8.00	4.12	2.00
Swift's Red Steer Standard Grade Guano	8.00	1.65	2.00
Swift's Plow Boy Guano	10.00	.82	1.00
Swift's Cotton Plant Standard Grade Guano	9.00	1.65	1.00
Swift's Golden Harvest Standard Grade Guano	8.00	1.65	2.00
Swift's Farmers' Favorite High Grade	9.00	1.65	3.00
Swift's Pioneer High Grade Guano Tobacco Grower	8.00	1.65	4.00
High Grade Swift's Early Trucker	7.00	4.12	5.00
Swift's Blood, Bone and Potash High Grade Guano	9.50	3.29	7.00
Swift's Corn and Cotton Grower	10.00	2.47	3.00
Swift's Cotton King High Grade	9.00	2.47	2.00
Swift's Ruralist High Grade Guano	8.00	2.47	3.00
Swift's Special High Grade Guano	9.50	4.12	3.00
Swift's Monarch H. G. Vegetable Grower	8.00	3.29	4.00
Swift's Special High Grade Phosphate and Potash	12.00	----	6.00
Swift's Plantation Standard Grade Phosphate and Potash	8.00	----	4.00
Swift's Farmers' Home High Grade Phosphate and Potash	10.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Swift's Field and Farm Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Wheat Grower Standard Grade Phosphate and Potash	10.00	----	2.00
Swift's Harrow Standard Grade Acid Phosphate	13.00	----	----
High Grade Swift's No. 1 Ground Tankage	6.00	8.24	----
Swift's Pure Bone Meal Total	25.00	2.47	----
Swift's Cultivator High Grade Acid Phosphate	14.00	----	----
Swift's Special High Grade Acid Phosphate	16.00	----	----
Swift's Chattahoochee Standard Grade Acid Phosphate	12.00	----	----
Swift's Ground Dried Blood	----	13.18	----
Swift's Pure Nitrate of Soda	----	14.82	----
Swift's Pure Raw Bone Meal Total	23.00	3.71	----
Swift's Muriate of Potash	----	----	50.00
Swift's German Kainit	----	----	12.00
Swift's Eagle High Grade Guano	10.00	1.65	2.00
Swift's Atlanta High Grade Phosphate and Potash	12.00	----	4.00
Swift's Special Peanut Grower Standard Grade Guano	8.00	.82	4.00
Southern Chemical Co., Inc., Roanoke, Va.—			
Our Favorite	8.00	1.65	2.00
Farmers' Joy	8.00	1.65	4.00
Our Leader	9.00	.82	2.00
Harvest King	8.00	.82	3.00
Southern Queen	8.00	2.47	10.00
Valley Chief	8.50	1.65	2.00
Spartanburg Fertilizer Co., Spartanburg, S. C.—			
Corn Formula	10.50	1.65	5.00
Gosnell's Plant Food	10.50	2.46	2.00
West's Potash Acid	13.00	----	3.00
Bold Buster	9.00	1.65	2.00
Potato Guano	7.00	2.46	7.00
Tiger Brand Acidulated Phosphate	14.00	----	----
Dana's Best	10.00	----	4.00
Glencove	8.00	2.46	3.00
Zirconia	10.00	----	2.00
Cotton Compound	8.75	1.65	2.00
Melrose	10.00	----	2.00
Nitrate of Soda	----	14.81	----
Muriate of Potash	----	----	50.00
Scotland Neck Guano Co., Scotland Neck, N. C.—			
Josey's Cotton Seed Meal Tobacco Guano	8.00	2.47	3.00
Josey's High Grade Acid Phosphate	16.00	----	----
Josey's Cotton Seed Meal Cotton Grower	8.00	1.65	2.00
Scotland Neck's Favorite Cotton Seed-meal Guano,	8.00	1.65	2.00
Our Best Peanut Guano	5.00	1.23	5.50
K Elite	3.00	7.83	3.50
The Southern Exchange Co., Maxton, N. C.—			
Southern Exchange Co.'s Special Tobacco Fertilizer	8.00	1.65	3.00
Bright Tobacco Formula	8.00	2.47	4.00
Melon Grower	8.00	4.12	7.00
McKimmon's Special Truck Formula	8.00	4.12	7.00
Two Fours Guano	7.00	3.30	4.00
That Big Stick Guano	8.00	2.47	4.00
Bull of the Woods Fertilizer	8.00	2.47	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Jack's Best Fertilizer	8.00	2.47	3.00
Correct Cotton Compound	8.00	2.47	3.00
Juicy Fruit Fertilizer	9.00	1.85	4.00
The Walnut Fertilizer	8.50	2.06	2.50
The Racer Guano	8.00	1.65	3.00
The Coon Guano	8.00	1.65	2.00
R. M. C. Special Crop Grower	8.00	2.47	3.00
S. E. C. Bone and Potash Mixture	10.00	----	4.00
S. E. C. Bone and Potash Mixture	10.00	----	2.00
S. E. C. Acid Phosphate	16.00	----	----
S. E. C. Acid Phosphate	14.00	----	----
Genuine German Kainit	----	----	12 00
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.65	----
Currie's Crop Lifter	8.00	1.65	3.00
The Southern Cotton Oil Co., Charlotte District, Concord, Charlotte, Davidson, Madison, Shelby, Gibson and Gastonia.—			
Dandy Top Dresser	4.00	9.07	2.50
Conqueror	8.00	3.30	4.00
Gloria	8.00	1.65	2.00
Peacock	8.00	2.47	3.00
Red Bull	8.00	2.06	2.00
Noon	8.00	2.47	3.00
King Bee	8.65	1.65	2.00
Gold Seal	14.00	----	----
Silver King	13.00	----	----
Genuine German Kainit	----	----	12.00
Magnolia Bone and Potash	10.00	----	2.00
Conqueror Bone and Potash	10.00	----	4.00
Cotton Seed Meal	2.30	6.18	1.50
Choice	8.00	3.30	6.00
Conqueror Bone and Potash	12.00	----	4.00
Southern Cotton Oil Co.'s 16 Per Cent Acid Phosphate	16.00	----	----
Razem	9.00	1.65	3.00
Nitrate of Soda, 19 Per Cent	----	15.65	----
Muriate of Potash	----	----	48.00
Sulphate of Potash	----	----	48.00
Nitrate of Soda, 16 Per Cent	----	13.20	----
Home Made	9.00	2.05	3.00
Uncle Sam	9.00	2.47	3.00
Double Two	8.00	1.65	2.00
All-to-Good	8.00	2.05	3.00
Melonite	8.00	3.29	4.00
Canto	8.00	3.29	6.00
Labi	----	8.99	17.00
Southern Cotton Oil Co., Goldsboro, Fayetteville, Rocky Mount and Wilson.—			
Goldsboro Cotton Grower	9.00	2.26	2.00
Rocky Mount Oil Mill Standard	8.00	1.65	2.00
Fayetteville Oil Mill Standard	8.00	1.65	2.00
Goldsboro Oil Mill Standard	8.00	1.65	2.00
Wilson Oil Mill Standard	8.00	1.65	2.00
The Southern Cotton Oil Company Standard	8.00	1.65	2.00
Fayetteville Oil Mill Special Cotton Grower	8.00	2.47	3.00
Wilson Oil Mill Special Cotton Grower	8.00	2.47	3.00
Rocky Mount Oil Mill Special Cotton Grower	8.00	2.47	3.00
Goldsboro Oil Mill Special Cotton Grower	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Goldsboro Oil Mill High Grade	8.00	2.26	2.50
Rocky Mount Oil Mill High Grade	8.00	2.26	2.50
Fayetteville Oil Mill High Grade	8.00	2.26	2.50
Wilson Oil Mill High Grade	8.00	2.26	2.50
The Southern Cotton Oil Co. High Grade	8.00	2.26	2.50
Edgerton's Old Reliable	8.00	2.47	3.00
Best & Thompson's Special	9.00	2.26	2.00
The Southern Cotton Oil Co.'s Special Tobacco Grower	8.00	2.47	3.00
Echo	8.00	2.06	3.00
Morning Glory	8.00	2.47	3.00
Southern Cotton Oil Co.'s Special Mixture	8.00	3.30	4.00
Best & Thompson's High Grade Cotton and Tobacco Guano	8.00	2.47	3.00
Statesville Oil and Fertilizer Co., Statesville, N. C.—			
King Cotton Soluble Guano	8.00	2.47	3.00
8-3-3 Soluble Guano	8.00	2.47	3.00
10-2 Bone and Potash	10.00	----	2.00
8-2-2 Manipulated Guano	8.00	1.65	2.00
10-4 Bone and Potash	10.00	----	4.00
16 Per Cent Acid Phosphate	16.00	----	----
Tuscarora Fertilizer Co., Atlanta, Ga., and Wilmington, N. C.—			
Acid Phosphate	14.00	----	----
Acid Phosphate	13.00	----	----
Tuscarora Alkaline Bone	10.00	----	5.00
Tuscarora Bone Potash	10.00	----	2.00
Champion	8.00	2.06	2.50
Manure Substitute	6.00	3.30	4.00
Tuscarora Trucker	8.00	4.12	7.00
Berry King	8.00	2.06	4.00
Tobacco Special	8.00	2.47	3.00
Tuscarora Fruit and Potato	8.00	1.65	10.00
Cotton Special	8.00	2.47	3.00
King Cotton	8.00	2.06	2.00
Big (4) Four	7.00	1.65	4.00
Tuscarora Standard	8.00	1.65	2.00
Sulphate of Potash	----	----	50.00
Muriate of Potash	----	----	48.00
Kainit	----	----	12.00
Nitrate of Soda	----	14.83	----
Acid Phosphate	16.00	----	----
Tuscarora Bone and Potash	8.00	----	4.00
Tuscarora Bone and Potash	10.00	----	4.00
Tuscarora Fertilizer No. 8-2-5	8.00	1.65	2.00
Union Guano Co., Winston-Salem, N. C.—			
Union 12-6 Bone and Potash	12.00	----	6.00
Sulphate of Potash	----	----	48.00
Muriate of Potash	----	----	49.00
Genuine German Kainit	----	----	12.00
Union 12 Per Cent Acid Phosphate	12.00	----	----
Union Dissolved Bone	13.00	----	----
Union High Grade Acid Phosphate	14.00	----	----
Union 16 Per Cent Acid Phosphate	16.00	----	----
Union 12-3 Bone and Potash	12.00	----	3.00
Union 10-6 Bone and Potash	10.00	----	6.00
Union 10-5 Bone and Potash	10.00	----	5.00
Union 10-4 Bone and Potash	10.00	----	4.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Union 8-5 Bone and Potash	8.00	----	5.00
Union 12-4 Bone and Potash	12.00	----	4.00
Union 12-5 Bone and Potash	12.00	----	5.00
Union Wheat Mixture	8.00	----	4.00
Union Bone and Potash	10.00	----	2.00
Quakers' Grain Mixture	10.00	----	4.00
Giant Phosphate and Potash	10.00	----	3.00
Liberty Bell Crop Grower	10.50	----	1.50
Roseboro's Special Potash Mixture	12.00	----	6.00
Union Potato Mixture	8.00	1.65	10.00
Union Dissolved Animal Bone----------Total	13.00	2.06	----
Union Vegetable Compound	7.00	4.12	8.00
Union Truck Guano	7.00	3.29	5.00
Union Premium Guano	8.00	3.29	4.00
Union Perfect Cotton Grower	9.00	2.26	2.00
Union Standard Tobacco Grower	8.00	2.06	2.00
Union Mule Brand Guano	10.00	1.65	2.00
Union Water Fowl Guano	8.00	2.06	3.00
Union Homestead Guano	8.00	2.47	3.00
Union Superlative Guano	8.00	.82	4.00
Union Special Formula for Cotton	10.00	2.47	3.00
Union Complete Cotton Mixture	9.00	1.65	3.00
Old Honesty Guano	8.00	1.65	2.00
Victoria High Grade Tobacco Guano	8.00	2.47	3.00
Sparger's Special Tobacco Grower	8.00	1.65	3.00
Old Honesty Tobacco Guano	8.00	1.65	2.00
Pure Animal Bone Meal----------Total	22.50	3.71	----
Nitrate of Soda	----	14.82	----
Q and Q Quality and Quantity Guano	9.00	1.65	1.00
Pure Animal Bone Meal----------Total	22.50	2.47	----
Sunrise Ammoniated Guano	8.00	.82	3.00
Union Approved Crop Grower	8.75	1.65	2.00
Fish Brand Ammoniated Guano	8.00	1.65	2.00
Farmers' Blood and Bone Guano	9.00	1.65	3.00
Union Prolific Cotton Compound	10.00	3.29	4.00
Sparga's Special Tobacco Grower	8.00	1.65	3.00
Union Guano for Tobacco and Cotton	8.00	3.29	6.00
Fish Brand Ammoniated Guano 8-2-2 for Tobacco	8.00	1.65	2.00
Union Abattoir Co., Baltimore, Md., and Richmond, Va.			
German Kainit	----	----	12.00
Potash and Soluble Bone	12.00	----	5.00
Potash and Soluble Bone	12.00	----	3.00
Potash and Soluble Bone	10.00	----	5.00
Potash and Soluble Bone	10.00	----	2.00
Parker & Hunter's Corn Fertilizer	8.00	.82	3.00
Cotton Guano	8.00	1.65	2.00
Cotton and Tobacco Guano	8.00	2.47	3.00
Early Truck and Tobacco Guano	8.00	3.28	4.00
Early Potato and Truck Guano	6.00	5.14	5.00
Peanut Guano	8.00	1.00	4.00
Early Potato and Truck Guano	6.00	4.10	7.00
Acid Phosphate	14.00	----	----
Acid Phosphate	16.00	----	----
Tobacco Fertilizer	9.00	2.26	2.00
R. L. Upshur, Norfolk, Va.—			
Cotton Seed Meal Mixture	9.00	2.26	2.00
Nitrate of Soda	----	15.22	----
Muriate of Potash	----	----	50.00
Genuine German Kainit	----	----	12.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Upshur's High Grade Acid Phosphate	14.00	----	----
Upshur's Peanut Guano	8.00	1.65	2.00
Upshur's G., G. & C. Guano	8.00	1.65	2.00
Upshur's Wheat Compound	12.00	----	5.00
Upshur's F. F. V. (Favorite Fertilizer of Virginia)	8.00	1.65	2.00
Upshur's Bone and Potash	10.00	----	2.00
Upshur's O. P. (Old Plantation)	9.00	1.65	2.00
Upshur's Norfolk Special 10 Per Cent	5.00	8.23	2.00
Upshur's 7 Per Cent Irish Potato	6.00	5.76	5.00
Upshur's F. C. (Farmers' Challenge)	6.00	5.76	6.00
Upshur's 7 Per Cent Special Potato Guano	5.00	5.76	5.00
Upshur's Special Truck	7.00	4.11	8.00
Upshur's F. F. (Farmers' Favorite)	7.00	4.11	6.00
Upshur's 5 Per Cent	5.00	4.11	5.00
Upshur's Fish, Bone and Potash	8.00	1.64	4.00
Upshur's 8-3-3 Cotton	8.00	2.47	3.00
Upshur's High Grade Tobacco Guano	8.00	2.47	3.00
Upshur's Premo Cotton Guano	8.00	1.65	2.00
Upshur's Special 2½-8-3	8.00	2.05	3.00
Upshur's 16 Per Cent Acid Phosphate	16.00	----	----
Upshur's 4-6-4	6.00	3.69	4.00
Venable Fertilizer Co., Richmond, Va.—			
Venable's 10 Per Cent Trucker	6.00	8.23	2.00
Venable's 6-6-6 Manure	6.00	4.94	6.00
Venable's 5 Per Cent Trucker	8.00	4.11	5.00
Venable's 4 Per Cent Trucker	8.00	3.29	5.00
Venable's Ideal Manure	8.00	1.65	5.00
Venable's Alliance Tobacco Manure, No. 1	8.00	2.06	3.00
Venable's Alliance Tobacco Manure, No. 2	8.00	1.65	2.00
Venable's B. B. P. Manure	9.00	1.65	1.00
Venable's Cotton Grower	8.00	2.06	3.00
Venable's Roanoke Special	8.00	2.06	3.00
Venable's Alliance Bone and Potash Mixture	8.00	----	4.00
Venable's Peanut Grower	8.00	----	4.00
Venable's Best Acid Phosphate	16.00	----	----
Venable's Alliance Acid Phosphate	14.00	----	----
Venable's Dissolved Bone	13.00	----	----
Venable's Standard Acid Phosphate	12.00	----	----
Bone and Potash Mixture	10.00	----	2.00
High Grade Bone and Potash Mixture	10.00	----	4.00
Planters' Bone Fertilizer	8.00	1.65	2.00
Ballard's Choice Fertilizer	8.00	2.47	3.00
Roanoke Mixture	9.00	2.26	2.00
Roanoke Meal Mixture	9.00	2.26	2.00
Pure Animal Bone ---- Total	25.00	2.47	----
Pure Raw Bone ---- Total	20.00	3.29	----
Muriate of Potash	----	----	50.00
Nitrate of Soda	----	15.63	----
Sulphate of Potash	----	----	48.00
Pure German Kainit	----	----	12.00
Venable's Corn, Wheat and Grass Fertilizer	9.00	1.65	1.00
Venable's Peanut Special	8.00	.82	4.00
Special Top Dresser	----	7.30	3.00
Our Union Special Fertilizer	8.00	1.65	2.00
Our Union Tobacco Fertilizer	8.00	1.65	4.00
Venable's H. G. Tobacco Fertilizer	8.00	2.47	3.00

Name and Address of Manufacturer and Name of Brand	Avail. Phos. Acid.	Nitrogen.	Potash.
Virginia-Carolina Chemical Co., Richmond. Va.—			
V.-C. C. Co.'s Special High Grade Potash Mixture	12.00	----	6.00
V.-C. C. Co.'s 14 Per Cent Acid Phosphate	14.00	----	----
V.-C. C. Co.'s 16 Per Cent Acid Phosphate	16.00	----	----
V.-C. C. Co.'s Standard Bone and Potash	10.00	----	5.00
V.-C. C. Co.'s Special Crop Grower	12.00	----	3.00
V.-C. C. Co.'s Formula 4-4	7.00	2.55	3.20
V.-C. C. Co.'s Special Truck Guano	6.00	4.12	7.00
V.-C. C. Co.'s Special	8.00	3.29	4.00
V.-C. C. Co.'s Special Potash Mixture	10.00	----	4.00
Genuine Peruvian Mixture Pelican	8.00	4.15	5.00
Jumbo Peruvian Guano Crop Grower	8.00	2.48	3.00
Yellow Leaf Tobacco Guano	8.00	2.47	3.00
Royal High Grade Fertilizer	8.00	2.47	3.00
V.-C. C. Co.'s Southern Cotton Grower	9.00	2.26	2.00
Burnhardt's Grain and Crop Guano	9.00	.82	3.00
Pure Animal Bone Meal—Total	22.50	2.47	----
McCormick's Wheat and Grain Guano	9.00	.82	3.00
Smith's Irish Potato Guano	8.00	1.65	10.00
Lion's High Grade Tobacco Fertilizer	8.00	2.47	4.00
Invincible High Grade Fertilizer	6.00	4.12	7.00
V.-C. C. Co.'s High Grade Tobacco Fertilizer	8.00	2.47	10.00
Great Texas Cotton Grower Soluble Guano	9.00	2.47	4.00
Cock's Soluble Guano High Grade Animal Bone	9.00	1.85	3.00
V.-C. C. Co.'s Truck Crop Fertilizer	7.00	4.12	7.00
Prolific Cotton Grower	9.00	2.26	2.00
Battle's Crop Grower	12.00	----	3.00
3 Per Cent Special C. S. M. Guano, No. 3	8.00	2.47	2.00
Delta C. S. M.	8.00	2.26	2.50
Winston Special for Cotton C. S. M.	8.00	1.65	2.00
Diamond Dust C. S. M.	8.00	1.65	2.00
Admiral	8.00	2.47	2.50
Blue Star C. S. M.	8.00	2.06	3.00
Good Luck C. S. M.	8.00	2.47	2.50
North State Guano C. S. M.	9.00	1.65	1.00
Plant Food C. S. M.	8.00	1.65	2.00
Split Silk C. S. M.	8.00	2.47	2.50
Superlative C. S. M. Guano	8.00	2.06	3.00
Farmers' Friend Favorite Fertilizer Special	8.50	1.65	2.00
White Stem C. S. M.	9.00	2.26	2.00
Special High Grade Tobacco Fertilizer C. S. M.	8.00	2.47	3.00
Wilson's Standard C. S. M.	8.00	1.65	2.00
Adams' Special	8.00	2.47	3.00
Ajax C. S. M. Guano	8.00	1.65	2.00
Royal Crown	8.00	2.26	2.00
Farmers' Favorite Fertilizer C. S. M.	8.00	1.65	2.00
Atlas Guano C. S. M.	8.00	2.47	2.50
Blake's Best	8.00	2.47	3.00
Orange Grove Guano	8.00	2.26	2.50
Carr's 8-4-4 Crop Grower	8.00	3.29	4.00
Ford's Wheat and Corn Guano	10.00	.82	2.50
Konqueror High Grade Truck Fertilizer	7.00	4.12	5.00
Goodman's Special Potash Mixture	12.00	----	5.00
Jones' Grain Special	8.00	----	4.00
V.-C. C. Co.'s Pure Raw Bone Meal—Total	22.50	3.71	----
V.-C. C. Co.'s Dissolved Animal Bone	10.00	2.06	----
Sludge Acid Phosphate	14.00	----	----
Manure Salts	----	----	20.00
Sulphate of Potash	----	----	48.00
Sulphate of Ammonia	----	20.59	----
Fish Scrap	----	8.24	----
Nitrate of Soda	----	14.82	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Genuine German Kainit	----	----	12.00
Muriate of Potash	----	----	49.00
V.-C. C. Co.'s Grain Special	10.00	----	6.00
V.-C. C Co.'s Dissolved Bone and Potash	10.00	----	2.00
Diamond Cotton Seed Meal Guano	8.00	2.47	3.00
Bold Buster Guano	10.00	1.65	2.00
Bigelow's Crop Guano	9.00	.82	3.00
V.-C. C. Co.'s 12-4 Grain Grower	12.00	----	4.00
Jeffreys' High Grade Guano	9.00	2.47	3.00
V.-C. C. Co.'s High Grade Top Dresser	4.00	6.18	2.50
Parker & Hunter's Special	8.00	1.65	2.00
Allison & Addison's Star Brand Vegetable Guano	8.00	3.71	4.00
Farmers' Success	8.00	2.46	4.00
Pace's Special 5 Per Cent Potato Guano	8.00	2.06	5.00
Virginia 11-5 Bone and Potash	11.00	----	5.00
Pasquotank Trucker	7.00	3.30	8.00
Myatt's Special High Grade	8.00	2.47	3.00
V.-C. C. Co.'s 10 Per Cent Top Dresser Extra H. G.	4.00	8.24	4.00
Dissolved Animal Bone	13.00	2.06	----
Allison & Addison's Star Special Tobacco Manure	9.00	2.26	2.00
Allison & Addison's Anchor Brand Tobacco Fertilizer	8.50	2.26	2.00
Allison & Addison's Anchor Brand Fertilizer	8.00	1.65	2.00
Allison & Addison's A. A. Guano	8.00	2.47	3.00
Allison & Addison's Old Hickory Guano	8.00	1.65	2.00
Allison & Addison's Star Brand Guano	9.00	1.65	1.00
Allison & Addison's B. P. Potash Mixture	10.00	----	2.00
Allison & Addison's McGavock's Special Potash Mixture	10.00	----	2.00
Allison & Addison's Fulton Acid Phosphate	14.00	----	----
Allison & Addison's I. X. L. Acid Phosphate	13.00	----	----
Allison & Addison's Standard Acid Phosphate	12.00	----	----
Allison & Addison's Rocket Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Acid Phosphate	16.00	----	----
Atlantic and Virginia Fertilizer Co.'s Crenshaw Acid Phosphate	13.00	----	----
Atlantic and Virginia Fertilizer Co.'s Valley of Virginia Acid Phosphate	14.00	----	----
Atlantic and Virginia Fertilizer Co.'s Our Acid Phosphate	12.00	----	----
Atlantic and Virginia Fertilizer Co.'s Eureka Bone and Potash Compound	10.00	----	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone Special for Tobacco	9.00	2.06	2.00
Atlantic and Virginia Fertilizer Co.'s Eureka Ammoniated Bone	8.00	1.65	3.00
Atlantic and Virginia Fertilizer Co.'s Carolina Truckers	7.00	5.76	7.00
Atlantic and Virginia Fertilizer Co.'s Virginia Truckers	8.00	4.12	5.00
Atlantic and Virginia Fertilizer Co.'s Orient Special for Tobacco	8.00	1.65	2.00
Atlantic and Virginia Fertilizer Co.'s Orient Complete Manure	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s King Cotton Grower	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s The Leader B. G.	8.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Groom's Special Tobacco Fertilizer	8.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Charlotte Dissolved Bone	12.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano B. G.	8.00	2.06	1.50
Charlotte Oil and Fertilizer Co.'s Charlotte Ammoniated Guano C. S. M.	8.00	2.06	1.50
Charlotte Oil and Fertilizer Co.'s Charlotte Acid Phosphate	13.00	----	----
Charlotte Oil and Fertilizer Co.'s Catawba Guano B. G.	8.00	2.47	3.00
Charlotte Oil and Fertilizer Co.'s Catawba Acid Phosphate	14.00	----	----
Charlotte Oil and Fertilizer Co.'s Queen of the Harvest C. S. M.	9.00	1.65	2.00
Charlotte Oil and Fertilizer Co.'s Oliver's Perfect Wheat Grower	11.00	2.47	4.00
Charlotte Oil and Fertilizer Co.'s Dayvault's Special	12.00	----	6.00
Charlotte Oil and Fertilizer Co.'s 10-2 Bone and Potash	10.00	----	2.00
Charlotte Oil and Fertilizer Co.'s 15 Per Cent Acid Phosphate	15.00	----	----
Charlotte Oil and Fertilizer Co.'s McCrary's Diamond Bone and Potash	9.00	----	3.00
Charlotte Oil and Fertilizer Co.'s Special 3 Per Cent Guano C. S. M.	8.00	2.47	2.00
Charlotte Oil and Fertilizer Co.'s High Grade Special Tobacco Fertilizer	9.00	2.06	2.00
Davie & Whittle's Owl Brand Guano for Tobacco	8.00	2.47	3.00
Davie & Whittle's Owl Brand Special Tobacco Guano	9.00	2.06	2.00
Davie & Whittle's Owl Brand Truck Guano	8.00	4.94	5.00
Davie & Whittle's Owl Brand Guano	8.00	1.65	2.00
Davie & Whittle's Owl Brand Acid Phosphate with Potash	10.00	----	2.00
Davie & Whittle's Owl Brand High Grade Dissolved Bone	14.00	----	----
Davie & Whittle's Owl Brand Dissolved Bone	12.00	----	----
Davie & Whittle's Owl Brand High Grade Acid Phosphate	16.00	----	----
Davie & Whittle's Owl Brand High Grade 3 Per Cent Soluble Guano	9.00	2.06	3.00
Davie & Whittle's Owl Brand Acid Phosphate	13.00	----	----
Davie & Whittle's Vinco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Blacksburg Dissolved Bone	13.00	----	----
Durham Fertilizer Co.'s Diamond Wheat Mixture.	10.00	----	3.00
Durham Fertilizer Co.'s Standard Wheat and Corn Grower	10.00	----	2.00
Durham Fertilizer Co.'s Excelsior Dissolved Bone Phosphate	14.00	----	----
Durham Fertilizer Co.'s Double Bone Phosphate	13.00	----	----
Durham Fertilizer Co 's Blue Ridge Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Carr's Special Wheat Grower	8.00	----	4.00
Durham Fertilizer Co.'s Standard Guano	9.00	1.65	2.00
Durham Fertilizer Co 's Best Potato Manure	7.00	5.76	7.00
Durham Fertilizer Co.'s L. & N. Special	9.00	2.47	2.00
Durham Fertilizer Co 's Special Plant and Truck Fertilizer	8.00	4 12	3.00
Durham Fertilizer Co.'s Gold Medal Brand Guano	8.00	2.47	3.00
Durham Fertilizer Co.'s Durham Bone and Potash Mixture	10.00	----	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Durham Fertilizer Co.'s Genuine Bone and Peruvian Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Genuine Bone and Peruvian Tobacco Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Raw Bone Superphosphate	8.00	2.06	1.50
Durham Fertilizer Co.'s Standard Wheat Grower	10.00	----	2.00
Durham Fertilizer Co.'s Blacksburg Soluble Guano	8.00	1.65	----
Durham Fertilizer Co.'s Superphosphate for Tobacco	8.00	2.06	2.00
Durham Fertilizer Co.'s N. C. Farmers' Alliance Official Guano	8 00	2.06	3 00
Durham Fertilizer Co.'s N. C. Farmers' Alliance Official Acid Phosphate	13.00	----	----
Durham Fertilizer Co 's Standard High Grade Acid Phosphate	14.00	-- --	----
Durham Fertilizer Co.'s Great Wheat and Corn Grower	10.50	----	1.50
Durham Fertilizer Co.'s Progressive Farmer Guano	8.00	1.65	2.00
Durham Fertilizer Co.'s Durham Ammoniated Fertilizer	9.00	1.65	1.00
Durham Fertilizer Co.'s Durham Best Acid Phosphate	16.00	----	----
Durham Fertilizer Co.'s Durham Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s New Era	8.00	1.65	3.00
Lynchburg Guano Co.'s Ironside Acid Phosphate	16.00	----	----
Lynchburg Guano Co.'s Spartan Acid Phosphate	12.00	----	----
Lynchburg Guano Co.'s Arvonia Acid Phosphate	13.00	----	----
Lynchburg Guano Co.'s S. W. Special Bone and Potash Mixture	10.00	----	4.00
Lynchburg Guano Co.'s Alpine Mixture	10.00	----	5.00
Lynchburg Guano Co.'s Dissolved Bone and Potash	10.00	----	2.00
Lynchburg Guano Co.'s Independent Standard	8.60	1.65	2.00
Lynchburg Guano Co.'s Solid Gold Tobacco	8.00	2.26	4.00
Lynchburg Guano Co.'s Lynchburg High Grade Acid Phosphate	14.00	----	----
Lynchburg Guano Co.'s Lynchburg Soluble	8.00	1.65	2.00
Lynchburg Guano Co.'s Lynchburg Soluble for Tobacco	8.00	1.65	2.00
Lynchburg Guano Co.'s Bright Belt Guano	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Crescent Brand Ammoniated Fertilizer	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Cooper's Bright Tobacco	8.00	2.06	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Trucker and Tomato Grower	8.00	4.12	5.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughterhouse Bone	8.00	1.65	2.00
Norfolk and Carolina Chemical Co.'s Genuine Slaughterhouse Bone, Made Especially for Tobacco	8.00	2.06	2.00
Norfolk and Carolina Chemical Co.'s Amazon High Grade Manure	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Bright Leaf Tobacco Grower	8.00	2.47	3.00
Norfolk and Carolina Chemical Co.'s Norfolk Bone and Potash	10.00	----	2.00
Norfolk and Carolina Chemical Co.'s Norfolk Soluble Bone	12.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Norfolk and Carolina Chemical Co.'s Norfolk Best Acid Phosphate	13.00	----	----
Norfolk and Carolina Chemical Co.'s Norfolk Reliable Acid Phosphate	14.00	----	----
Norfolk and Carolina Chemical Co.'s Amazon H. G. Tobacco Manure	8.00	2.47	3.00
Old Dominion Guano Co.'s Standard Raw Bone Soluble Guano	9.00	1.65	1.00
Old Dominion Guano Co.'s Farmers' Friend High Grade Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Farmers' Friend Fertilizer	8.00	1.65	2.00
Old Dominion Guano Co.'s Farmers' Friend Special Tobacco Fertilizer	8.00	2.47	3.00
Old Dominion Guano Co.'s Old Dominion Special Wheat Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Special Sweet Potato Guano	6.00	1.65	6.00
Old Dominion Guano Co.'s Old Dominion Soluble Tobacco Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Soluble Guano	8.00	1.65	2.00
Old Dominion Guano Co.'s Old Dominion Potato Manure	7.00	4.12	8.00
Old Dominion Guano Co.'s Old Dominion Raw Bone Soluble Guano	9.00	2.05	3.00
Old Dominion Guano Co.'s Old Dominion 6-7-5 Truck Guano	6.00	5.75	5.00
Old Dominion Guano Co.'s Old Dominion 7-7-7 Truck Guano	7.00	5.75	7.00
Old Dominion Guano Co.'s Old Dominion Alkaline Bone and Potash	10.00	----	2.00
Old Dominion Guano Co.'s Bullock's Cotton Grower	8.00	1.65	2.00
Old Dominion Guano Co.'s Osceola Tobacco Guano	8.00	2.06	3.00
Old Dominion Guano Co.'s Millers' Special Wheat Mixture	8.00	----	4.00
Old Dominion Guano Co.'s Planters' Bone and Potash Mixture	10.00	----	3.00
Old Dominion Guano Co.'s Bone Phosphate	13.00	----	----
Old Dominion Guano Co.'s Royster's Acid Phosphate	12.00	----	----
Old Dominion Guano Co.'s High Grade Acid Phosphate	14.00	----	----
Old Dominion Guano Co.'s Obelisk Brand Bone and Potash	10.00	----	4.00
Old Dominion Guano Co.'s Horne's Cotton Fertilizer	9.00	2.06	3.00
Old Dominion Guano Co.'s 7 Per Cent Truck Fertilizer	6.00	5.76	6.00
Old Dominion Guano Co.'s 10 Per Cent Truck Fertilizer	5.00	8.24	2.50
Powers, Gibbs & Co.'s Almont Acid Phosphate	12.00	----	----
Powers, Gibbs & Co.'s Cotton Brand Best Acid Phosphate	13.00	----	----
Powers, Gibbs & Co.'s Almont High Grade Acid Phosphate	14.00	----	----
Powers, Gibbs & Co.'s Fulp's Acid Phosphate	13.00	----	----
Powers, Gibbs & Co.'s Cotton Brand Acid Phosphate	12.00	----	----

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Powers, Gibbs & Co.'s Acid Phosphate and Potash	10.50	----	1.50
Powers, Gibbs & Co.'s Almont Wheat Mixture	10.00	----	3.00
Powers, Gibbs & Co.'s Dissolved Bone and Potash	10.00	----	2.00
Powers, Gibbs & Co.'s Almont Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibbs & Co.'s Carolina Golden Belt Ammoniated Guano for Tobacco	8.00	2.06	3.00
Powers, Gibbs & Co.'s Truck Farmers' Special Ammoniated Guano	8.00	3.29	5.00
Powers, Gibbs & Co.'s Old Kentucky High Grade Manure	8.00	2.47	3.00
Powers, Gibbs & Co.'s Cotton Seed Meal Standard Guano	9.00	2.47	2.00
Powers, Gibbs & Co.'s Cotton Seed Meal Soluble Ammoniated Guano	8.00	1.65	2.00
Powers, Gibbs & Co.'s Cotton Belt Ammoniated Guano	8.00	2.47	2.00
Powers, Gibbs & Co.'s Eagle Island Ammoniated	8.00	1.65	2.00
Powers, Gibbs & Co.'s Cotton Brand Ammoniated Dissolved Bone	8.00	3.29	4.00
Powers, Gibbs & Co.'s Gibbs' Ammoniated Guano	8.00	2.06	1.50
Powers, Gibbs & Co.'s Powers' Ammoniated Guano	8.00	2.06	2.00
Southern Chemical Co.'s Electric Tobacco Guano	8.00	1.65	2.00
Southern Chemical Co.'s Electric Standard Guano	8.00	1.65	2.00
Southern Chemical Co.'s Pilot Ammoniated Guano Special for Tobacco	8.00	2.06	3.00
Southern Chemical Co.'s George Washington Plant Bed Fertilizer for Tobacco	8.00	2.47	2.50
Southern Chemical Co.'s Sun Brand Guano	9.00	2.06	5.00
Southern Chemical Co.'s Yadkin Complete Fertilizer	8.00	1.65	2.00
Southern Chemical Co.'s Solid South	10.00	----	6.00
Southern Chemical Co.'s Chick's Special Wheat Compound	8.00	----	4.00
Southern Chemical Co.'s Mammoth Wheat and Grass Grower	10.00	----	2.00
Southern Chemical Co.'s Winston Bone and Potash Compound	10.00	----	2.00
Southern Chemical Co.'s Winner Grain Mixture	10.00	----	4.00
Southern Chemical Co.'s Mammoth Corn Grower	10.00	----	2.00
Southern Chemical Co.'s Farmers' Pride Bone and Potash	10.00	----	3.00
Southern Chemical Co.'s Reaper Grain Application	12.00	----	3.00
Southern Chemical Co.'s Quickstep Bone and Potash	11.00	----	5.00
Southern Chemical Co.'s Tar Heel Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Red Cross 14 Per Cent Acid Phosphate	14.00	----	----
Southern Chemical Co.'s Comet 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chick's 16 Per Cent Acid Phosphate	16.00	----	----
Southern Chemical Co.'s Chatham Acid Phosphate	13.00	----	----
Southern Chemical Co.'s Horseshoe Acid Phosphate	12.00	----	----
Southern Chemical Co.'s Victor Acid Phosphate	13.00	----	----
J. G. Tinsley & Co.'s Dissolved S. C. Bone	13.00	----	----
J. G. Tinsley & Co.'s Powhatan Acid Phosphate	14.00	----	----
J. G. Tinsley & Co.'s Richmond Brand Guano	8.00	2.47	3.00
J. G. Tinsley & Co.'s Lee Brand Guano	8.00	1.65	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
J. G. Tinsley & Co.'s Killickinick Tobacco Mixture	8.00	2.06	3.00
J. G. Tinsley & Co.'s Stonewall Brand Acid Phosphate	12.00	----	----
J. G. Tinsley & Co.'s Stonewall Brand Guano	8.00	1.65	2.00
J. G. Tinsley & Co.'s Stonewall Tobacco Guano	8.00	1.65	2.00
J. G Tinsley & Co.'s Tinsley's Special Irish Potato Guano	6.00	5.76	6.00
J. G. Tinsley & Co.'s Tinsley's Bone and Potash Mixture	10.00	----	2.00
J. G. Tinsley & Co.'s Tinsley's Strawberry Grower	6.00	3.29	4.00
J. G. Tinsley & Co.'s Tinsley's 10 Per Cent Truck Guano	5.00	8.25	2.50
J. G. Tinsley & Co.'s Tinsley's Irish Potato Guano	6.00	4.94	6.00
J. G. Tinsley & Co.'s Tinsley's Tobacco Fertilizer	8.00	3.29	2.50
J. G. Tinsley & Co.'s Tinsley's 7 Per Cent Ammoniated Guano for Beans, Peas, Cabbage, Strawberries, etc.	6.00	5.76	6.00
S. W. Travers & Co.'s National Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s National Special Tobacco Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Beef, Blood and Bone Fertilizer	8.00	1.65	2.00
S. W. Travers & Co.'s Standard Dissolved S. C. Bone	13.00	----	----
S. W. Travers & Co.'s Travers' Dissolved Bone Phosphate	14.00	----	----
S. W. Travers & Co.'s Capital Dissolved Bone	12.00	----	----
S. W. Travers & Co.'s Capital Cotton Fertilizer	8.00	2.06	2.00
S. W. Travers & Co.'s Capital Bone and Potash Compound	10.00	----	2.00
S. W. Travers & Co.'s Capital Truck Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Capital Tobacco Fertilizer	8.00	3.29	3.00
S. W. Travers & Co.'s Travers' Special Wheat Compound	8.00	----	4.00
S. W. Travers & Co.'s Travers' 7 Per Cent Truck Fertilizer	6.00	5.76	5.00
S. W. Travers & Co.'s Champion Acid Phosphate	16.00	----	----
Virginia State Fertilizer Co.'s Virginia State Dissolved Bone and Potash	10.00	----	2.00
Virginia State Fertilizer Co.'s Virginia State Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Virginia State High Grade Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Number One Soluble Guano	9.00	1.65	2.00
Virginia State Fertilizer Co.'s XX Potash Mixture	10.00	----	4.00
Virginia State Fertilizer Co.'s Mountain Top Bone and Potash	10.00	----	5.00
Virginia State Fertilizer Co.'s Peerless Tobacco Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Battle Axe Tobacco Guano	8.00	1.65	2.00
Virginia State Fertilizer Co.'s Dunnington's Special Formula for Tobacco	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Austrian Tobacco Grower	8.00	2.06	2.00
Virginia State Fertilizer Co.'s Buffalo Guano	8.00	2.06	3.00
Virginia State Fertilizer Co.'s Gamecock Special for Tobacco	8.50	1.65	2.00
Virginia State Fertilizer Co.'s Gilt Edge Special Tobacco Guano	8.00	2.06	2.00

Name and Address of Manufacturer and Name of Brand.	Avail. Phos. Acid.	Nitrogen.	Potash.
Virginia State Fertilizer Co.'s Bull Dog Soluble Guano	8.00	2.47	3.00
Virginia State Fertilizer Co.'s Clipper Brand Acid Phosphate	13.00	----	----
Virginia State Fertilizer Co.'s Highland King	9.00	1.65	1.00
Virginia State Fertilizer Co.'s Alps Brand Acid Phosphate	12.00	----	----
Virginia State Fertilizer Co.'s Bull Run Acid Phosphate	16.00	----	----
Virginia State Fertilizer Co.'s Lurich Acid Phosphate	12.00	----	----
Virginia State Fertilizer Co.'s Gilt Edge Brand Acid Phosphate	14.00	----	----
Virginia State Fertilizer Co.'s Gilt Edge Brand Dissolved Bone and Potash	8.00	----	4.00
V.-C. C. Co.'s Vecesco Cotton Grower	9.00	2.26	2.00
V.-C. C. Co.'s Corn and Peanut Special	8.00	1.65	4.00
V.-C. C. Co.'s Long Leaf Tobacco Guano	8.00	3.29	5.00
Reliable Cotton Brand Fertilizer	9.00	1.65	3.00
V.-C. C. Co.'s Potash Potato Producer	7.00	3.29	8.00
Powhatan Crop Mixture	8.50	1.65	1.50
Thomas Wakefield, Friendship, N. C.—			
Bone Meal----Total	21.73	4.12	----
Williams & Clark Fertilizer Co., Charleston, S. C.—			
Standard American Ammoniated Bone Superphosphate	9.00	1.85	1.00
Winborne Guano Co., Tyner, N. C.—			
King Taminy Guano	8.00	2.47	3.00
Farmers' Select Guano	8.00	2.06	3.00
Winborne's 7 Per Cent Guano	5.00	5.75	5.00
Winborne's Excelsior Guano	8.00	1.65	2.00
Winborne's Tobacco Guano	8.00	2.47	3.00
Winborne's Eureka Guano	8.00	1.65	2.00
Winborne's 3-8-4 Guano	8.00	2.47	4.00
Winborne's Triumph Guano	8.00	1.65	2.00
High Grade Acid Phosphate	14.00	----	----
Standard 16 Per Cent Acid Phosphate	16.00	----	----
Genuine German Kainit	----	----	12.00
Soluble Bone and Potash	10.00	----	2.00
Nitrate of Soda	----	15.63	----
Muriate of Potash	----	----	50.00
T. W. Wood & Sons, Richmond, Va.—			
Standard Grain and Grass Fertilizer	8.00	1.65	2.00
Standard High Grade Trucker Fertilizer	8.00	4.94	6.00
Standard Vegetable Fertilizer	8.00	2.47	3.00
Standard High Grade Acid Phosphate	14.00	----	----
Standard Bone and Potash Mixture	10.00	----	2.00
Wood's Lawn Enricher	6.00	2.47	3.00
Nitrate of Soda	----	15.64	----
Acid Phosphate Fertilizer	16.00	----	----
Acid Phosphate Fertilizer	14.00	----	----
Standard H. G. Acid Phosphate	16.00	----	----
Wessel, Duval & Co., New York.—			
Nitrate of Soda	----	14.85	----

LEAF TOBACCO SALES FOR JUNE, 1909.

Pounds sold for producers, first hand	56,152
Pounds sold for dealers	28,515
Pounds resold for warehouse	2,578
Total	87,245

THE BULLETIN

OF THE

NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. AUGUST, 1909. Number 8.

I. CULTURE OF WHEAT AND OATS.

II. VARIETY TESTS OF WHEAT.

III. VARIETY TESTS OF OATS.

IV. VARIETY TESTS OF RYE.

V. METHODS OF BREEDING.

PUBLISHED MONTHLY AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MAIL MATTER.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, N. C., August 15, 1909.

SIR:—I submit herewith manuscript on the culture of wheat and oats and tests of varieties of wheat, oats and rye on the several Test Farms of the Department during the past few years. I recommend the publication of this material as the August Bulletin.

Very respectfully,

B. W. KILGORE,

Director Test Farms.

To HON. WILLIAM A. GRAHAM,

Commissioner of Agriculture.

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CULTURE OF WHEAT AND OATS.

By B. W. Kilgore, J. L. Burgess and F. T. Meacham.

INTRODUCTION.

The object of this bulletin is not only to report the progress of the work done in testing different varieties of wheat, oats and rye, but also to call attention to and create a greater interest in the possibilities along the line of grain production that lie within easy reach of the farmers in many parts of the State. We hope the day is not far distant when we shall be able to sell wheat and oats rather than buy these cereals for home consumption.

Every farmer knows that all of our soils are not equally well suited to wheat production; that we have some soils on which wheat culture should not be attempted. But there are areas of soils in the Coastal Plain, Piedmont and Mountainous sections of the State on which wheat culture may be carried on with profit. The Piedmont has a larger area adapted to wheat than the other sections of the State, but, since farming, in the last analysis, is a business in which the different departments must stand or fall on an economic basis, we cannot encourage the growth of wheat in one section and discourage it in another, because it is always wise to grow the crop that PAYS BEST; and while some soils are much better suited to the production of cereals than are others, there are conditions under which it may pay the farmer better to grow wheat on the soils that lend themselves less kindly to the production of this than to the production of some other crop.

In this connection we would urge the farmer to study the demands of the local and the general markets and plan his crops with reference to the wants of the consumer. Be ever seeking to grow that which PAYS BEST under the conditions existing in the locality.

HISTORICAL NOTE ON WHEAT.

Wheat is one of our oldest known cereals. It was a field crop with the Greeks and Egyptians. A small-grained variety was grown in Switzerland as early as the Stone Age and in China its cultivation was common in 2700 B. C. The domestication of this plant is much older than the history of man, as is evidenced by its presence in many ancient monuments that antedate the Hebrew Scriptures.

The original habitat of wheat is not certainly known, but is thought to be the valley of the Euphrates in western Asia.

Its ease of cultivation, nutritive value and ease of preparation for food, its almost exclusive possession of the elements necessary to make a light, porous bread, and its ability to adapt itself to widely different soil and climatic conditions has made it one of the principal foods of man. While the wheat crop has long been important in countries occupied by civilized people, its use is becoming more and more pronounced as civilization advances. Indeed, wheat is the principal edible cereal of most civilized countries.

Wheat, unlike the potato, corn and tobacco, is a naturalized plant in America, its cultivation having been commenced here some time after Columbus reached our shores.

Prior to 1880, wheat was grown pretty generally over North Carolina, but since that time the production has been largely restricted to the Piedmont and Mountainous sections of the State.

A number of factors have operated in curtailing the production of wheat in the Coastal Plain region, not least among these being a general absence of soils suited to wheat culture and a lack of sufficient water power to operate the primitive burr mills used in its manufacture into flour. The farmers of the section were also, doubtless, influenced against wheat growing by the better adaptation of their soils to and the promise of greater rewards from the growing of cotton, peanuts, light tobacco and early truck crops.

STATISTICS.

The annual supply of wheat to the world to-day is something over three billion bushels, of which the United States produces about one-fourth. For years no systematic records were kept of the yield of wheat in this country. In 1850 the Census Report showed the production of the United States to be about 100,000,000 bushels. From this amount the yield grew to our maximum production of over 748,000,000 bushels in 1901. In 1907 the average yield of wheat per acre in the United States was 14 bushels. The same year the average acre yield for North Carolina was 9.5 bushels.

Strange as it may appear, the price of wheat in the United States in 1850, when we grew but 100,000,000 bushels, was lower than it is to-day, when we grow over 700,000,000 bushels. This shows that while the supply has increased over 600 per cent, the demand has undergone an even more pronounced change.

In 1900 North Carolina produced 5,960,803 bushels of wheat worth 82 cents a bushel, representing a money value to the State of $4,887,858. In 1907 we produced but 5,320,000 bushels, but the price advanced to $1.07 a bushel, thus giving the crop a money value of $5,692,000, an increase of $804,142 over the larger but lower-priced crop of 1900.

In view of the rapidly increasing price of wheat and the thousands of acres of land in the State well suited to the production of this crop on a profitable scale, the State Department of Agriculture deems it wise to foster and encourage the growth of this crop among our farmers.

When we remember that the great wheat region of the Northwest, where good crops may be grown without irrigation, is nearly all occupied, and that these virgin soils lose their crop-producing power rapidly after five or six years of continuous wheat culture, the present high price of wheat in our midst should carry a definite meaning to North Carolina wheat growers. Why should not the farmers of the State make wheat growing a profitable branch of their farm economy? Everything seems to be in their favor. The wheat growers of the West must harvest their crop and let their land lie idle till the next season. One crop per year is all they may hope to get. But in our State many of the growers can follow their wheat with either a crop of cowpeas for seed or hay, or they may sometimes put corn in on the newly broken stubble. This latter practice is rarely advisable, however, except where heavy and special fertilization is practiced. It is quite feasible and generally advisable to have a crop of either cowpeas or soy beans follow the wheat crop, as this plan gives the farmer a double profit in a single year and leaves his land in better condition for the growth of succeeding crops.

CULTIVATION.

The farmers in the Piedmont and Mountainous sections of the State are familiar with the ordinary methods of wheat culture as practiced in the State. Usually, the crop follows wheat or peas which have grown on a wheat or other small-grain stubble, or is sown on corn stubble after the crop has been removed. In the eastern part of the State cotton is sometimes out in time to allow wheat to follow this crop. More generally wheat follows corn. Where level cultivation of the corn has been practiced, and where the land was well prepared for the corn crop and there is not too much trash in the way of grass and weeds on the land, the wheat may be put in with a drill after the corn has been removed, or else cut and shocked on the land, by giving the land a thorough disking beforehand and going over it a sufficient number of times to make a good nice seedbed two to four inches deep. Many farmers, however, prefer to give the land a light plowing before putting in the crop, even where corn has been grown. This latter practice is likely the best where there is much weeds and grass on the land, which cannot be gotten rid of well with a disk harrow; but the plowing should be shallow and should be done a sufficiently long time before seeding—one month will answer, especially if there are some rains in the meantime to

allow the seedbed to thoroughly settle. The disk harrow should be run over the land after it is plowed so as to further fine the surface and aid in settling and becoming compact. Previous preparation of the land is of the greatest importance. When we recall that every pound of dry matter in wheat requires over 300 pounds of water for its production, the necessity for so preparing the land that the greatest amount of moisture may be rendered available to the plant will become apparent. With a view to the conservation of moisture, the land intended for corn which precedes a crop of wheat should be well and deeply broken in the fall or winter and thoroughly disked in the spring before planting the corn. Where possible, a crop of green manuring for soil improvement should occupy the land during the winter and be turned under in the spring to precede the crop of corn. Where practicable, the cultivation of the corn should be level, as this is best, as a rule, for corn and leaves the land in the best shape for preparation for wheat or other small grain.

Where good land, which has been in desirable rotation, has been well prepared and well cultivated in corn the preparation indicated above, of thorough disking or light plowing, will put the soil in ideal condition for the wheat crop, as it insures a deep section of soil which has been thoroughly broken and pulverized and which has become compacted by standing during the growth of a clean culture crop, on the top of which has been formed a shallow, fine seedbed. This method opens up the soil for the absorption of moisture and also reduces its porosity so that the fibrous roots of the wheat plant may be able to extend their feeding ground to the greatest possible limit. Where wheat is to follow peas, wheat, or other crops, the same principle as to seedbed should be kept fairly in mind. Not infrequently wheat follows wheat or other small grain where weeds and grass have grown to a greater or less height during the interval between the harvest of the previous crop and seeding time. Where this growth is considerable it is likely the best practice to mow the weeds and grass and allow them to dry for some time on the land, after which they may be turned under, the object being to reduce the bulk of the weeds and grass, and at the same time add organic matter to the soil. Where the growth of weeds and grass is not very large, they may be turned under, but in both cases the plowing should be done at least a month before seeding time, so as to allow the ground to settle. Disk and smoothing harrows should be used liberally in cutting up the soil to aid it in settling and becoming firm. A heavy roller may be run over the freshly plowed land soon after breaking or after a rain to break the clods and lumps and compact the soil. It is well to follow the roller with a smoothing harrow, especially if seeding time is near at hand, so as to form a mulch to prevent evaporation of water.

On account of our dry falls, the wheat should be put in rather deeply, and the drill rows left open or undragged, in order to prevent winter killing by the heaving of the soil and be a protection from cold winds. One bushel is a fair seeding, though some use as much as one and one-half bushels with good results. The seed should be put in sufficiently early to allow the plants to attain sufficient size and hold on the soil before cold weather comes, to reduce as far as possible the bad effects of freezing and soil heaving. The best time will vary in different sections and in different seasons. Where the Hessian fly is troublesome it is likely best to delay seeding until after a good frost, but where it is not troublesome seeding may be made prior to this time to good advantage.

In the great wheat region of the Northwest the crop is sometimes harrowed with a light harrow or weeder in the spring for the conservation of moisture, but in the East the cultivation is generally all given before the crop is put on the land. This makes it all the more important to thoroughly prepare the land before the crop is put in. We have used a light smoothing harrow and weeder in the spring to good advantage and we believe it is good practice to employ these implements, especially when the season is dry.

The above principles regarding preparation apply to oats and other small grain, as well as to wheat. Oats can be grown successfully on a greater variety of soils than wheat, and, where possible, fall seeding should be followed, using some of the hardy winter varieties, as the largest yields of grain are obtained from fall sowing when they stand the winter. Much can be done in carrying oats through the winter in good condition by thorough preparation of the land and sufficiently early seeding to allow the plants to reach a good root development before winter frosts set in.

FERTILIZATION.

The best fertilization of wheat and other small grain will depend on the character of soil, its condition, the crops which have preceded and the fertilization which has been given them. Wheat can be grown to best advantage and most profitably in rotation with other crops where one or more of the legumes or nitrogen-gathering plants have occupied prominent places, which has enabled them to gather from the air and store in the soil a large amount, at least, of the nitrogen so necessary for the development of small grain. In the Mountain district and on the red clay and valley lands of the Piedmont the following rotations are well suited:

First year: Wheat with red clover sown in the spring on the fall-sown wheat.

Second year: Red clover, with the second crop turned under after maturity of seed for soil improvement and for storing seed in the soil.

Third year: Corn.

This gives a three-year rotation, with corn following clover and wheat corn, which fit into each other nicely. In the Piedmont and Eastern sections of the State a shorter rotation of wheat, followed by peas to be cut for hay or left on the ground and turned under for soil improvement in the fall or winter for the first year, and corn the second year, to be followed again by wheat or other small grain, gives an excellent two-year rotation, which, with proper fertilization, would improve the soil and the crop yields at the same time. Cotton may be added to this rotation where the land is suitable, allowing the cotton to follow wheat and peas the second year. Crimson clover may be put in the cotton at last cultivation, or after first picking, and turned under the third year in time for corn.

Our examinations of the upland and valley soils of the Mountain district and of the red clay and valley soils of the Piedmont show them to be high in potash and poor in phosphoric acid, the amount of nitrogen, or ammonia, in all of them depending on the amount of organic matter, or humus, present. A fertilizer for best results on these soils should contain small amounts of potash and large amounts of phosphoric acid, the amount of nitrogen, or ammonia, depending on the organic matter present in them, and the size of the stalk which the land will produce naturally without fertilizer; the main office of the nitrogen being to produce stalk, without a satisfactory growth of which a good crop of grain cannot be obtained. Phosphoric acid and potash, and especially phosphoric acid, are needed to cause the small grain heads to fill properly. Mixtures which will contain 8 to 10 per cent of phosphoric acid, 1½ to 2½ per cent potash and 3 to 4 per cent of ammonia, will give good results on these types of soil. For the sandy-loam soils of the Piedmont and Eastern districts mixtures containing 7 to 8 per cent phosphoric acid, 2 to 3 per cent potash, 3 to 4 per cent of ammonia, will do well. In making these mixtures the phosphoric acid may be supplied by 14 or 16 per cent acid phosphate, the potash by kainit or manure salt, muriate or sulphate of potash, and the nitrogen, or ammonia, by dried blood, tankage, cotton-seed meal in small quantity, or other vegetable or animal ammoniates, or by nitrate of soda or sulphate of ammonia for top dressing in the spring. If the fertilizer is to be put in the drill with the wheat, only a small amount of cotton-seed meal should be used, as in its decomposition or rotting in the soil the germination of the wheat or small grain is destroyed, and the stand may be poor on this account. Small amounts of cotton-seed meal may be used without injury; possibly 50 pounds to the acre is as much as should be employed. Where meal is used the rest of the ammonia, or nitrogen, may be supplied by blood, tankage, or similar materials. If the fertilizer is to be broadcasted, all of the ammonia may come

from meal without injury to the stand. Finely ground bone-meal is an excellent fertilizer for wheat and small grain where put in in the fall with the grain and will give good results by itself on soils rich in potash. Bone-meal carries about 22 per cent phosphoric acid and 4 to 5 per cent of ammonia.

A good application of fertilizer for wheat is 300 to 600 pounds per acre. Where the land has been well prepared and is in good condition it will pay to fertilize liberally. As a rule, the fertilizer should be applied in the fall at time of seeding, this being particularly true in the application of phosphoric acid and potash supplying materials or mixtures of these. Good results will be obtained from the use of one-half the nitrogen, or ammonia, in blood, tankage, meal, etc., in the fall along with the phosphoric acid and potash, and the other half as a top dressing in the spring after growth has well started from nitrate of soda or sulphate of ammonia. Where wheat or other small grain has been grown in one of the rotations suggested above or similar ones with soil-improving crops, one-half the nitrogen in the mixtures may be omitted after the rotation has been repeated one or more times, and may be left out altogether after sufficient organic matter, or humus, has been stored in the soil to produce a sufficiently large development of stalk for a good crop of grain. Each individual farmer must judge of this for himself by observing the land and the kind of growth it produces, having specially in mind that a good stalk development is necessary to a good crop, and that nitrogen, or ammonia, supplies this, and that phosphoric acid and potash are the constituents which have most to do with the production of grain or seed; and further that too great development of stalk proportionally to grain is a disadvantage and should be counteracted either by omitting nitrogen, or ammonia, from the fertilizer or increasing the amounts of phosphoric acid and potash. In dividing the application of nitrogen and applying part in the fall and the rest in the spring as a top dressing, the following equivalents would be useful:

One pound nitrate of soda is equal to 2.2 pounds cotton-seed meal, 2 pounds fish scrap, 1.2 pounds dried blood, and ¾ pounds sulphate of ammonia.

The following equivalents apply to potash-supplying materials:

One pound kainit equals .62 pound manure salt and ¼ pound each of muriate or high-grade sulphate of potash.

These figures, with the data given in the several formulas, will enable any one to make change of one potash or nitrogen supplying material for another in any of the formulas.

The discussion above, as well as the formulas, are applicable for oats the same as for wheat.

Where it is desired to make home mixtures the formulas given below will be found convenient and will give good results. They may be easily changed according to the suggestions above to meet the different conditions as to soil, rotation and division of the application of nitrogen, or ammonia.

1. Formulas for the Mountain District and for the Piedmont Red Clay and Valley Lands.

No. 1—

Acid phosphate, 14 per cent phosphoric acid	1,000 pounds
Cotton-seed meal, 6.59[1] per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	900 pounds
Kainit, 12.5 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.1 per cent; potash, 1.3 per cent; nitrogen, 2.9 per cent (equal to ammonia, 3.52 per cent).

No. 2—

Acid phosphate, 16 per cent phosphoric acid	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	900 pounds
Kainit, 12.5 per cent potash	150 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.7 per cent; potash, 1.6 per cent; nitrogen, 2.9 per cent (equal to ammonia, 3.52 per cent).

No. 3—

Acid phosphate, 14 per cent phosphoric acid	950 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	800 pounds
Kainit, 12.5 per cent potash	250 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9 per cent; potash, 1.5 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.01 per cent).

No. 4—

Acid phosphate, 16 per cent phosphoric acid	900 pounds
Fish scrap, 8.25 per cent nitrogen and 6.0 per cent phosphoric acid	800 pounds
Kainit, 12.5 per cent potash	300 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.6 per cent; potash, 1.8 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.01 per cent).

[1] 6.59 per cent nitrogen equals 8 per cent ammonia.

No. 5—

Acid phosphate, 14 per cent phosphoric acid	1,000 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	950 pounds
Muriate of potash, 50 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8 per cent; potash, 1.9 per cent; nitrogen, 3.10 per cent (equal to ammonia, 3.76 per cent).

No. 6—

Acid phosphate, 16 per cent phosphoric acid	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	1,000 pounds
Muriate of potash, 50 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.8 per cent; potash, 2 per cent; nitrogen, 3.2 per cent (equal to ammonia, 3.88 per cent).

No. 7—

Acid phosphate, 14 per cent phosphoric acid	1,400 pounds
Dried blood, 13 per cent nitrogen	525 pounds
Muriate of potash, 50 per cent potash	75 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.8 per cent; potash, 1.8 per cent; nitrogen, 3.4 per cent (equal to ammonia, 4.13 per cent).

No. 8—

Acid phosphate, 16 per cent phosphoric acid	1,350 pounds
Dried blood, 13 per cent nitrogen	550 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 10.8 per cent; potash, 2.5 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.25 per cent).

No. 9—

Acid phosphate, 16 per cent phosphoric acid	1,350 pounds
Dried blood, 13 per cent nitrogen	550 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 10.8 per cent; potash, 2.5 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.25 per cent).

No. 10—

Bone-meal, 22.5 per cent phosphoric acid and 3.7 per cent nitrogen	1,000 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	900 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: phosphoric acid, 12.3 per cent; potash, 3.1 per cent; nitrogen, 4.8 per cent (equal to ammonia, 5.83 per cent).

No. 11—

Acid phosphate, 14 per cent phosphoric acid	650 pounds
Cotton seed, 3.1 per cent nitrogen, 1.3 per cent phosphoric acid, and 1.2 per cent potash	1,300 pounds
Kainit, 12.5 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 5.3 per cent; potash, 1 per cent; nitrogen, 2 per cent (equal to ammonia, 2.43 per cent).

No. 12—

Acid phosphate, 14 per cent phosphoric acid	1,350 pounds
Tankage, 11 per cent nitrogen	575 pounds
Muriate of potash, 50 per cent potash	75 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.4 per cent; potash, 1.8 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.76 per cent).

No. 13—

Acid phosphate, 16 per cent phosphoric acid	1,350 pounds
Tankage, 11 per cent nitrogen	575 pounds
Muriate of potash, 50 per cent potash	75 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 10.8 per cent; potash, 1.8 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.76 per cent).

No. 14—

Acid phosphate, 14 per cent phosphoric acid	1,200 pounds
Dried blood, 13 per cent nitrogen	300 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	300 pounds
Kainit, 12.5 per cent potash	200 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.7 per cent; potash, 1.4 per cent; nitrogen, 2.8 per cent (equal to ammonia, 3.40 per cent).

2. Formulas for the Sandy-loam Soils of the Piedmont and Eastern Sections.

No. 1—	
Acid phosphate, 14 per cent phosphoric acid	900 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	950 pounds
Kainit, 12.5 per cent potash	150 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.4 per cent; potash, 1.6 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.76 per cent).

No. 2—	
Acid phosphate, 16 per cent phosphoric acid	850 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	1,000 pounds
Kainit, 12.5 per cent potash	150 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8 per cent; potash, 1.6 per cent; nitrogen, 3.2 per cent (equal to ammonia. 3.88 per cent).

No. 3—	
Acid phosphate, 14 per cent phosphoric acid	850 pounds
Fish scrap, 8.25 per cent nitrogen and 6 per cent phosphoric acid	850 pounds
Kainit, 12.5 per cent potash	300 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.2 per cent; potash, 1.8 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.25 per cent).

No. 4—	
Acid phosphate, 16 per cent phosphoric acid	800 pounds
Fish scrap, 8.25 per cent nitrogen and 6 per cent phosphoric acid	850 pounds
Kainit, 12.5 per cent potash	350 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.9 per cent; potash, 2.1 per cent; nitrogen, 3.5 per cent (equal to ammonia, 4.25 per cent).

No. 5—	
Acid phosphate, 14 per cent phosphoric acid	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	1,000 pounds
Muriate of potash, 50 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 7.9 per cent; potash, 2 per cent; nitrogen, 3.2 per cent (equal to ammonia, 3.88 per cent).

No. 6—

Acid phosphate, 16 per cent phosphoric acid	900 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	1,050 pounds
Muriate of potash, 50 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8.2 per cent; potash, 2 per cent; nitrogen, 3.4 per cent (equal to ammonia, 4.13 per cent).

No. 7—

Acid phosphate, 14 per cent phosphoric acid	1,300 pounds
Dried blood, 13 per cent nitrogen	600 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.1 per cent; potash, 2.5 per cent; nitrogen, 3.9 per cent (equal to ammonia, 4.73 per cent).

No. 8—

Acid phosphate, 16 per cent phosphoric acid	1,300 pounds
Dried blood, 13 per cent nitrogen	600 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 10.4 per cent; potash, 2.5 per cent; nitrogen, 3.9 per cent (equal to ammonia, 4.73 per cent).

No. 9—

Bone-meal, 22.5 per cent phosphoric acid and 3.7 per cent nitrogen	950 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	950 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: phosphoric acid, 11.8 per cent; potash, 3.2 per cent; nitrogen, 4.8 per cent (equal to ammonia, 5.85 per cent).

No. 10—

Acid phosphate, 14 per cent phosphoric acid	600 pounds
Cotton-seed, 3.1 per cent nitrogen, 1.3 per cent phosphoric acid, and 1.2 per cent potash	1,350 pounds
Kainit, 12.5 per cent potash	50 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 5.7 per cent; potash, 1.1 per cent; nitrogen, 2 per cent (equal to ammonia, 2.43 per cent).

No. 11—

Acid phosphate, 14 per cent phosphoric acid	1,300 pounds
Tankage, 11 per cent nitrogen	600 pounds
Muriate of potash, 50 per cent potash	100 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 9.1 per cent; potash, 2.5 per cent; nitrogen, 3.3 per cent (equal to ammonia, 4.01 per cent).

No. 12—

Acid phosphate, 14 per cent phosphoric acid	1,100 pounds
Dried blood, 13 per cent nitrogen	325 pounds
Cotton-seed meal, 6.59 per cent nitrogen, 2.5 per cent phosphoric acid, and 1.5 per cent potash	300 pounds
Kainit, 12.5 per cent potash	275 pounds
	2,000 pounds

This mixture will contain: available phosphoric acid, 8 per cent; potash, 2 per cent; nitrogen, 3.1 per cent (equal to ammonia, 3.76 per cent).

ADAPTATION.

We generally think of wheat as a plant suited to cold climates. The great bulk of the crop is grown where the winters are very cold and where the summer heat is seldom excessive. The most noted exceptions are the wheatfields of California, Egypt and India.

The wheat industry is gradually spreading northward in this country, first as a spring, then as a fall-sown crop. Spring wheat once grew over Kansas, Nebraska and Iowa, where winter wheat is now grown almost altogether. In the Dakotas and Minnesota spring wheat was grown exclusively till a short while ago, when here and there fall-sown wheat began to appear. Wheat soon adapts itself to untoward climatic conditions. By careful manipulation spring wheat may be changed to winter wheat in a short time. In one instance only three years were required to change the one to the other.

In its adaptation to different soils the process seems to be somewhat slower. Wheat, being one of the grasses, requires a rather close, heavy soil for the best development of its fibrous root system, and this condition is met with only in a loam, silt loam, clay loam or a clay soil. There is no variety of wheat that does well in a light sandy soil in the Eastern part of the United States and in the West, while the durum wheats do better on the light soils than the other varieties, they make their best yields on the heavier silty loams.

The soils in North Carolina that produce our best wheat are found in the Piedmont and Mountainous sections of the State. These soils are known as the Cecil or red clay, the Cecil loam and the Porters loam, the last-named soil being confined to the mountains. All of them are characterized by a red to reddish-brown soil containing varying amounts of sharp sand, silt and clay, impregnated with iron

oxide. These are all residual soils, derived from the breaking down of the granites, crystalline schists, mica schists and the more basic rocks found in the western part of the State. The soils thus derived contain, as a rule, an abundance of mineral plant food, but in a form in which the plants cannot use it, and must be rendered available by cultivation, manuring and proper fertilization. A stiff red-clay loam underlies all of these soils.

COMPOSITION.

The following tables show the composition of the wheat grain, by-products and the feeding value of wheat straw:

TABLE I—SHOWING COMPOSITION OF WHEAT GRAIN AND PATENT, BAKERS' AND LOW-GRADE FLOURS.

	Grain.	Patent Flour.	Bakers' Flour.	Low-grade Flour.
Water	10.5	11.48	12.18	12.01
Ash	1.8	.39	.62	1.99
Protein (Nx6.25)	11.8	12.95	14.88	17.95
Crude fiber	1.8	.18	.33	.93
Nitrogen-free extract	72.0	73.55	69.99	63.26
Fat	2.1	1.45	2.00	3.86
Phosphoric acid	.82	.18	.31	1.16

TABLE II—SHOWING COMPOSITION OF BY-PRODUCTS OF WHEAT.

	Bran.	Shorts.	Middlings.
Water	11.9	11.8	12.1
Ash	5.8	4.6	3.3
Protein (Nx6.25)	15.4	14.9	15.6
Crude fiber	9.0	7.4	4.6
Nitrogen-free extract	53.9	56.8	60.4
Fat	4.0	4.5	4.0

TABLE III—SHOWING PERCENTAGE COMPOSITION AND FEEDING VALUE OF WHEAT STRAW.

	Percentage Composition.	Per Cent Digestible.
Water	9.6	----------
Ash	4.2	----------
Protein (Nx6.25)	3.4	11
Crude fiber	38.1	52
Nitrogen-free extract	43.4	38
Ether extract	1.3	31

It will be noted that the wheat grain is quite high in protein, fat, and nitrogen-free extract, and thus highly nutritious, while the feeding value of straw is quite low. These tables show the composition of the ripened grain and straw only and reveal to us that at maturity most of the nutritive value of the plant is collected in the grain, thus rendering the straw of little value as forage. The tables also show that of the nutrients left in the straw only a small percentage of them is digestible.

ENEMIES OF THE WHEAT CROP.

The Hessian fly is perhaps the most serious insect pest that attacks wheat in this State. To offset its ravages it has been found advisable to sow the crop a little late and after the first frost. There seems to be no known practicable remedy for the prevention of rust, except that of developing rust resistant varieties. Smut may be largely prevented by treatment of the seed before sowing with a solution of formalin. This is done by immersing the seed for thirty minutes in a solution made by mixing one pound, or one pint, of formalin with fifty gallons of water. Before treatment with the formalin immerse the seed in cold water and skim off any smut balls that may rise to the surface. After immersion in the formalin solution spread out the seed and allow them to dry thoroughly before sowing.

All wheat and other small grain should be treated in this way before sowing.

II. VARIETY TESTS OF WHEAT.

There are, perhaps, over two hundred varieties of wheat in the United States to-day. In the case of live stock each breed or strain is developed to meet some special demands; so, also, in plants, in general, a variety is the result of a definite set of environmental conditions that have combined to produce the variations that go to make the new strain. The variety, then, is the result either of changed natural conditions or of effort along lines carefully laid with a view to adapt and adjust strains of plants to new environmental conditions. The variety thus developed is, in the nature of the case, adapted to the surroundings where it has been making its best yields.

In the case of wheat the mere existence of these varieties carries with it the suggestion that they are not all equally well suited to all climatic and soil conditions, and that each one has, doubtless, proven to be the best variety tested in its native locality. We are to assume, then, that these are all good wheats when grown under favorable soil and climatic conditions. Again, since varieties of plants are generally developed in a given locality under given soil and climatic

conditions, it follows that they will make as good, if not better, yields when propagated under soil and climatic conditions similar to those under which they have been developed. Now if there be a probability that varieties of wheat will make better yields in their native environments than elsewhere, it follows that the adaptability of the many different varieties put on the market should be tested. If any of them are well suited to the climate and soils of our State it is worth our while to know it. Should they not be adapted to our conditions, such knowledge is a necessary protection against loss. The only way to gain this knowledge is to subject these wheats to a rigid test on our soils. The recommendations of the seedsmen are not to be relied upon, since they never know whether the environment in which the variety has been developed is similar to the one in which you will be forced to grow it.

With a view to protect the farmer against the frauds of unscrupulous seedsmen and originators on the one hand, and to ascertain the varieties best suited to the soils of the State on the other, the State Department of Agriculture began, in 1900, to collect wheat varieties from different parts of the world and to subject them to a rigid test on the recognized wheat soils of the State. Since then over thirty different varieties have been collected and tested—some for longer, others for shorter periods.

The reader will bear in mind that in any given year all of the varieties tested were subjected to identical soil and climatic conditions at the different farms and received identical treatment as to fertilization and previous preparation of land.

COMMENTS ON VARIETY TESTS OF WHEAT.

Wheats have been tested at the Edgecombe farm but one year, 1901. The soil on this farm is known as the Norfolk sandy loam. It has a gray surface soil from ten to twelve inches deep composed of a medium sand, fine sand, silt and clay. Scattered here and there over the farm are irregular areas of the Norfolk fine sandy loam which has, as the name indicates, a heavier texture than the former. The subsoil of both these types is a yellow sandy to fine sandy loam, carrying about 25 per cent clay. It is thus fairly retentive of moisture and serves as a good foundation on which to build up a good soil.

Table No. IV shows the results of the tests on this farm in 1901. During this year ten different varieties were tested, of which Red May, Purple Straw and Early Arcadian were the three highest yielders.

Most of the tests of wheat varieties have been made at the Iredell farm, where the soils seem better adapted to wheat culture and not so well suited to the growth of such crops as make their best

development in the Coastal Plain region. The soils on this farm belong to the Cecil series and range in texture from a loam to a clay loam. The depth of these soils runs from six to eight inches. They are reddish-brown in color, well drained and fairly retentive of moisture. Wherever found, these soils are well suited to the growth of general crops, such as corn, wheat and oats, except in so far as climatic conditions may be opposed.

TABLE IV—RESULTS OF VARIETY TESTS OF WHEAT, 1901.

EDGECOMBE FARM.

VARIETIES OF WHEAT TESTED.	Yield per Acre in Bushels of 60 Pounds Each.	Date of Ripening.	Rank According to Yield in Bushels per Acre.
Red May	15.00	6—15	1
Early Arcadian	13.66	6—17	2
Purple Straw	11.66	6—15	3
Budapest	10.66	6—15	4
Allara (5075)	10.00	6—15	5
Early Boant	10.00	6— 5	6
Red Chaff	9.00	6—12	7
Canadian Hybrid	9.00	6—17	8
Origora (5342)	6.66	6— 8	9
King's Early (5079)	6.66	6—15	10

On the following pages are recorded the results of the variety tests of wheat on the Iredell farm from 1904 to 1908, inclusive. The tables give a brief description of each variety, showing whether it is smooth or bearded; the per cent of grain to straw; the bushels of grain and pounds of straw per acre; and the rank of the varieties according to the acre-yield in bushels of sixty pounds each. Table No. V brings before us clearly the importance of testing and ascertaining the relative adaptability of the different varieties of wheat to our soils. It is seen that Tuscan Island ranks first with 10.3 bushels, while Medeah and Early Genessee Giant rank seventeen with only 2 bushels per acre. Table No. VI shows even greater extremes the following year, with Medeah again making the lowest yield. In 1906 the history of this variety is again repeated, and

the following year it is dropped from the test. The yields all run unusually high in 1907, with Improved Amber in the lead. But even this year, when conditions seem favorable to all varieties, we find a difference in the yield of the varieties of 11.4 bushels per acre—more than the average yield of wheat for the State in 1907. The yields of 1908 are even better than those of 1907, but again the same extremes in production are maintained.

TABLE V—RESULTS OF VARIETY TESTS OF WHEAT, 1904.

IREDELL FARM.

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	Per Cent of Grain.	Per Cent of Straw.	Yield per Acre in Bushels of 60 Pounds Each.	Pounds of Straw per Acre.	Rank According to Yield per Acre in Bushels of 60 Pounds Each.	Rank According to Yield in Pounds of Straw per Acre.
Tuscan Island (native)	B	41.0	59.0	10.3	885	1	1
Kubanka (8522)	B	41.9	58.1	9.2	760	2	4
Bearded Fulcaster	B	41.0	59.0	9.2	790	2	3
Velvet Don (8231)	S	52.4	47.6	8.8	480	3	11
Golden Chaff	S	46.9	53.1	7.7	520	4	7
Fish-headed (6598)	B	45.5	54.5	7.6	545	5	6
Long-headed (6599)	B	45.0	55.0	7.5	550	6	5
Early Windsor	S	37.0	63.0	7.5	820	6	2
Currell's Prolific	S	40.7	59.3	7.3	650	7	5
Michigan Amber	B	40.1	59.9	6.1	545	8	6
Mahmandi	B	42.3	57.7	6.0	490	9	10
Improved Amber	B	40.9	59.1	5.7	490	10	10
Khorkov (7786)	B	40.3	59.7	5.6	495	11	9
Dietz Mediterranean	B	28.1	71.9	5.2	790	12	3
Mahomed Ben (7793)	B	38.1	61.9	5.1	495	13	9
Adjina (7580)	B	42.2	57.8	5.0	510	14	8
Ultra (5638)	B	52.3	47.7	3.7	200	15	14
Turkey Red	B	46.5	53.5	3.2	210	16	13
Medeah (7579)	B	31.5	68.5	2.0	260	17	12
Early Genessee Giant	B	37.5	62.5	2.0	200	17	14

TABLE VI—RESULTS OF VARIETY TESTS OF WHEAT, 1905.

IREDELL FARM.

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	Per Cent of Grain.	Per Cent of Straw.	Yield per Acre in Bushels of 60 Pounds Each.	Pounds of Straw per Acre.	Rank According to Yield per Acre in Bushels of 60 Pounds Each.	Rank According to Yield in Pounds of Straw per Acre.
Long-headed	B	42.5	57.5	14.2	1150	1	4
Golden Chaff	S	37.1	62.9	12.6	1275	2	1
Improved Amber	B	37.1	62.9	12.3	1250	3	2
Bearded Fulcaster	B	37.5	62.5	12.1	1205	4	3
Fish-headed (6598)	B	39.5	60.5	12.0	1100	5	5
Michigan Amber	B	41.6	58.4	11.6	980	6	9
Early Windsor	S	37.7	62.3	11.1	1095	7	6
Kubanka (8522)	B	38.5	61.5	10.3	990	8	8
Tuscan Island (native)	B	35.6	64.4	9.3	1010	9	7
Khorkov (7786)	B	36.8	63.2	9.2	920	10	11
Early Genessee Giant	B	36.9	63.1	8.9	915	11	12
Dietz Mediterranean	B	43.6	56.4	8.6	665	12	19
Ultra (5638)	B	43.6	56.4	8.6	725	12	17
Fanta Ray (native)	S	35.3	64.7	8.4	925	13	10
Mahomed Ben (7793)	B	36.2	63.8	8.3	880	14	13
Turkey Red	B	39.3	60.7	8.0	740	15	16
Adjina	B	35.7	64.3	7.5	830	16	14
Velvet Don	S	31.4	68.6	7.3	960	17	9
Mahmandi (7792)	B	38.5	61.5	7.3	700	17	18
Currell's Prolific	S	33.0	67.0	6.7	810	18	15
Danish Golden Chaff	S	38.8	61.2	5.5	520	19	21
Red Russian	S	27.8	72.2	5.3	830	20	14
Medeah (7579)	B	32.8	67.2	5.1	625	21	20

TABLE VII—RESULTS OF VARIETY TESTS OF WHEAT, 1906.

IREDELL FARM.

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	Per Cent of Grain.	Per Cent of Straw.	Yield per Acre in Bushels of 60 Pounds Each.	Pounds of Straw per Acre.	Date of Ripening.	Rank According to Yield per Acre in Bushels of 60 Pounds Each.	Rank According to Yield in Pounds of Straw per Acre.
Fish-headed (6598)	B	55.9	44.1	12.7	600	6—11	1	7
Golden Chaff	S	47.1	52.9	12.3	830	6—11	2	2
Fanta Ray (native)	S	51.1	48.9	10.8	620	6—11	3	6
Improved Amber	B	32.2	67.8	10.4	715	6—18	4	4
Early Genessee Giant	B	47.3	52.7	10.3	690	6—18	5	5
Purnell's Prolific	B	53.4	46.6	10.3	540	6—15	5	10
Early Windsor	S	52.9	47.1	10.3	550	6—11	5	9
Kubanka (8522)	B	55.5	44.5	10.0	480	6—18	6	15
Bearded Fulcaster	B	43.4	56.6	9.7	715	6—11	7	4
Red Russian	B	43.9	56.1	9.7	740	6—18	7	3
Red Wonder	B	55.2	44.8	9.7	470	6—18	7	16
Velvet Don (8231)	S	52.8	47.2	9.2	490	6—11	8	14
Long-headed (6599)	B	52.3	47.7	9.2	500	6—11	8	13
Mahomed Ben (7793)	B	50.0	50.0	9.0	540	6—15	9	10
Michigan Amber	B	54.3	45.7	8.4	425	6—18	10	19
Mahmandi (7792)	B	45.1	54.9	7.8	570	6—18	11	8
Turkey Red	B	47.4	52.6	7.7	510	6—11	12	12
Adjini (7580)	B	51.1	48.9	7.7	440	6—18	12	18
Dietz Mediterranean	B	46.3	53.7	7.5	520	6—18	13	11
Kubanka	B	34.8	65.2	7.5	840	6—18	13	1
Ultra (5638)	B	49.4	50.6	7.3	450	6—18	14	17
Tuscan Island (native)	B	56.5	43.5	6.5	300	6—11	15	20
Danish Golden Chaff	S	55.3	44.7	6.2	295	6—18	16	21
Medeah (7579)	B	34.9	65.1	6.2	690	6—11	17	5

TABLE VIII—RESULTS OF VARIETY TESTS OF WHEAT, 1907.

IREDELL FARM.

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	Per Cent of Grain.	Per Cent of Straw.	Yield per Acre in Bushels of 60 Pounds Each.	Pounds of Straw per Acre.	Date of Ripening.	Rank According to Yield per Acre in Bushels of 60 Pounds Each.	Rank According to Yield in Pounds of Straw per Acre.
Improved Amber	B	55.0	45.0	22.0	1080	6—25	1	13
Bearded Fulcaster (selected)	B	65.0	35.0	21.6	1060	6—23	2	14
Golden Chaff	S	48.9	51.1	21.1	1330	6—17	3	8
Ultra (5638)	B	50.0	50.0	20.0	1200	6—25	4	11
Purple Straw	S	48.5	51.5	19.4	1235	6—17	5	9
Tuscan Island (native)	B	50.4	49.6	19.3	1360	6—25	6	6
Velvet Don	S	52.2	47.8	19.1	1050	6—25	7	15
Harvest King	S	44.2	55.8	19.1	1235	6—17	7	9
Dietz Mediterranean	B	53.3	46.7	18.6	980	6—25	8	16
Bearded Fulcaster	B	21.1	78.9	17.6	3945	6—25	9	1
Red May	S	55.7	44.3	17.6	840	6—17	9	17
Red Wonder	B	34.3	65.7	17.2	1970	6—25	10	2
Leap's Prolific	S	44.5	55.5	16.3	1450	6—17	11	3
Turkey Red	B	44.5	55.5	14.8	1110	6—25	12	12
Early Genessee Giant	B	38.2	61.8	14.6	1420	6—25	13	4
Kubanka (8522)	B	38.4	61.6	14.0	1355	6—25	14	7
Fultz	S	44.2	55.8	14.0	1220	6—17	14	10
Currell's Prolific	S	32.2	67.8	10.7	1355	6—25	15	7
Michigan Amber	B	32.0	68.0	10.6	1360	6—25	16	6

TABLE IX—RESULTS OF VARIETY TESTS OF WHEAT, 1908.

IREDELL FARM.

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	Per Cent of Grain.	Per Cent of Straw.	Yield per Acre in Bushels of 60 Pounds Each.	Pounds of Straw per Acre.	Date of Ripening.	Rank According to Yield per Acre in Bushels of 60 Pounds Each.	Rank According to Yield in Pounds of Straw per Acre.
Bearded Fulcaster (selected)	B	45.1	54.9	23.3	1700	6—10	1	1
Gurnis	S	45.5	54.5	21.2	1525	6— 7	2	3
Red Wonder	B	46.5	53.5	20.1	1390	6— 9	3	7
Leap's Prolific	S	49.5	50.5	19.0	1160	6— 7	4	11
Bearded Fulcaster	B	40.7	59.3	17.6	1540	6— 9	5	2
Fultz	S	44.7	55.3	17.1	1070	6— 9	6	13
Purple Straw	S	63.7	36.3	17.0	580	6— 9	7	16
Golden Chaff	S	48.3	51.7	16.9	1085	6— 9	8	12
Early Genessee Giant	B	43.8	56.2	16.0	1235	6—11	9	10
Red May	S	48.0	52.0	16.0	1040	6— 8	9	14
Harvest King	S	43.4	56.6	15.8	1245	6— 7	10	9
Fultz Mediterranean	S	48.1	51.9	15.5	670	6— 7	11	15
Currell's Prolific	S	30.4	69.6	15.5	1470	6— 9	11	4
Michigan Amber	B	46.2	53.8	15.4	1395	6—11	12	6
Velvet Don (8231)	S	37.2	62.8	13.6	1380	6—10	13	8
Ultra (5638)	B	36.3	63.7	13.3	1400	6—11	14	5

TABLE X—COMPILED RESULTS OF

VARIETIES TESTED.	B—Bearded. S—Smooth-headed.	1904.				1905.				1906.			
		Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 60 Pounds.	Pounds of Straw per Acre.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 60 Pounds.	Pounds of Straw per Acre.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 60 Pounds.	Pounds of Straw per Acre.
Golden Chaff	S	46.9	53.1	7.7	520	37.1	62.9	12.6	1275	47.1	52.9	12.3	830
Bearded Fulcaster	B	41.0	59.0	9.2	790	37.5	62.5	12.1	1205	43.4	56.6	9.7	715
Velvet Don (8231)	S	52.4	47.6	8.8	480	31.4	68.6	7.3	960	52.8	47.2	9.2	490
Ultra (5638)	B	52.3	47.7	3.7	200	43.6	56.4	8.6	725	49.4	50.6	7.3	450
Michigan Amber	B	40.1	59.9	6.1	545	41.6	58.4	11.6	980	54.3	45.7	8.4	425
Early Genessee Giant.	B	37.5	62.5	2.0	200	36.9	63.1	8.9	915	47.3	52.7	10.3	690
Fish-headed (6598)	B	45.5	54.5	7.6	545	39.5	60.5	12.0	1100	55.9	44.1	12.7	600
Khorkov (7786)	B	40.3	59.7	5.6	495	36.8	63.2	9.2	920	.....	.....	.....	....
Mahomed Ben (7793).	B	38.1	61.9	5.1	495	36.2	63.8	8.3	880	50.0	50.0	9.0	540
Adjina (7580)	B	42.2	57.8	5.0	510	35.7	64.3	7.5	830	51.1	48.9	7.7	440
Long-headed (6599)	B	45.0	55.0	7.5	550	42.5	57.5	14.2	1150	52.3	47.7	9.2	500
Currell's Prolific	S	40.7	59.3	7.3	650	33.0	67.0	6.7	810	.....	.....	.....	....
Early Windsor	S	37.0	63.0	7.5	820	37.7	62.3	11.1	1095	52.9	47.1	10.3	550
Kubanka (8522)	B	41.9	58.1	9.2	760	38.5	61.5	10.3	990	55.5	44.5	10.0	480
Dietz Mediterranean	B	28.1	71.9	5.2	790	43.6	56.4	8.6	665	46.3	53.7	7.5	520
Mahmandi (7792)	B	42.3	57.7	6.0	490	38.5	61.5	7.3	700	45.1	54.9	7.8	570
Turkey Red	B	46.5	53.5	3.2	210	39.3	60.7	8.0	740	47.4	52.6	7.7	510
Medeah (7579)	B	31.5	68.5	2.0	260	32.8	67.2	5.1	625	34.9	65.1	6.2	690
Improved Amber	B	40.9	59.1	5.7	490	37.1	62.9	12.3	1250	32.2	67.8	10.4	715
Tuscan Island (native).	B	41.0	59.0	10.3	885	35.6	64.4	9.3	1010	56.5	43.5	6.5	300
Red Russian	S	.....	.....	.....	.....	27.8	72.2	5.3	830	43.9	56.1	9.7	740
Danish Golden Chaff	S	.....	.....	.....	.....	38.8	61.2	5.5	520	55.3	44.7	6.2	295
Fanta Ray (native)	S	.....	.....	.....	.....	35.3	64.7	8.4	925	51.1	48.9	10.8	620
Kubanka (7786)	B	.....	.....	.....	.....	.....	.....	.....	.....	34.8	65.2	7.5	480
Red Wonder	B	.....	.....	.....	.....	.....	.....	.....	.....	55.2	44.8	9.7	470
Currell's Prolific	B	.....	.....	.....	.....	.....	.....	.....	.....	53.4	46.6	10.3	540
Red May	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Purple Straw	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Harvest King	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Leap's Prolific	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Fultz	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Bearded Fulcaster (selected).	B	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Fultz Mediterranean	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Gurnis	S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....

VARIETY TESTS OF WHEAT.

	1907.					1908.								
Date of Ripening.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 60 Pounds.	Pounds of Straw per Acre.	Date of Ripening.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 60 Pounds.	Pounds of Straw per Acre.	Date of Ripening.	Average Number of 60-lb. Bushels per Acre for Five Years.	Average Number of Pounds of Straw per Acre for Five Years.	Rank According to Yield of Grain.	Rank According to Yield of Straw.
6—11	48.9	51.1	21.1	1330	6—17	48.3	51.7	16.9	1085	6— 9	14.1	1008	1	2
6—11	21.1	78.9	17.6	3945	6—25	40.7	59.3	17.6	1540	6— 9	13.2	1639	2	1
6—11	52.2	47.8	19.1	1050	6—25	37.2	62.8	13.6	1380	6—10	11.6	872	3	5
6—18	50.0	50.0	20.0	1200	6—25	36.3	63.7	13.3	1400	6—11	10.5	395	4	6
6—18	32.0	68.0	10.6	1360	6—25	46.2	53.8	15.4	1395	6—11	10.4	941	5	3
6—18	38.2	61.8	14.6	1420	6—25	43.8	56.2	16.0	1235	6—11	10.3	892	6	4
6—11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	32.2	67.8	10.7	1355	6—25	30.4	69.6	15.5	1470	6— 9	.....	.....	.....	.....
6—11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	38.4	61.6	14.0	1355	6—25	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	53.3	46.7	18.6	980	6—25	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—11	44.5	55.5	14.8	1110	6—25	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	55.0	45.0	22.0	1080	6—25	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—11	50.4	49.6	19.3	1360	6—25	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6—18	34.3	65.7	17.2	1970	6—25	46.5	53.5	20.1	1390	6— 9	.....	.....	.....	.....
6—15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	55.7	44.3	17.6	840	6—17	48.0	52.0	16.0	1040	6— 8	.....	.....	.....	.....
.....	48.5	51.5	19.4	1235	6—17	63.7	36.3	17.0	580	6—19	.....	.....	.....	.....
.....	44.2	55.8	19.1	1235	6—17	43.4	56.6	15.8	1245	6— 7	.....	.....	.....	.....
.....	44.5	55.5	16.3	1450	6—17	49.5	50.5	19.0	1160	6— 7	.....	.....	.....	.....
.....	44.2	55.8	14.0	1220	6—17	44.7	55.3	17.1	1070	6— 9	.....	.....	.....	.....
.....	65.0	35.0	21.6	1060	6—23	45.1	54.9	23.3	1700	6—10	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	48.1	51.9	15.5	670	6— 7	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	45.5	54.5	21.2	1525	6— 7	.....	.....	.....	.....

It will be noted that nearly the same differences in yields, namely, from 9 to 11 bushels per acre, have been maintained each year throughout the period of the tests. It will be noted also that slight climatic changes have affected the yields of some of the varieties very materially. In 1904 Tuscan Island yielded 10.3 bushels per acre, while Early Genessee Giant yielded but 2 bushels per acre. In 1907 Early Genessee Giant had increased its yield to 12.6 bushels per acre, while Tuscan Island had increased its yield but 9 bushels per acre. Other varieties show similar fluctuations in yield during different years.

The chief interest in these tests lies, of course, in the possibility of discovering the variety or the varieties best suited to our soils. The results bring out clearly that some of the varieties are better suited to our conditions than others. In 1904 Medeah and Early Genessee Giant yielded but 2 bushels each per acre, while Tuscan Island, Bearded Fulcaster and Velvet Don yielded 10.3, 9.2 and 8.8 bushels per acre respectively. The following year Golden Chaff, Bearded Fulcaster and Long Headed produced 14.2, 12.6 and 12.1 bushels per acre respectively, while Red Russian and Danish Golden Chaff produced but 5.5 bushels each per acre. The varieties making highest yields in 1906 were Fish Headed, Golden Chaff and Fanta Ray. In 1907 Improved Amber, Bearded Fulcaster (selected), Golden Chaff and Ultra stood highest, while in 1908 the table shows Bearded Fulcaster (selected), Gurnis and Red Wonder in the lead.

COMMENT ON TEN OF THE LEADING VARIETIES TESTED.

Only six varieties have gone through the five-year test, and of these Golden Chaff, a smooth-headed variety, ranked first in yield of grain and second in yield of straw. This variety stands up well and appears to be a good wheat for the red-loam soils of the Piedmont section. It is a rather tall wheat with medium to long heads. Its date of maturity is medium and may be expected to ripen anywhere from the 10th to the 15th of June.

Bearded Fulcaster ranked second in yield of grain and first in yield of straw during the five-year test. It is, as the name indicates, one of the bearded varieties and practically equal in productive capacity to the Golden Chaff. Its date of maturity is medium and is to be looked upon as a good variety for our conditions.

Velvet Don, a smooth-headed variety, ranked 3 in 1904, 17 in 1905, 8 in 1906 and 13 in 1908. This variety matures about June 15th, depending on weather conditions.

Ultra is a bearded wheat and ranked 15 in 1904, 12 in 1905, 14 in 1906, 4 in 1907 and 14 in 1908. Matures about June 18th or 20th.

Michigan Amber, also a bearded variety, ranked 8 in 1904, 6 in 1905, 10 in 1906, 16 in 1907 and 12 in 1908. Its date of maturity is about like that of Ultra.

Early Genessee Giant, a bearded variety, ranked 17 in 1904, 11 in 1905, 5 in 1906, 13 in 1907 and 9 in 1908. It matures anywhere from June 15th to June 20th.

Tuscan Island has been in the test but three years. It is one of the bearded wheats, and ranked 1 in 1904, 9 in 1905 and 15 in 1906. Its date of maturity is medium.

Long Headed, another bearded wheat, ranked 6 in 1904, 1 in 1905 and 8 in 1906. Matures about June 15th.

Fish Headed, a bearded variety, has made a very good record during the test, having ranked 2 in 1904, 5 in 1905 and 1 in 1906. It has been under test but three years. Matures about June 15th.

Improved Amber has also done well at the Iredell farm, during the period it was under test. In 1904 it ranked 10, in 1905 it ranked 3, 4 in 1906 and 1 in 1907. Matures about June 15th.

Bearded Fulcaster (selected) ranked 2 in 1907 and 1 in 1908. Matures about June 15th.

A number of the above varieties have commendable characteristics, but having been under test only a short time they would not seem to justify a positive recommendation to our farmers till their qualities have been tried for a longer period. Golden Chaff and Bearded Fulcaster are exceptions, however, and may be looked upon as good varieties for our soils.

BEARDED OR SMOOTH VARIETIES.

There seems to be no material difference in yield between the smooth and bearded varieties of wheat. Our test shows Golden Chaff, a smooth wheat, to have outyielded the Bearded Fulcaster, during the five-year test, .9 of a bushel per acre. When the question of handling the crop comes up for consideration the smooth wheat has a decided advantage over the bearded.

It has been found, however, that the bearded wheats withstand wet weather conditions better than the smooth wheats and that they are also better suited to moist land soils.

III. VARIETY TESTS OF OATS.

Variety tests of oats have been conducted at the Edgecombe farm but one year, 1901. During this year 10 varieties were tested, and of these the Red, Appler and Burt were the highest yielders.

Seed of the Appler and Red varieties were also sown in the spring in order to test their relative values as spring or winter varieties. The table shows the fall seeding of the Appler to have outyielded the spring seeding 15.38 bushels per acre, while the fall-sown Red yielded 20.6 bushels more per acre than the spring sown.

The dates of maturity of these spring seedings, it will be noted, are not very different from those of the fall seedings, while, in all cases, the fall sowings greatly outyielded the spring sowings.

TABLE XI—SHOWING RESULTS OF VARIETY TESTS OF OATS, 1901.

EDGECOMBE FARM.

VARIETIES TESTED.	Yield per Acre in Bushels.	Date of Ripening.	Rank According to Yield per Acre.
Red	37.50	6—15	1
Appler	34.75	6—15	2
Burt	31.25	6—15	3
Black Hungarian (4344)	30.62	6—20	4
Turf or Virginia Gray	30.00	6—20	5
Red, Ga. (sown in 18 in. drill)	25.00	6—20	6
Appler (spring sown)	19.37	6—20	7
Roussee Caronne (5032)	18.75	6—20	8
Red (spring sown)	16.87	6—20	9
Barrett (spring sown)	15.62	6—20	10

Work in the testing of oat varieties has been conducted at the Iredell farm during 1907 and 1908. In 1907 the Appler and the Culberson only were under test. The Culberson was tested both in the drill and the open furrow, while the Appler was tested in the drill only. In case of the Culberson the open-furrow seeding showed a gain of 2.7 bushels per acre over the ordinary drill method. Under similar conditions the Appler outyielded the Culberson 9.6 bushels per acre. The following year five different varieties were tested, namely, the Appler, Culberson, Burt Ninety Day, Red Rust Proof and the Virginia Gray. It will be noted that the Appler, grown by the open-furrow method, made the highest yield, while the Culberson, grown by the broadcast seeding, made the next highest yield.

The tables show the per cent of grain to straw to be much higher in some of the varieties than in others. Appler, Burt Ninety Day and the Culberson (with one open-furrow seeding) all run over 60 per cent grain. Our work in testing of oat varieties has not gone far enough yet to justify us in recommending any special variety as being best for our soils, though some interesting suggestions may be gathered from the data contained in the accompanying tables. It is safe to say that Burt or Ninety Day is one of the best, if not the best, of the spring oats for general growing in the State, and that Appler is one of the heaviest yielders of winter oats, while Culberson is the hardiest and at the same time a good yielder.

TABLE XII—RESULTS OF VARIETY TESTS OF OATS, 1907.

IREDELL FARM.

VARIETIES TESTED AND METHODS OF CULTURE USED.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 32 Pounds.	Pounds of Straw per Acre.	Rank According to Yield of Grain per Acre.	Rank According to Yield of Straw per Acre.
Appler (drilled)	52.5	47.5	39.3	1140	1	1
Culberson (open furrow)	61.9	38.1	40.6	800	2	2
Culberson (drilled)	63.1	36.9	37.9	700	3	3

TABLE XIII—RESULTS OF VARIETY TESTS OF OATS, 1908.

IREDELL FARM.

VARIETIES TESTED AND METHODS OF CULTURE USED.	Per Cent Grain.	Per Cent Straw.	Yield per Acre in Bushels of 32 Pounds.	Pounds of Straw per Acre.	Rank According to Yield of Grain per Acre.	Rank According to Yield of Straw per Acre.
Appler (open furrow)	66.7	33.3	58.4	930	1	5
Culberson (broadcast)	47.3	52.7	56.2	2000	2	1
Appler (broadcast)	74.1	25.9	55.6	620	3	7
Culberson (open furrow)	44.7	55.3	47.5	1980	4	2
Burt or Ninety Day (drilled)	66.8	33.2	45.9	730	5	6
Red Rust Proof (drill)	57.5	42.5	43.1	1020	6	4
Virginia Gray—spring (drill)	46.4	53.6	36.2	1340	7	3

IV. VARIETY TESTS OF RYE.

Variety tests of rye were conducted at the Edgecombe farm during 1901 only. But three varieties were under test, namely, the Georgia, the Albruzzen and the Petkus. The Georgia made the highest yield of the three. The dates of maturity of these ryes run about like the wheats.

THE BEST VARIETY.

It is not to be expected that we shall, by merely testing the many different varieties of corn, wheat, cotton, etc., be able to find the best possible varieties for the different soil types of the State. The

variety tests can only show which are the best varieties of the lot tested and help to guard against trying to grow those that are useless.

TABLE XIV—RESULTS OF VARIETY TESTS OF RYE.

EDGECOMBE FARM.

VARIETIES TESTED.	Yield per Acre in Bushels.	Date of Ripening.	Rank According to Yield per Acre.
Georgia	31.25	6—17	1
Albruzzen (4343)	16.66	6— 5	2
Petkus (5058)	10.66	6—20	3

On another page we stated that the best variety of plant for a given locality is the one that has been developed under the soil and climatic conditions of that locality. This being true, the only way to know positively that we are growing the best varieties is to ascertain the details of their development in their original environments, and since few or none of the many existing varieties of crops are at present grown under soil and climatic conditions similar to those in which they were developed, but have been scattered far and wide over the country and grown under all sorts of soil and climatic conditions till they have lost all inheritance but their name, it is plain that any definite knowledge of the probable performance of any of the varieties of crops offered for sale in the general markets will be difficult to obtain.

In view, then, of the difficulties in the way of securing from abroad the varieties of crops best suited to our conditions, the Department is carrying on extensive plant-breeding work, looking to the development, on our own soils, of varieties of plants that shall be perfectly adapted to their environments. Below is a brief outline of the method of work in breeding the cereal crops.

V. METHODS OF WORK IN WHEAT AND OAT BREEDING.

A large number of plants is carefully selected in the field from varieties that give promise of becoming valuable in the given locality on a definite type of soil.

A record is kept for each plant selected. This record shows date of maturity; the number of tillers or stalks the mother plant produced: the height of the stalks; the weight of grain produced; color of grain; the character of the head, whether smooth or bearded; and the ability to resist diseases, etc.

The best head from each plant of every selection from each variety is now taken and the weight and number of grains recorded. The grains from each of these heads are planted in rows four inches apart each way. A single head occupies a row.

The development of the different plants from each head is carefully studied during the season and those showing desirable characteristics are noted and numbered.

Of the large number of plants thus selected only one hundred of each variety are retained at harvest time, and later in the season this number is culled down to ten. The progeny of each plant of each variety is kept separate.

In the fall the seeds of each variety thus saved are planted in small squares of one hundred plants each, called centgeners, the term meaning one hundred plants of a single or one parentage. The following season the yields from the different centgeners are carefully noted and compared and those giving promise of most value will be propagated and offered to the farmers as improved strains or new varieties.

This method of improvement with, perhaps, some alterations, will go on continuously, so that the Department will be able, from time to time, to offer the wheat and oat growers of the State varieties that shall climb higher and higher in their producing power.

It will be well to say in this connection that wheats, like other plants, bred under a given condition of soil must be grown on this type of soil and under like conditions of fertilization and cultivation if best results are to be obtained. Plants become adapted and adjusted to the particular soil and climatic environment in which they are developed, and their yielding capacities are generally influenced adversely when a radical change in the environment occurs.

SOURCES OF SEED TESTED.

The records of the sources of many of the varieties tested have been lost. The following were obtained from the Bureau of Plant Industry of the United States Department of Agriculture, at Washington, D. C.:

Velvet Don	No. 8231
Ultra	" 5638
Fish Headed	" 6598
Khorkov	" 7786
Mahomed Ben	" 7793
Adjina	" 7580
Long Headed	" 6599
Kubanka	" 7786
Kubanka	" 8522
Mahmandi	" 7792
Medeah	" 7579

LEAF TOBACCO SALES FOR JULY. 1909.

Pounds sold for producers, first hand	726,326
Pounds sold for dealers	92,759
Pounds resold for warehouse	68,028
Total	887,113

THE BULLETIN

OF THE

NORTH CAROLINA

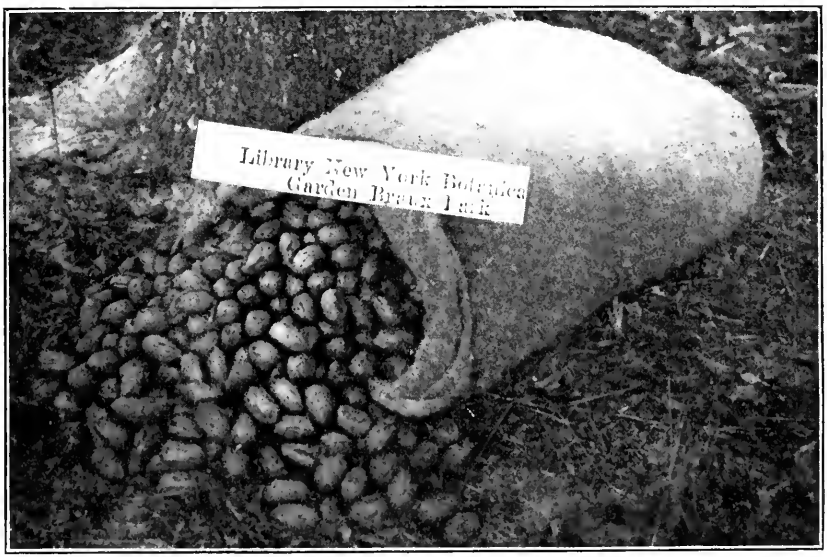
DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. SEPTEMBER, 1909. Number 9.

PECANS

By W. N. HUTT.



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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, N. C., September 11, 1909.

SIR:—I herewith submit a preliminary report of my observations and researches during the last three years on the subject of Pecan Culture in North Carolina. During this limited time careful notes and records have been kept on the growth and habits of pecan trees as illustrated by the extensive variety collections on the State Test Farms. Pecan culture is, however, such a new industry in this country that it will take some years yet to mature data on many unsettled points. This manuscript is submitted, therefore, not with the idea of giving arbitrary information on this subject, but rather to encourage the planting of this very valuable species of tree. I firmly believe that commercial pecan culture is one of the most promising horticultural possibilities of the South.

Very respectfully,

W. N. HUTT,
State Horticulturist.

To HON. WILLIAM A. GRAHAM,
Commissioner of Agriculture.

PECANS.

W. N. Hutt, Horticulturist.

The possibilities for commercial pecan growing are very bright. There is now a greater demand for all kinds of nuts than ever before. In spite of increasing duties on nuts imported from foreign countries to the United States our imports of them are now larger than at any time in the Nation's history. The following table gives the value of our imports of nuts for the last decade:

1900	$3,484,699
1901	3,756,137
1902	4,214,676
1903	5,038,726
1904	5,473,306
1905	6,154,515
1906	7,228,607
1907	6,315,891
1908	9,563,742

With the exception of the year 1907, it will be seen that each year shows a large excess in nut imports over the year preceding. This large increase is due in some measure to the natural increase in wealth and population, but much more to the fact that nuts are now being recognized as foods and not merely as condiments and luxuries. They are now considered as a household staple like rice and raisins and are entering largely into the daily diet of our people. This has created a demand for nuts greater than ever before—a demand that our growers will not be able to catch up with for years. This demand is stimulating the production of all kinds of nuts, but most of all the pecan, which is undoubtedly the finest, most nutritious and most delicious of all nuts. The pecan being a native of the Southern United States, is to us a natural monopoly. The world must get her supplies of pecans from us, and as yet we do not begin to supply the local demands, to say nothing of producing any for export. In the pecan trees of the South and the soils capable of growing them we have a natural resource with possibilities for golden development, yet one of which our people have scarcely yet become conscious. The cotton planter with the boll weevil hanging over him like the sword of Damocles temporizes from year to year with a crop that adds no increased value to his land, when he could raise pecans at less per pound than cotton, sell them at double and triple and add a permanent increment to his farm. The pecan tree is not attacked by the dreaded boll weevil, and the planter who is turning his cotton patch into a pecan orchard has nothing to fear from its depredations.

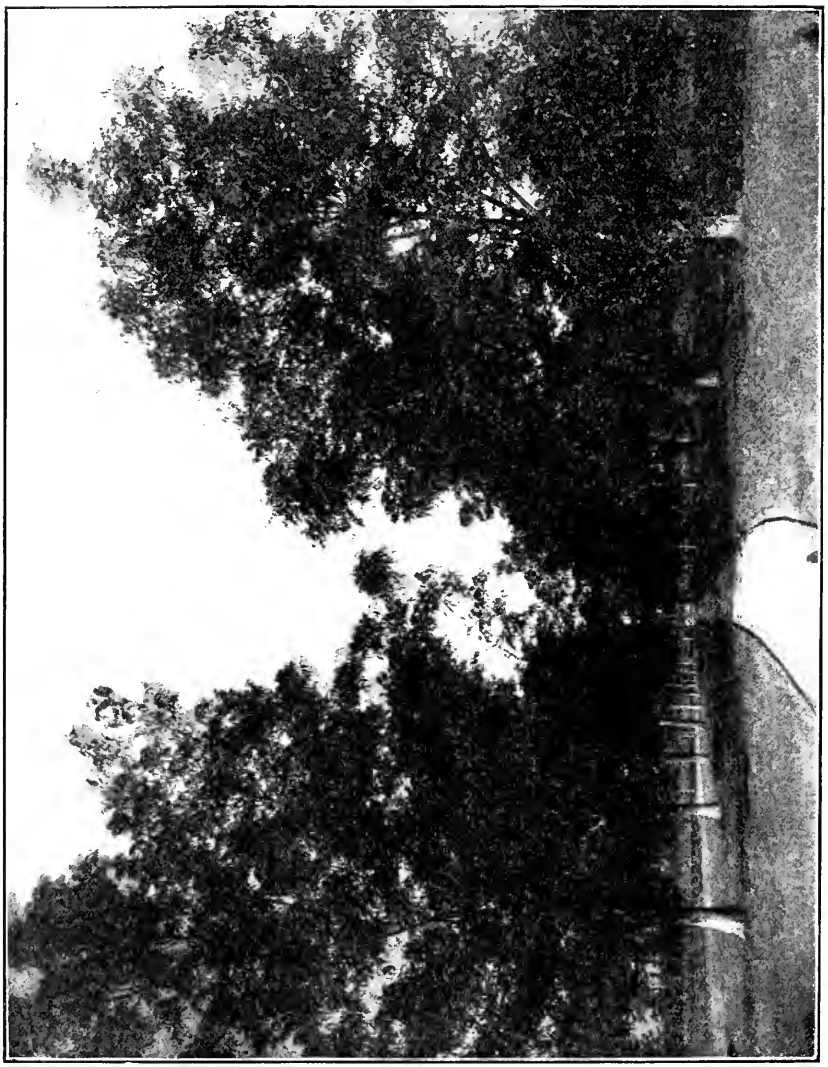

FIG. 1.—Pecan Grove of Dr. J. B. Curtis, Orange Heights, Florida.
(Photo by H. H. Hume.)

A pecan orchard under proper conditions and given good care is a safe and profitable investment. It is one of an enduring nature that can be handed down from father to son. It yields a product for which there is an unlimited demand with no prospect of an overproduction. Nut growing is a pleasant as well as a profitable business. It gives large returns from a small investment of money and patience. It gives a product of large value in small bulk. The yield of a pecan orchard needs no expensive harvesting, fancy packages or cold storage.

I once visited the home of a commercial pecan grower when he was in the height of his shipping season. He sat on his piazza comfortably ensconced in a rocking chair. This was in striking contrast to the perspiring exertions of his neighbors who were in a frenzy of haste picking, wrapping and packing perishable fruit for the early train. At his convenience the pecan grower sent his darky to the depot with a single barrel of pecans. They were packed in a second-hand sugar barrel that cost 10 cents. The barrel of nuts was not consigned to any commission man to take its chances in the open market, but was sold on order, a check for $45 already having been received for it. A consignment of perishable fruit of similar value would have cost much more in picking, packing, boxes, hauling, icing, commissions, etc., with the not improbable prospect of a notice for remittance to cover express charges.

The pecan business is a bona fide, substantial business in spite of the wild-cat schemes and bogus companies that have been foisted upon it by unprincipled speculators. Counterfeit money is a proof that there is good sterling coin. Every landowner who is fortunate enough to live in the pecan region of the Sunny South should plant pecan trees. He should plant them about his lawn for ornament, about his dooryard for shade, and about his buildings for the small boys. There is no more beautiful tree than the pecan and none more beloved by the children. Is there a single country home in the pecan belt that can afford to be without them? If the unsightly Oderhoet mulberries, the ragged elms and the sickly maples that encumber farmyards in the South would give place to the beautiful and productive pecan tree it would add millions to farm values.

Besides the home plantings of pecans for shade and family uses there are excellent opportunities in the South of enhancing farm values by the utilization of much waste land that is now producing nothing but 'possum persimmons, sassafras and briers. Such plantings would not even encroach on land now used in other crops. There is more or less of such waste land on every Southern farm that could be profitably cultivated in pecan trees. Some of the richest and most productive lands in the South are those lying within the overflow regions of rivers. There is a great deal of such land in Eastern North Carolina that is periodically enriched with a layer

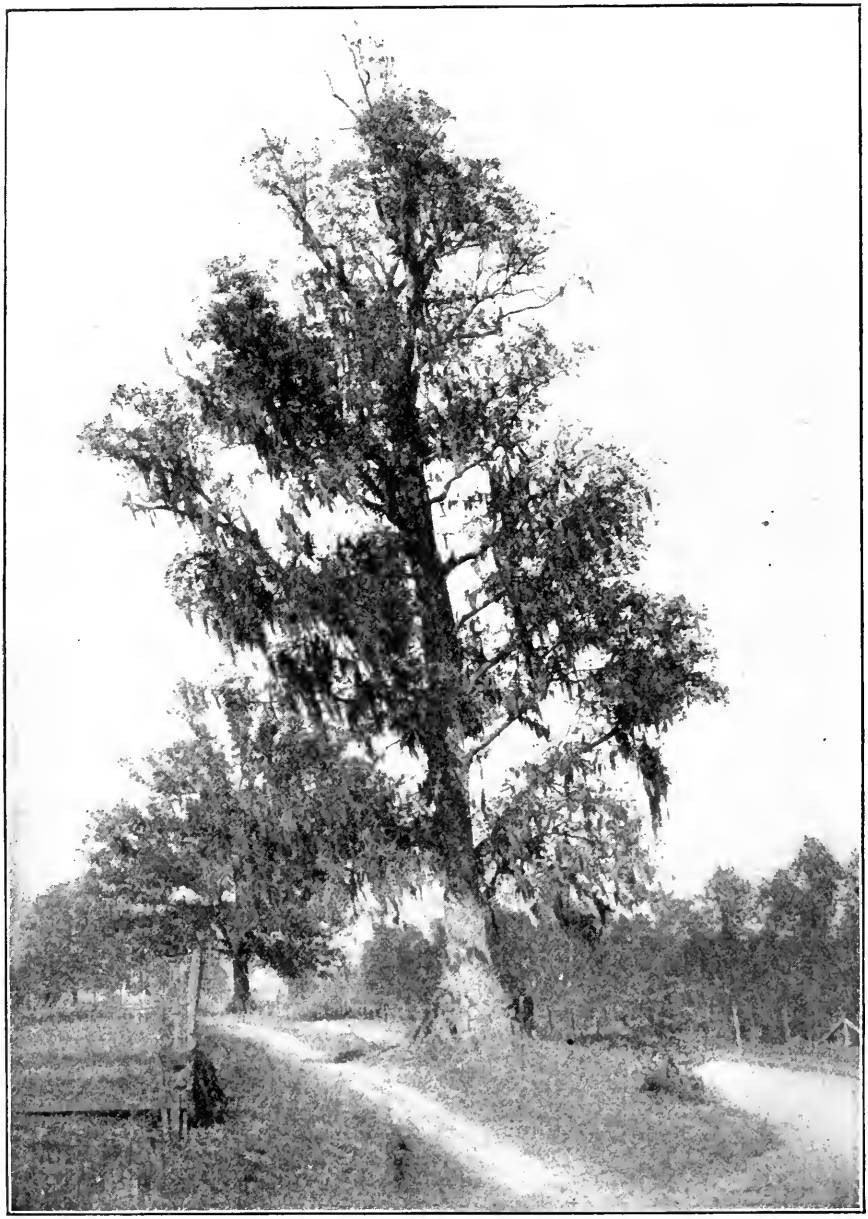

FIG. 2.—Veteran Pecan Trees at Mound, Louisiana, 107 Feet High, Trunk 19 Feet in Circumference.

of alluvial mud. These lands could produce the finest crops of corn and cotton, but the rivers so often claim the crop that their cultivation has been abandoned. Such lands would raise the finest pecan orchards, for they are benefited rather than injured by the overflow. There are thousands of acres of such lands in Eastern North Carolina, now worth nothing, that if planted in budded pecan trees would soon become the most valuable lands in the State.

The following from *The Rural New Yorker* gives the experience of Mr. S. H. James, the veteran pecan grower of Louisiana. Mr. James was the first to plant a commercial pecan grove:

In 1907 we had an overflow from the Mississippi River which covered our plantation for seven whole weeks. It came while the pecan grove was in full leaf. In some portions of the grove the water stood 10 feet deep. What were the results? Only one tree out of more than a thousand died. It seemed to do the others good. Had they been any other kind of fruit or nut trees, with the exception of figs, nearly all would have died. The first Sunday in May last year (1907) there visited this community the worst storm or cyclone of hail and wind ever known in the State of Louisiana. Corn was two feet high in the fields and cotton was chopped to a stand. After the storm was over not a vestige of corn nor cotton, nor any living thing could be found in the fields. The hail came so hard and fast that it unroofed houses, killed all the smaller animals, and the wind blew down oaks and cedars in great abundance and left havoc and destruction on every side. What was the effect on the pecan grove? Every leaf and nut was knocked off the trees (they had been in full leaf for two months), but only two trees were totally destroyed; and now, just one year afterwards, as I look out upon the grove, I can scarcely see any evil effects from the storm.

Fig. 8 shows a thriving pecan orchard in time of overflow.

THE PECAN REGION.

The pecan tree is not a native of North Carolina, though, like many other introduced species, it shows itself to be very much at home in the eastern part of our State. It is a native of the Southern Mississippi Valley, just across the Blue Ridge Mountains from us. In geographical distribution the pecan seems to thrive wherever cotton does. More recent observation and experience show that the pecan is more hardy than cotton and thrives considerably north of what is commonly considered the cotton country. The pecan is found growing wild in Iowa and Illinois, and recent reports have been made of large trees found growing along the Wabash River as far north as Vincennes, Indiana. Last year, at the meeting of the National Nut Growers' Association, a fine collection of native nuts was exhibited from this region. In Virginia pecan trees are found growing all over the coastal region. Many large trees are to be seen that give evidence of having been there close to a century. In Virginia two seedling trees have been found of such exceptional merit that they are being extensively propagated as named varieties. These are the varieties Mantura and Appomattox. With such northern-grown varieties it is probable that the northern limit of pecan production

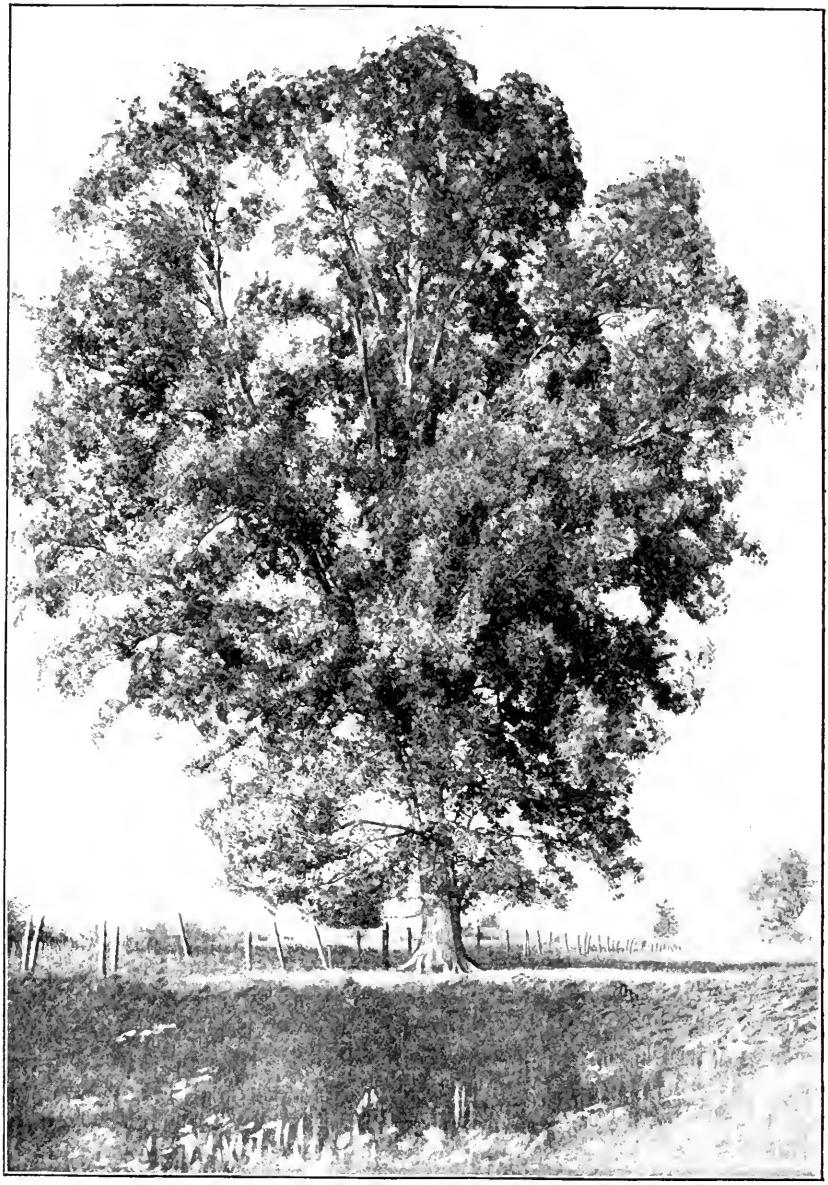

FIG. 3.—Pecan Tree at Mound, Louisiana, 125 Feet High, Trunk at Shoulder Height 14 Feet in Circumference.

will be greatly extended. On the Eastern Shore of Maryland many pecan trees are found growing which have been produced from planted nuts. Some of these are of enormous size and produce small though well-formed nuts. The southern limit of the geographical distribution of the pecan tree is not definitely fixed, though it is known to extend into Mexico. In Texas the pecan grows wild in great profusion, especially along the river bottoms of the numerous water courses flowing into the Gulf of Mexico. It is in this region that the great bulk of commercial pecans are produced. In the deep alluvial soils of Louisiana the pecan grows wild in the forest and is one of the largest and finest timber trees. From the Mississippi Valley trees and nuts have been carried to the east and the pecan has become naturalized throughout Georgia, Florida, Alabama and the Carolinas.

PECAN SOILS.

In the matter of soils the pecan is almost as cosmopolitan as the strawberry. It is found growing and thriving on almost every type of soil in the South. In its native habitat, in the Mississippi Valley, it is found on deep, rich alluvial soils. It is on such soils that it makes its greatest growth. Fig. 2 shows veteran pecan trees at Mound, Louisiana. These trees measured 107 feet high and 19 feet in circumference shoulder high. They are still in vigorous condition, although they are considerably over a century old. Fig. 3 shows another veteran pecan tree at this place which is 125 feet high and has a trunk measurement of 14 feet. The tree is as vigorous as a ten-year-old. In black alluvial soil at Jeanerette, Louisiana, there is a pecan tree that has grown up in the open which measures 16 feet around the trunk shoulder high. The branches of this tree have a spread of 110 feet. This tree bears immense quantities of small or pewee nuts. In the forests of Louisiana along the Mississippi River pecan trees are the largest timber trees. In rich alluvial soil the trees grow to be of large size, but are usually long coming into bearing. The tree in Fig. 4 was planted by S. H. James, of Mound, Louisiana, in February, 1878. The photograph shows the tree in its thirtieth year. It is 10½ feet in circumference at 15 inches above the ground and is 84 feet high. This tree was not especially precocious, but after coming into bearing has borne very large crops. In 1907 the crop of this tree was 400 pounds of nuts, which sold for $80. The same year a tree in the yard of Capt. B. P. Williamson, at Raleigh, bore 400 pounds of nuts, which sold for $100.

Probably an additional reason why the pecan tree grows to such great size and is so productive in alluvial soils is that it finds there an abundance of moisture. Soils of an alluvial nature, which have been deposited by the agency of water, are very apt to hold con-

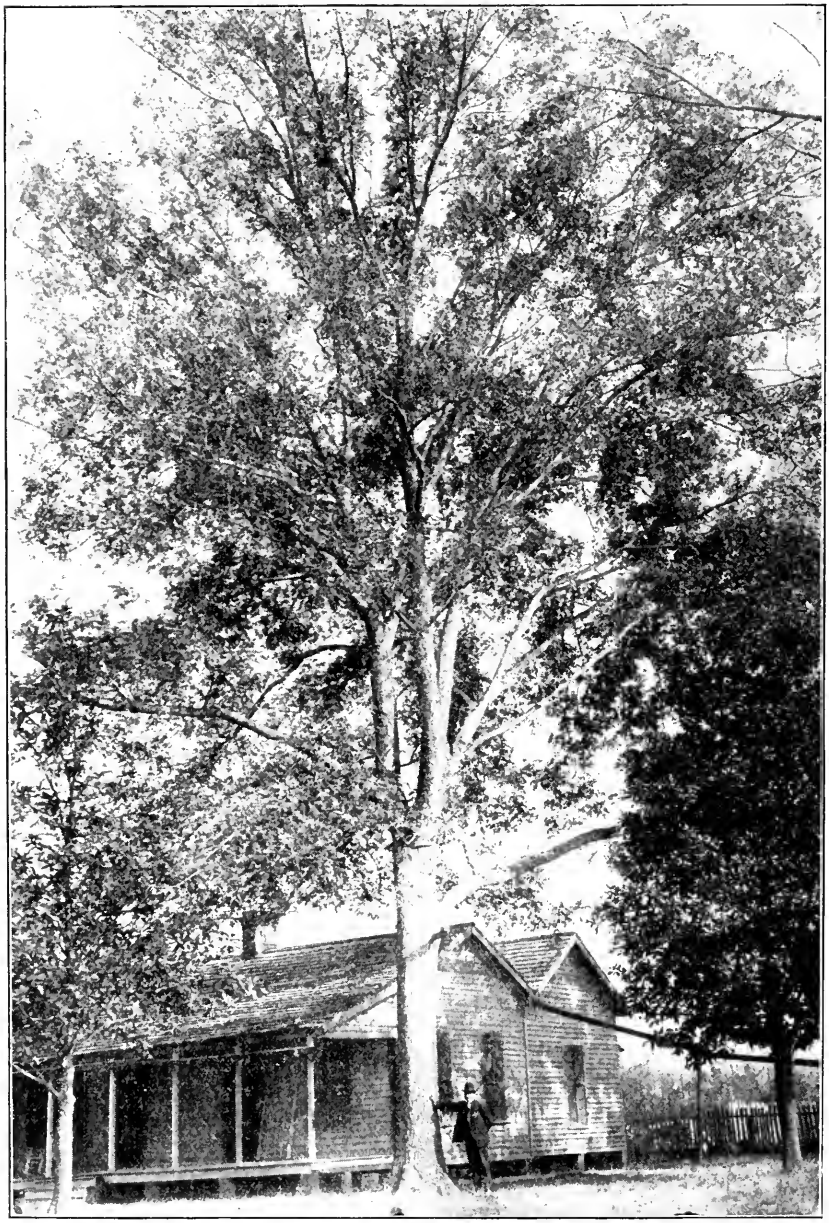

FIG. 4.—Pecan Tree Planted at Mound, Louisiana, by Mr. S. H. James Thirty Years Ago. Tree now 84 Feet High and 10½ Feet in Circumference at 15 Inches from the Ground.

siderable ground water. As the pecan tree in its natural distribution follows the alluvial river land, it is evident that it is a lover of water. While this is true, it is also true that the tree cannot be considered in any sense of the word an aquatic. It will not grow on marshy lands nor on sour, water-logged soils. If one tries to plant pecan trees on low, ill-drained lands he is sure to be utterly disappointed. The river lands on which pecans are found naturally are not the low, sobby land, but rather the second bottoms where the drainage is good, with the permanent water table somewhere in the region of ten feet below the surface. In times of flood these lands may be deeply but temporarily inundated. When in a few days or weeks the water assumes its normal level, these lands will be above watermark and be naturally well drained. Willow soils would be death to pecan trees.

While the pecan is native to alluvial soils, it is found by trial that it will do well on loam soils, on light sandy soils, also on clay soils. It seems to be much more particular about its subsoil requirements than it is of the surface soil. This is doubtless on account of its enormous development of taproot. On one or two year old seedlings the taproot is longer than the entire top of the tree. If the subsoil is hard and impervious it is impossible for the taproot to get down to water, and without this it seems impossible to grow pecan trees. On the loosest sandy soils pecan trees can be made to do well if the subsoil conditions are right, while on rich, fertile loams the tree will not do well if there is a hardpan close to the surface. Some of the most precocious and productive pecan trees are found on light, sandy land where subsoil and drainage conditions are suitable. Many large and productive pecan trees are found on red clay soil. It is evident from this that more depends on subsoil and drainage conditions than on the nature of the surface soil.

COST OF PECAN TREES.

Prospective planters of nut orchards are often shocked by the high prices asked for pecan trees. They are quoted in nursery catalogues at from 50 cents to $2 per tree, according to size. This is so much in excess of the prices of peaches, apples and other nursery trees that it would appear to the uninitiated that pecan nurseries charge exorbitant prices. These prices for budded and grafted pecan trees are only commensurate with the high cost and trouble of producing the trees. There is scarcely any other kind of nursery stock that is more difficult or expensive to produce. In the first place, pecan nuts cost much more per pound than peach, pear or apple seeds, and produce many less trees per pound of seed planted. After planting pecan nuts they are much preyed upon by field rodents and it is difficult to get a full stand. The seedlings sprout and grow slowly and cannot be budded or grafted at all the first year. The

ordinary nursery methods of propagating the apple and peach fail almost entirely with pecans. Special and difficult methods of budding and grafting must be employed, and our best-known methods of propagating pecan trees give, under favorable conditions, only about 50 per cent of living buds. Pecan bud-wood is also much more expensive than that of standard varieties of fruit trees. There is a remarkable variation in the growth of the little seedling trees in the nursery rows. Some of the trees grow off all right, but often a very large percentage of them are "runts" and will not make good trees if given the most favorable conditions for years. Fig. 5 illustrates a row of

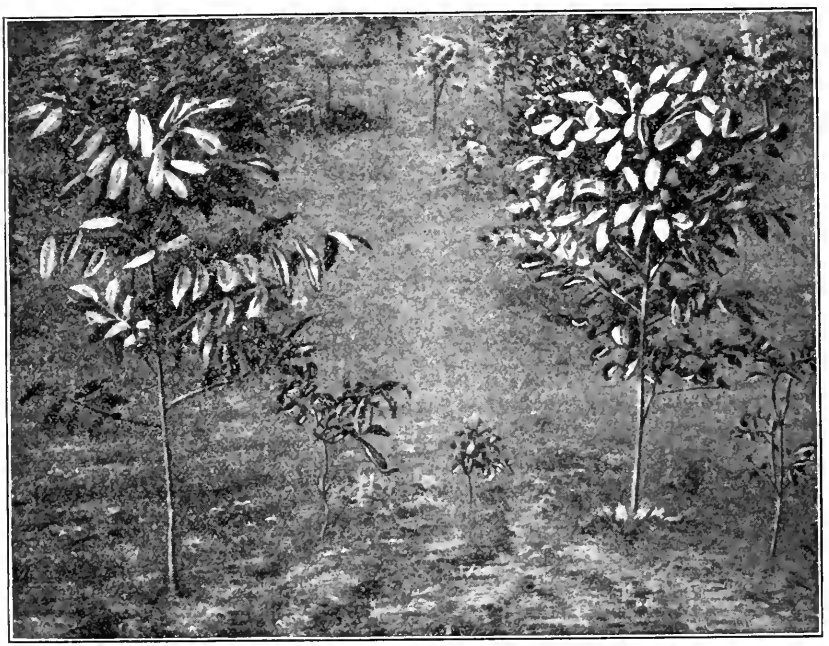

FIG. 5.—Pecan Seedlings in Nursery Row, Showing Great Variation in Vigor.
(Photo by H. H. Hume, Glen Saint Mary, Florida.)

nursery stock showing the great variation in the seedlings. With reputable nurserymen the small "runty" trees are destroyed, for they are lacking in vigor and will never amount to anything. Fig. 6 shows one of such trees that is 16 years old and has not made 5 feet of growth. This culling out of the seedlings which are lacking in vigor is of course a considerable loss to the nurserymen and must necessarily increase the price of the remaining trees. Unfortunately, all nurserymen are not as scrupulous as they should be, and while an honest propagator would put the stunted trees on the brush-pile, another uses them to fill orders for smaller sizes of trees. The planter

who is looking for cheap pecan trees is very likely to get these "runty" trees, and if he does so he will find them by long odds the most expensive trees he ever purchased in his life. They may cumber his ground for a decade or so, but they will never give him a crop. An intending planter should fear cheap pecan trees as he would a pestilence. It takes three and four years under the most favorable nursery conditions to produce a good grafted or budded pecan tree. On account of their enormous taproots pecan trees cannot be dug by machinery and handled in the wholesale way in which peaches and apples are treated in most nurseries. Each tree must be dug separately and by hand, and especial care must be taken not to injure the taproot. The foregoing explanation will make it plain why budded and grafted pecans cannot be handled at the same price as other nursery stock.

FIG. 6.—Pecan Tree Sixteen Years Old, Showing Lack of Cultivation.

The necessarily high price that must be paid for good pecan trees should not deter the intelligent planter. Pecan trees should be set in the orchard double the distance at which other trees should be set. Forty feet apart on the square is the least distance at which pecan trees should be set, and this should be done with the idea of cutting out every other tree when the trees begin to crowd. At this rate there would be 28 trees per acre at the start and 14 trees after the fillers were cut out. It is generally conceded that most planters in the South farm or try to farm too much land. A few acres more or less is neither here nor there to them, so they do not need to crowd their trees. My experience and observation has led me to decide that

60 feet apart is the proper distance for setting pecan trees. The pecan tree is a very long-lived, large-growing tree, and one should always consider what land a tree will require when it comes to its greatest growth and productiveness. Many well set and tended orchards have failed to give their best production because at the very time when they should be giving their greatest returns they found themselves starved for root and leaf space on account of too close planting. At 60 feet apart it would require but 12 trees per acre. At even $2 per tree the cost of setting a pecan orchard would scarcely exceed the cost of setting an orchard of peaches or apples.

HOW TO GET A PECAN GROVE.

On account of the wide distances at which the trees are set a pecan orchard is less expensive than orchards of other trees, because the nut trees take practically no room for a few years and the ordinary cultivated crops can be grown as usual. The pecans will not use much of the land until they are able to pay for its use. It is on account of this use of the land for maintenance crops that a planter in the South can get a very profitable orchard cheaper than in any part of the country.

FIG. 7.—Pecan Orchard at Norfleet, Halifax County, N. C., Grown in a Cotton Field.

The orchard shown in Fig. 7, at Norfleet, Halifax County, N. C., belonging to Judge Walter Clark, of Raleigh, was grown in a cotton field. The land has not missed a single crop in the fifteen years since the trees were set. They are 60 feet apart and cotton is now successfully grown on the land, except immediately under the shade of the limbs of the trees.

HOW TO PLANT PECAN TREES.

The roots of nearly all nut-bearing trees are characterized by very large taproots. Those of pecan trees are simply enormous. I know of no other tree whose taproot development anywhere compares with that of the pecan tree. From the very germination of the nut the primary root of the little seedling grows into the soil with a determination that would lead one to think it intended to clinch at the antipodes. During the first season the root will penetrate the soil to four or five times the depth that the leader pushes up above ground. Fig. 9 shows the typical root system of three little pecan trees. Like the groundhog, the roots go directly down until they reach water. During the early history of the pecan business it was thought that owing to their prodigious taproots, it was impossible to transplant pecan trees and that the only way to get them was to plant nuts in the places where trees were desired. Later experience has entirely disproved this and it is found entirely practicable to transplant them, but of course greater care must be used in digging and setting than with other trees. It used to be thought, too, that if the taproot of the pecan was broken or cut, the tree would not produce nuts. This also has been found to be erroneous. With proper care they can be transplanted successfully like other orchard trees.

PLANT PECANS IN THE COTTON FIELD.

The best place for setting out pecan trees is in cultivated lands. Indeed, it is practically a waste of time and money to plant them in any other than in cultivated ground. I have yet to see a pecan grove set in untilled or sod land that amounted to anything. The trees can be set successfully in the rows of any cultivated crop, with the possible exception of corn, unless with the latter crop a sufficient space is given about each tree. Cotton is an ideal nurse crop for a pecan orchard, and I know of no one who can so readily and cheaply get a good pecan orchard as a cotton farmer. The trees can be set in the rows and the cultivation and fertilizer given the cotton crop will be exactly what the trees need to start them in life. There is only one drawback to the cotton-field pecan tree, and that is "the nigger and the mule." Mr. J. B. Wight, president of the National Nut Growers' Association, says: "The negro who can plow among pecan trees and never skin one has not yet been born." On our State Test Farms we have found that injuries from "the nigger and the mule" can be safely avoided by driving in four stakes about each tree and nailing to these a few slats. Fig. 10 shows one of these tree protectors in use. Land used for truck crops such as melons, canta-

FIG. 8.—Pecan Orchard in Time of Overflow.
(Photo by C. A. Reed, Department of Agriculture, Washington, D. C.)

loupes, tomatoes, sweet or Irish potatoes, snaps, etc., or peanuts would be as good or better for pecan growing, and the middles could be cropped successfully until the pecan trees needed all the land. As soon as they did need it all they would be paying a revenue for it that would far surpass the profits from the annual crops. By this gradual transition from cotton, truck or peanut crops to the pecan orchard it is possible to change a precarious annual crop into a permanent paying investment without the loss of the land for a single season.

In setting pecan trees, cut back the taproots to about 2 or 2½ feet in length. This can easily be done, for, though large, the roots of pecan trees are almost as soft as a turnip. The mark on the root in Fig. 11 shows where the taproot should be cut in transplanting. At the same time shorten back the side roots and with a clean, smooth cut remove all broken, torn or dried roots. Even after this shortening back, deeper holes will be necessary than for other orchard trees. As the lateral roots are slight, wide holes are not necessary unless the soil is very firm. One of the handiest tools I have found for making holes for pecan trees is a post-hole digger. The trees should be set in the holes not deeper than they stood in the nursery. Fill in the hole with surface soil, being careful to ram it in tightly so as to leave no crevices or air holes. If water rises in the hole when you are planting the tree you can make up your mind that the land is too wet for pecan trees, and unless the water table is lowered the planting will be in vain. Unless with large trees it will not be necessary to cut back the tops at planting time. I have found by experience that it pays better to set 3 foot to 4 foot trees rather than the larger 5 foot to 7 foot trees—provided, of course, that the trees are smaller by reason of youth and not because they are the "runts" from older stock. The younger trees, if they are vigorous, will give a greater number of living trees than the larger nursery grades. They also cost less, and I find that on the average they do better in the end.

A planter who has not had experience with pecan trees will almost invariably be disappointed with his first planting. They do not all start off evenly and make a uniform orchard like peaches, apples and pears. All pecan trees are notably slow in starting after transplanting. When established trees are leafing out the transplanted ones will not show a sign of budding. Some of the trees will start out later and make a vigorous growth, others will pass through the summer and even on to fall before leafing out. Still others will go right over into the next season without pushing a single bud, even though the inner bark may be fresh and green all the while. These latter almost invariably die the second season.

TIME FOR TRANSPLANTING PECAN TREES.

I have found that the best season for setting pecan trees is in the fall. They can be shipped from the nursery and set in the orchard just as soon as the leaves have fallen, showing that the buds are

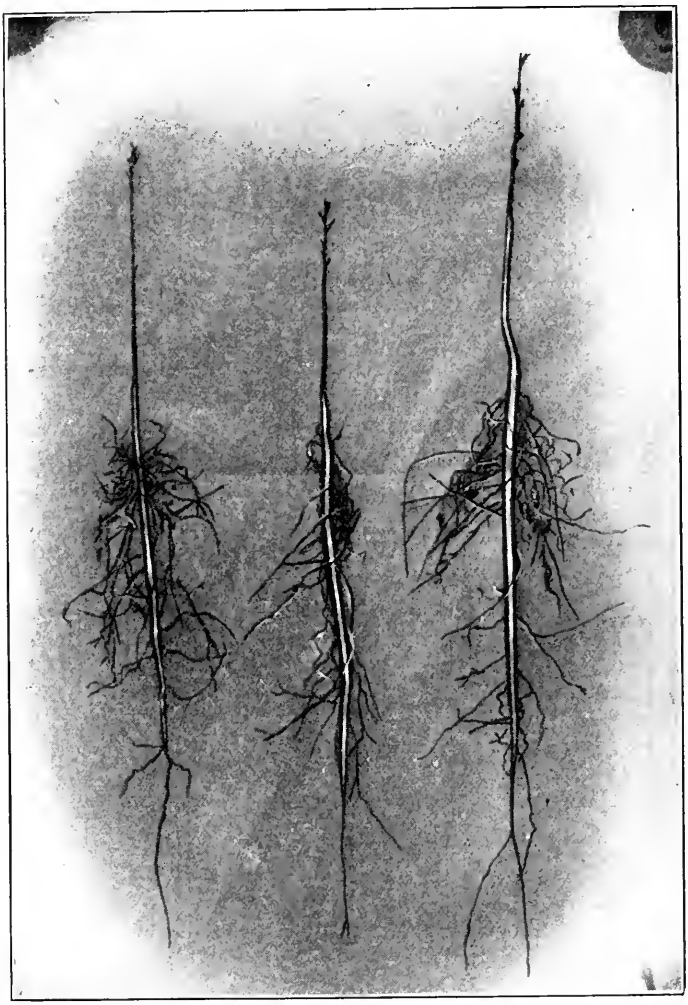

FIG. 9.—Seedling Pecan Trees, Showing Characteristic Root Systems.
(*Photo by H. H. Hume, Glen Saint Mary, Florida.*)

mature. Starting with this season, pecan trees can be set anywhere in the pecan area at any time during the winter up to budding-out time in spring. Records on the growth of the trees at our different

Test Farms have proved conclusively that the fall and early winter plantings give more living trees and better growth than those set at any other time. Since transplanted pecan trees are very tardy in budding out, those set late hardly get started into growth before the fall and winter overtakes them. The fall-set trees form calluses in the mild spells in winter and spring and are thus able to make an earlier and more substantial growth. There will be many less blanks to fill after fall transplanting.

SUMMER TREATMENT OF TRANSPLANTED TREES.

As soon as preparation and cultivation begin for the cultivated crops between the trees they should have the ground loosened about them to retain moisture. This can be done incidentally in the tillage of the maintenance crop. In this way the trees will receive numerous cultivations throughout the season. The ground should never be allowed to harden and bake about them any more than about the plants of the crop between the trees. During the summer no pruning at all should be done. The trees should be encouraged to make all the leaves they will, no matter what their position on top or trunk. The more leaf development we can get, the greater the root growth and the sooner the tree becomes established. After a vigorous root system is developed it is an easy matter to get the top into proper form, for the leaders then shoot up very rapidly. From observing the growth of our large variety collections on the State Test Farms I find that pecan trees require very little pruning and shaping. Like hickories, they have a fine, erect habit of growth, with just enough branching and spread to give fine shade and at the same time expose their developing fruits to the maximum of air and sunshine. It is very seldom under conditions of nature that we find a pecan tree whose form would have been improved by pruning. Fig. 3, 4, 24 and 25 amply illustrate this point.

PECAN FERTILIZERS.

The planter can easily tell from the amount of annual growth whether or not his trees are making the increase in size that they should. The yield of the maintenance crops between the tree rows will also be a good indicator. If plenty of fertilizers are applied and good truck crops raised, the question of fertilizing the trees will not need to be considered. If on the other hand the soil is poor it will be necessary to make a fertilizer application especially for the trees. In any case they should not be allowed to starve and become stunted. My observations lead me to believe that a pecan tree does very little in the way of fruiting until it gets to a considerable size. Small, runty trees do not fruit, no matter what their age. We can hasten the fruiting time by pushing the tree up

rapidly in size. Fig. 6 shows a pecan tree 16 years old and only 4½ feet high that has been dwarfed by neglect. Such trees are the most ruinous crops that ever encumbered the ground.

FIG. 10.—Young Pecan in Tree Protector.

Growing trees require liberal amounts of nitrogen. This can usually be most cheaply added to the soil in the form of a leguminous cover crop. Whenever the maintenance crops are not occupying the ground between the trees it should be busy in the production of a crop of cowpeas, vetch, clover or other legumes which will enrich the

soil with humus and nitrogen. Pecan trees on ground handled in this way will be found to be making rapid growth. It is often wise, however, to supplement this with dressings about the trees of slowly available forms of nitrogen, such as bone meal and tankage. Where

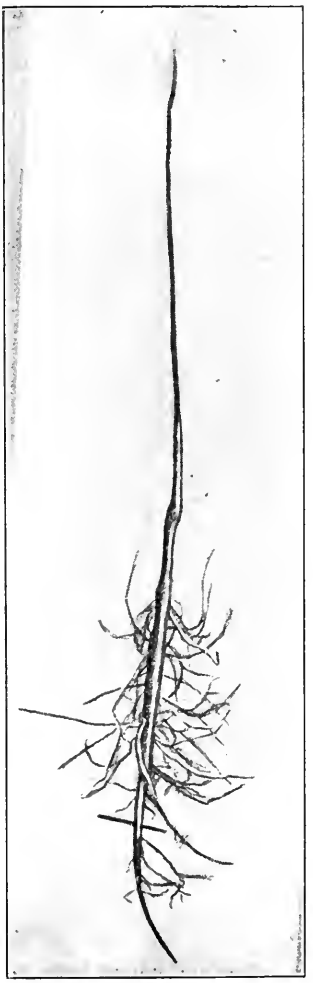

FIG. 11.—The Cross Line Shows Where the Taproot Should be Cut for Transplanting.

these special fertilizers are not readily obtainable, any good general fertilizer will be found advantageous. It goes without saying that there is no better fertilizer for pecan trees than stable manure. The only trouble is we have too little of it.

In planting young trees I do not make a practice of putting fertilizers in the holes, but when the trees become established they can safely have two pounds of mixed fertilizer worked into the surface soil. The fertilizer should not be placed close to the trunk of the tree. The amount of fertilizer can be increased as the necessities of growth seem to require. When the trees become of bearing size they should have less of nitrogen in the fertilizer and more phosphoric acid and potash. The latter ingredients are especially

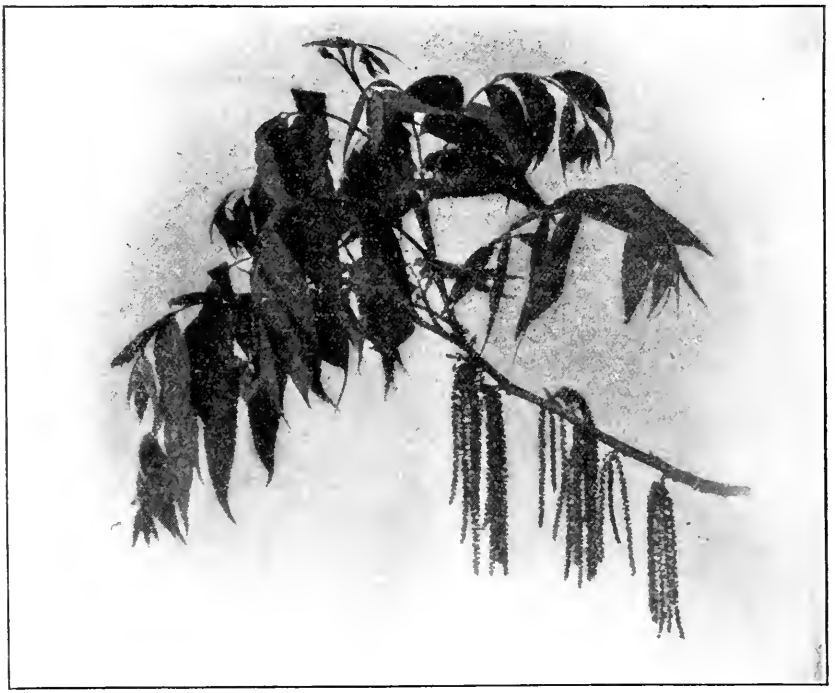

FIG. 12.—Branch Showing Staminate Flowers.
(Photo by S. B. Shaw.)

fruit manures and tend to encourage nut production. Where cover crops are used, a good dressing for trees of bearing size is 5 pounds of kainit and 5 pounds of acid phosphate per tree. It is thought by some that it is not necessary to cultivate mature trees, but all growers will agree that for growing trees tillage is imperative.

PECAN BLOOM.

In common with many nut-bearing trees, the pecan tree has flowers that differ considerably from the flowers we see most commonly about us. Unless one's attention were called to it, he might never think that the pecan tree bloomed at all, for its flowers are not of the

bright-colored kind that attract bees, butterflies and other beauty lovers. They are, on the other hand, of the inconspicuous type that depend on the wind for fertilization and do not attract insects for the work of pollen bearing. Most common flowers are perfect and have in the one flower all the essential organs for fertilization. An apple blossom is a good example of this type of flower. Pecan blossoms are not perfect, but belong to that peculiar class of inflorescence

FIG. 13.—Branch Showing Pistillate Flowers, Which Later Become Nuts.
(*Photo by S. B. Shaw.*)

known to botanists as *monoecious;* that is, having the male and female organs in different flowers on the same tree. The staminate or male flowers are in the form of long tassel-like catkins. These appear along the sides of the twigs of last year's growth and push out in spring, before the pistillate or female blossoms are evident. See Fig. 12. This fact gives rise to the popular but erroneous impression that pecan trees bloom twice a year. The pistillate or female blossoms are on the end of the fresh, new growth of the present season.

They are very minute at first, but if examined carefully the form of each little nut can be seen, crowned with its short, sticky, plume-like stigma. See Fig. 13.

FERTILE AND STERILE BLOOM.

After a most extended study of biology, the great Darwin crystallized one of his most erudite observations on nature into the following words: "Nature abhors self-fertilization." Nowhere is the truth of this statement more evident than in the vegetable world. Nature does abhor self-fertilization, and she takes means to prevent it. The monoecious inflorescence of the pecan tree is an evidence of this fact. By the placing of the stamens and pistils in separate flowers on different parts of the tree instead of in the same flower, it is evident that nature intended pecan blooms to be cross and not self fertilized. It is well known that cross-fertilization almost invariably produces more vigorous offspring than self-fertilization. To further avoid self-fertilization, sometimes the stamens ripen and shed their pollen before the pistils are sufficiently developed to be pollinated. This is common throughout the plant world and is known to botanists as *proterandry*. The phenomenon is well illustrated in the sunflower and other compositous plants. Sometimes the pistils in plants ripen and are fertilized by outside pollen before their own anthers are developed. This is known as *proterogyny*. It has been shown by Dr. Trelease, of Shaw's Garden, St. Louis, that there is evidence of proterandry in certain varieties of pecans. It is probable, too, that with some varieties the other condition may be present. The industry is yet too young and large variety collections of pecans too scarce to make it possible to have all these points verified. The next decade or so of pecan growing will doubtless clear up many of these obscure points. We have, however, sufficient data to know that it is not wise to plant single varieties of pecan trees in solid orchard blocks. There is a much better chance for perfect pollination when they are planted in alternate rows, as well as surer prospects of a crop.

In spite of the staminate catkins appearing first, they do not usually mature until the pistillate flowers are ready for pollination. The pendulous staminate catkins switch about in the wind and fill the air with their copious, dust-like pollen, and the sticky stigmas of the pistillate flowers hold it as it comes in contact with them. The pollen from one pecan tree centrally situated may be carried by the wind so as to fertilize the blossoms of many trees about it.

There is still another vegetable phenomenon which may be present in pecan trees; that is the inability of the pollen of a tree to fertilize its own pistils. This is quite common with apples and other fruits. This same pollen, though perfectly sterile with its own blossoms, may

be very fertile with the flowers of other trees, and *vice versa*. Some of our choicest varieties of fruit are almost completely sterile when placed alone or in solid orchard blocks of their own variety, while they are heavy producers in mixed-variety plantations. It is very probably true that this same phenomenon will account for the barrenness of some pecan trees. It has been pointed out by Professor Hume, in his admirable work on "The Pecan and Its Culture," that since the male catkins are naked and exposed during their development, they are more liable to be frosted than the pistillate blooms which come out later in a protecting cluster of leaves. This accounts in a large measure for the nonsetting of fruit in high altitudes and on the northern boundaries of the pecan area. In a mixed plantation it might be possible for a variety on which the stamens had been frosted to produce fruit by being fertilized by later blooming varieties. When the characteristics of pecan varieties have been fully worked out, as they have been with our more domesticated fruits, it is very probable that the undesirable reputation which the pecan now possesses for unfruitfulness and late and shy bearing will in part be dissipated.

PECANS WILL NOT "COME TRUE."

In the early days of pecan growing the only way to get trees was by planting nuts. At that time no grafted and budded trees were obtainable. The common practice was to obtain and plant nuts that came from some tree that produced large, thin-shelled nuts. It was naturally to be expected that large, thin-shelled nuts would produce trees bearing the same kind or at least similar nuts. This was where the rub came in, for after waiting patiently for a decade or score of years it was generally found that the much-hoped-for tree bore small, bitter nuts. Such disheartening experiences have forever disgusted many people with pecan growing. The pecan will not "come true" from seed; but neither will the apple, peach or pear or any other of our fruits. Why should any more be expected of the pecan tree?

Let us look into the reason of the "not coming true" of our fruits, nuts and other plants. All seeds, whether nuts or otherwise, are the product of breeding. Breeding is the reproductive union of two individuals—one a male, the other a female. If these parent individuals are very much alike, the seeds produced by the daughter plant will resemble those produced by the mother. If the parents are very unlike, the seeds produced by the daughter plant will have every reason to be dissimilar to the parents. The large, thin-shelled nut that was planted with such hope was very probably fertilized with the pollen from a bitter-nut tree (*Hicoria aquatica*), which is a first cousin of the pecan (*Hicoria pecan*). The bitter nuts and the pecans cross very readily and give a race of seedlings producing

nuts with a mixture of the characteristics of the pecan and the bitter nut. The hickories are also cousins of the pecan tree and cross with it, giving rise to a race of trees producing the nuts called hicans. The nuts from isolated pecan trees, producing large nuts, would be more likely to come true, because they would more possibly be fertilized with their own pollen. Even in this case they might by the law of atavism revert to some remote ancestor that bore very small, thick-shelled nuts. Bitter experience from nut plantings in every part of the country show that there is little to be expected from pecan trees produced from selected nuts. The only way to have the pecan come true would be to have it systematically "rogued," as is done in the annual generations of our garden vegetables. A short,

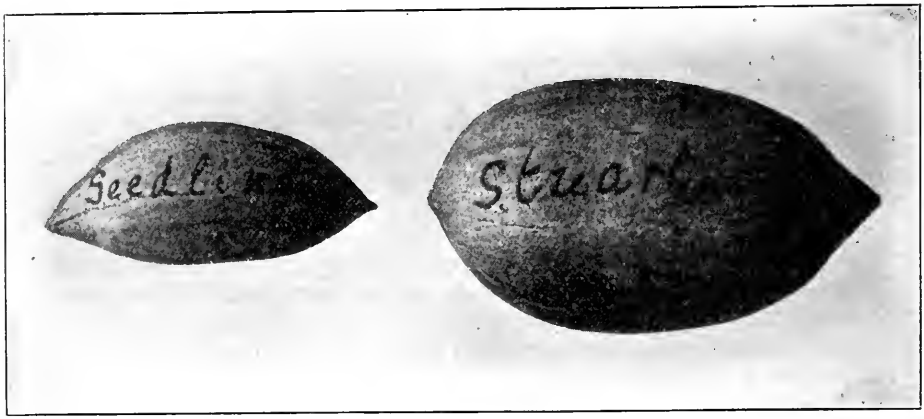

FIG. 14.—Life-size Illustration of Seedling Pecan and a Nut of the Stuart Variety. (*Photo by S. B. Shaw.*)

smooth, red carrot will come true from seed, because all individuals have been "rogued" out of the planting, except those that are short, smooth and red. It would take a Methuselah, however, to "rogue" the pecan sufficiently to come true. It is fortunate, though, that plants will not come true, for then we would be unable to get new varieties by plant breeding. For commercial purposes we have a much quicker and surer way, by grafting and budding, that will with unerring accuracy give us thousands of individuals which have the characteristics we desire.

SEEDLINGS VS. NAMED VARIETIES.

"What's in a name?" Everything, when it comes to pecans. The name which distinguishes a variety of pecan from a seedling is the same as the breed name that distinguishes a high-class type of cattle from the "scrub." The name stands for known characteristics; the seedling stands for nothing. The named variety was originally a

seedling, but it was a seedling with such high individual merit that it was desirable to have thousands and thousands like it. Fortunately we have in horticulture the practices of budding and grafting which reproduce unerringly every characteristic of the parent plant. No! not parent plant, but the same plant, for budding and grafting are merely horticultural long division, for they make new individuals, *ad infinitum,* by simply dividing the original one. The trees, therefore, of named varieties are identical with the trees from which the buds were taken, and never can be anything else. An orchard planted with budded or grafted Stuart trees will all have the same habit of growth, texture of foliage, shape, size and color of nut, with the same full, meaty, fine-flavored kernel. In commercial orcharding this insures a uniformity of ripening, a uniformity of product and a certainty of results. In planting nuts or seedling trees there will be as many varieties as there are trees, for no two individuals are exactly alike. The planter who has 100 seedling pecan trees will have exactly 100 different varieties. The nuts will be of every different size, shape, color and quality. A uniform grade of nuts from a seedling orchard is therefore impossible.

There is as much difference between ordinary seedling pecans and the named varieties as between the luscious Crawford peach and a roadside seedling. Fig. 14 shows a life-size photograph of a very fair seedling pecan and a nut of the Stuart variety. Seedling nuts are generally undersize. It would take about 200 nuts of this seedling to make a pound, the largest part of which would be shell. In a pound of Stuarts there would be only about 40 nuts, and the largest proportion of this weight would be fine, edible meat. A common fault with seedling nuts, particularly those that would seem to commend themselves by fairly large size, is that they do not fill up their shells. This fault is shared even by some named varieties that have been chosen especially for size. Fig. 15 shows different views of a desirable type of nut, of which the thin shell is packed tight with meat. The larger nut, compared with it, has a much thicker shell, which is far from being filled. The nonfilling of the shell does not seem to be due to lack of food or tillage, but is an inherent characteristic of the tree, just as its habit of growth or its shape of foliage. I have given to poor fillers the most intensive tillage and as high as 75 pounds of high-grade fertilizer per tree, and could not see that the kernels were any more plump than before. Some varieties are naturally good fillers, no matter on what kind of soil they grow. The varieties Curtis and Schley always pack their shells so full of meat that the kernels cracked out look bigger than the whole nuts. They are always this way, no matter the kind of soil. These varieties have also very thin shells. The sutures of the kernels are shallow and do not retain the bitter lining of the shells, but crack out freely, leaving the meat in unbroken halves.

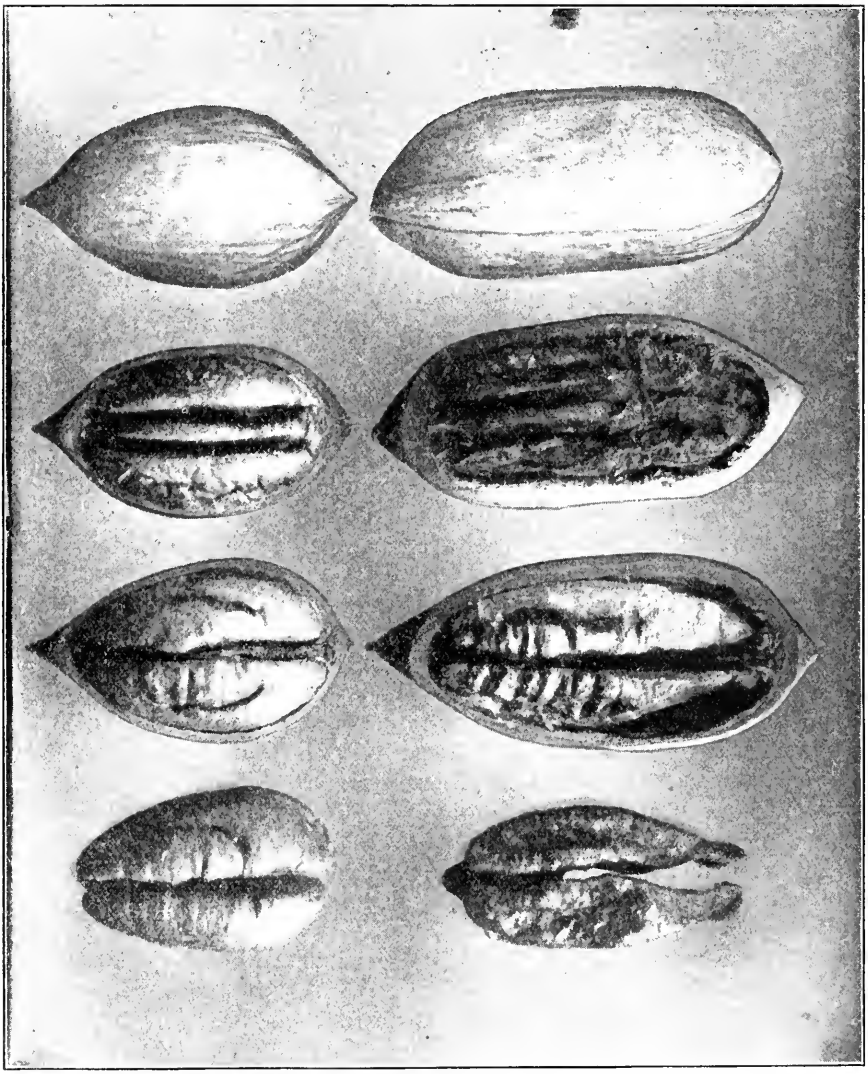

FIG. 15.—Comparison of Well and Poorly Filled Nuts.
(Photo by S. B. Shaw.)

NONBEARING OF SEEDLING TREES.

It is a common complaint with seedling pecan trees that they are provokingly tardy in coming into bearing. One may wait twelve, fifteen or twenty years, annually encouraged by ever-increasing foliage, only to find in the end that the trees give a meagre pittance of nuts, that are of poor or indifferent quality. Experience has shown also that in planting a number of seedling trees there will be a proportion of them that will be barren. After waiting for years for a crop, with hope annually deferred, the grower becomes sick of the whole business and concludes that there is nothing in pecan culture anyway.

Last year I was asked to visit a pecan grove to advise the owner as to ways and means for making his trees fruitful. I found a grove of beautiful, large seedling trees of fourteen years growth, every tree of which was in fine, healthy condition, but not a single one of them had produced anything. The owner was discouraged with them, because they had given not a cent's revenue for fourteen years' tenure of his best soil, and he had decided to cut them down. I could offer him little hope of an immediate crop, because the pecan is a very long-lived tree, and a decade or two is neither here nor there with a multicentenarian. Even should there be a heavy crop on the grove in a year or two, there would still be some trees which would probably never bear. There was every reason to believe also that the nuts of the trees which did bear would be small and have a wide variation in size, color and contents. The difficulty in predicting any probability of profit from these large, healthy trees lay in the fact that they were seedlings and therefore had behind them no known ancestry for early or heavy bearing, and the owner might possibly wait another decade without getting any additional data on the subject. My advice to the owner was not to cut the trees off at the root, but to cut off all the branches and work the stubs and the resulting sprouts with scions of varieties having known characteristics for early and heavy bearing.

The characteristics of early and heavy bearing, or the lack of them, are just as much individual possessions with a pecan tree as the shape of its leaves or the size and color of its fruit. The pecan tree is one of Dame Nature's hardy children that has had to maintain its own identity in competition with her other wild children. With no aid but its stalwart trunk and tough, woody sinews, it has had to brave fierce storms, endure extremes of flood and drought and fight its upward way to light and air, amid a tangle of wild, struggling vegetation. Under such conditions nature's hardy children are very conservative of their reserve forces, and give up very grudgingly the moiety not needed for the ever-present battle for food and air. Except under especially favorable conditions, wild

plants are characteristically slow to bear, and yield only very meagre crops. The reminiscences of our boyhood rambles at nutting time will tell us that the forest was not the place where we gathered our nuts, but in the glades and open meadows, where the trees had no struggle for light and food against encroaching vegetation. Those that gave us the large crops of fine nuts were in the rich soils along the streams and in the open meadows, where life was easier. It is from domesticated plants, farthest removed from the wild, that the earliest crops and largest production is obtained. The pecan tree can scarcely be said yet to be domesticated, but has for centuries been a forest tree. During these ages in the wild it has normally acquired a habit for late and shy bearing, which is inherent in every seedling tree. Why, then, should we be so unreasonable as to expect in a seedling pecan the prodigality of early and heavy bearing, when nature has for centuries trained it to the most persistent and rigid economy? From their inbred nature and long habit, pecan seedlings are normally slow of bearing and meagre in cropping. This explains the numerous complaints that come in from all parts of the country regarding the late and shy bearing of seedling pecan trees.

While the normal tendency of seedling pecan trees, as has been said before, is to late and shy bearing, there are, as with other plants, some very exceptional and precocious individuals. These are doubtless the product of some former favorable environment, probably of an accidental nature, with the parent tree. It is on these very few precocious individual trees that the future success of pecan growing depends. These trees are to become the parents of the ideal pecan of the future, just as the famous sire, Hambletonian, stands in the history of the thoroughbred horse of to-day. It is an advantage rather than a loss to us that the pecan will not "come true," for this tends to eliminate the seedling or "pewee' pecan, and leaves us the uniform product resulting from trees budded and grafted with fine, high-class precocious varieties. The first milestone in pecan culture was the finding of the first high-class seedling which became worthy of naming and propagating. Many such milestones have now been passed, and we have to-day many high-class named varieties of pecan trees that are beginning to bear early and are producing heavy crops of large, meaty nuts. The history of one or two of our standard named varieties of pecans will illustrate this point.

EARLY HEAVY BEARING VARIETIES.

*Georgia Giant.**—The original Georgia Giant was one of something over 1,000 seedling trees set out in 1886 at DeWitt, Georgia, by Mr. G. M. Bacon. The trees were set on about thirty acres of hard red-clay land, from which the top soil had been washed and was there-

*Herbert C. White in The Nut Grower.

fore of little use for farm purposes. As little is to be expected from seedling pecan trees before fifteen or eighteen years, these trees were left more or less to shift for themselves and nothing much expected from them for some years. In 1891, five years from setting out, one tree bore 32 large, fine nuts that weighed one pound. This was so different from what was to be expected from pecan trees that it was thought advisable to give the whole thirty acres of seedlings more cultivation and attention. The next year this six-year-old tree bore 2½ pounds of nuts. From this beginning it has borne an annually increasing crop. At eighteen years of age the tree bore its eleventh crop, which was four bushels. At this time the tree was so heavily

FIG. 16.—Frotscher Pecan Tree belonging to Mr. J. B. Wight, Cairo, Georgia. It is fifteen years old and bore last year 169 pounds of nuts.

cut for budding wood that its normal growth was considerably impeded. Of course, the trees that are produced from such a variety by budding or grafting faithfully reproduce the characteristics of the parent tree. A number of two-year grafts and eighteen-months-old buds inserted in one-year-old seedling stocks in 1902 began to bear in 1904. One of these little trees, not over seven feet in height, had on it 24 nuts, in clusters, the largest cluster of which had eight nuts.

The above cut (Fig. 16) is that of a budded Frotscher pecan which belongs to Mr. J. B. Wight, of Cairo, Ga. The tree was purchased from Mr. William Nelson, New Orleans, in January, 1892. It was about three feet high when set, and cost $2. The first column gives

the circumference in inches, three feet from the ground, of the tree at the end of the year indicated. The second column gives the weight of nuts in pounds produced each year. No measurement was made of the tree until December, 1894.

	Circumference.	*Nuts in Pounds.*
1894	8½ inches	
1895	12¼ inches	
1896	14½ inches	1 nut
1897	20 inches	7 lbs.
1898	25 inches	10½ lbs.
1899	29¼ inches	13½ lbs.
1900	33¼ inches	27 lbs.
1901	37¼ inches	16 lbs.
1902	40¼ inches	45 lbs.
1903	44 inches	80 lbs.
1904	46¾ inches	121 lbs.
1905	50 inches	131 lbs.
1906	53 inches	96 lbs.
1907	56 inches	30 lbs.
1908	59½ inches	169 lbs.

Since it began bearing, this tree has been severely cut for budding wood; and hence its bearing has to some extent been retarded. The greater part of the nuts were sold to Mr. R. Thomas, of Thomasville, at 50 cents a pound, who retailed them at 75 cents per pound.

Mr. H. K. Miller, of Monticello, Florida, gives the following brief but interesting account of his experience as to the precocity of varieties of pecans: "The Schley tree in question bore one nut its fourth season, 60 the fifth, and five pounds the sixth season. When I last saw the tree, in June of the present year, it was well set with nuts, and I estimate ten or fifteen pounds for this its seventh season. One hundred and forty pounds were gathered from the original Sweetmeat tree last season (1908), its fifteenth year from seed. We had four grafted trees of Moore variety in Monticello and they each had 50 pounds to 70 pounds last season. They had been planted eight years. One six-year Delmas had eight pounds last season and will have fifteen pounds this year. Seventy-five per cent of our seven-year trees, consisting of Schley, Delmas, Teche, Frotscher, Van Deman, Dewey, Curtis, Success and Bolton, are in fruit this year, although they have been cut heavily for bud wood."

The foregoing should give a pretty good idea of what may be expected from grafted and budded trees.

AGE OF BEARING.

Experience with pecan trees shows that budded and grafted trees of first-class named varieties can be counted on to begin bearing in about the same time as apple trees. Some varieties of apple trees, like Missouri and Ben Davis, will come into bearing in five or six years, while others, like Golden Russet and Royal Limbertwig, will

scarcely do so in fifteen. What is true with apples is also true with pecans. Many varieties of both will begin bearing at four to six years, but paying results from either are not to be looked for under ten years. With this in view, experienced fruit men know that under proper conditions it pays to plant apple trees, and it pays to plant pecans. The unfortunate reputation of the pecan for tardy bearing, as has been said before, is due to the seedling tree. What fruit grower now would think of planting seedling apple trees? Fig. 17 shows the large clusters of nuts of heavy-yielding varieties of pecans.

For commercial pecan orcharding the day of the seedling tree has forever passed. In the whole history of pecan culture in America I have never yet seen nor heard of a successful seedling orchard.

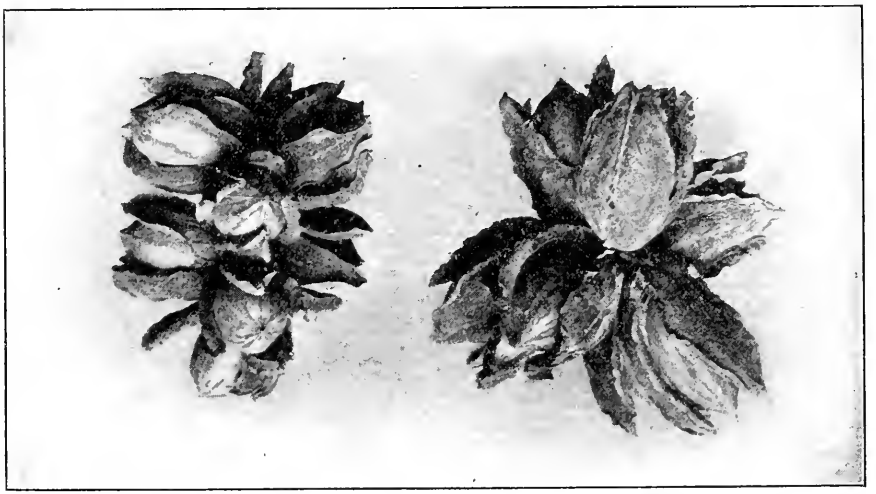

FIG. 17.—Typical Clusters of Nuts of Heavy-yielding Varieties.
(*Photo by S. B. Shaw.*)

The only profitable use for seedling trees is for stocks on which to work standard varieties or for the plant breeder in originating new sorts. It may be set down as a business maxim in commercial pecan growing, *Never plant seedling trees.*

VARIETIES.

What varieties to plant in any locality is a very easy question to ask, but a difficult one to answer, because there are so many factors in the problem and so many conditions to be considered that unless one is thoroughly conversant with local conditions he can at best but make only a good guess. With our older domesticated fruits experience and actual tests have given us so much data on the subject

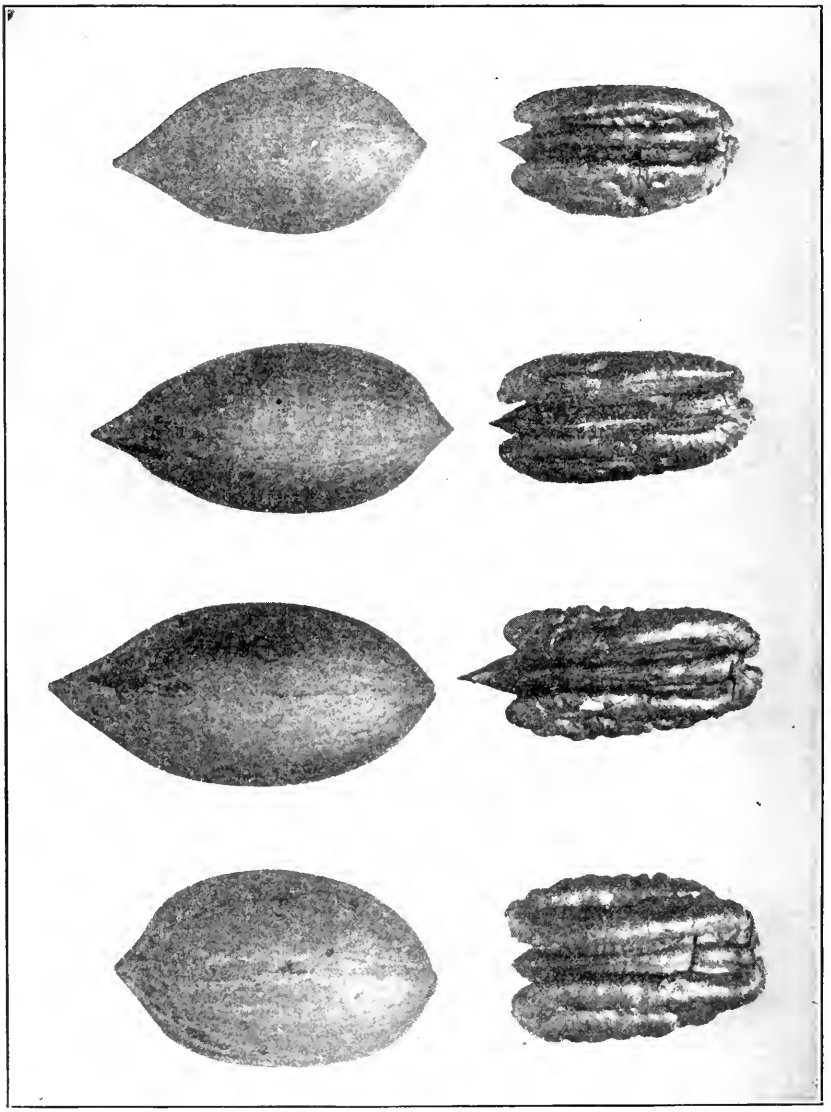

FIG. 18.—Stuart. Van Deman. Schley. Curtis.
(*Photo by S. B. Shaw.*)

that one can get pretty definite information as to the behavior of varieties at different latitudes and altitudes and in different climates and types of soils. The history of the pecan as a cultivated tree is not yet old enough to give us all this data. However, every passing year of this present decade is settling and confirming the varietal habits and requirements of the pecan tree. From the history of other fruits we learn that varieties that have originated in a certain region are more likely to be successful there than varieties that have been brought in from a distance. For example, northern varieties are found to be much less liable to winter kill than varieties introduced

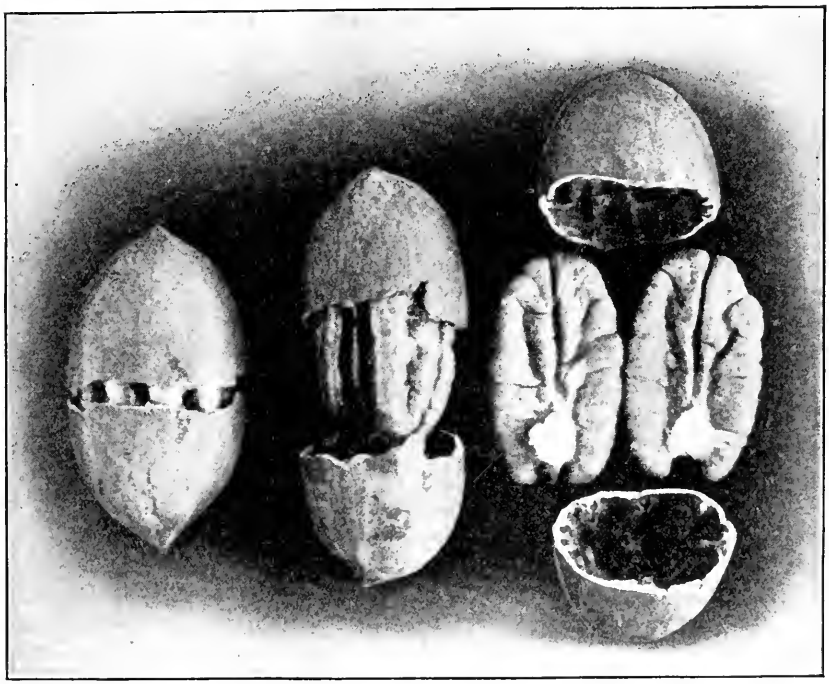

FIG. 19.—A Method of Cracking Pecan Nuts.
(*Photo by S. B. Shaw.*)

from the south. In North Carolina it will undoubtedly be found true that varieties of northern origin will be much more suited to our conditions than the varieties native to the southern portion of the pecan area. In regions subject to cold a plant must restrict its growth period to escape frosts or freezes in spring and fall. Varieties from extreme southern regions do not seem to be able to do this, and often have their bloom killed in the spring or their buds nipped before they ripen in the fall. For the northern portions of the pecan region

varieties should be chosen which shed their leaves early. This indicates the proper ripening of the twigs, which makes them firm and in good condition for passing safely through winter.

In Virginia there have been found two meritorious varieties, which have been named Mantura and Appomattox. These varieties are now being propagated and will doubtless be of great value for planting in the northern portion of the pecan area. As yet no varieties of pecans that have originated in North Carolina have been named and propagated. Among the thousands and thousands of healthy bearing pecan trees that are growing all over the coastal-plain region of this State there are undoubtedly some good individual

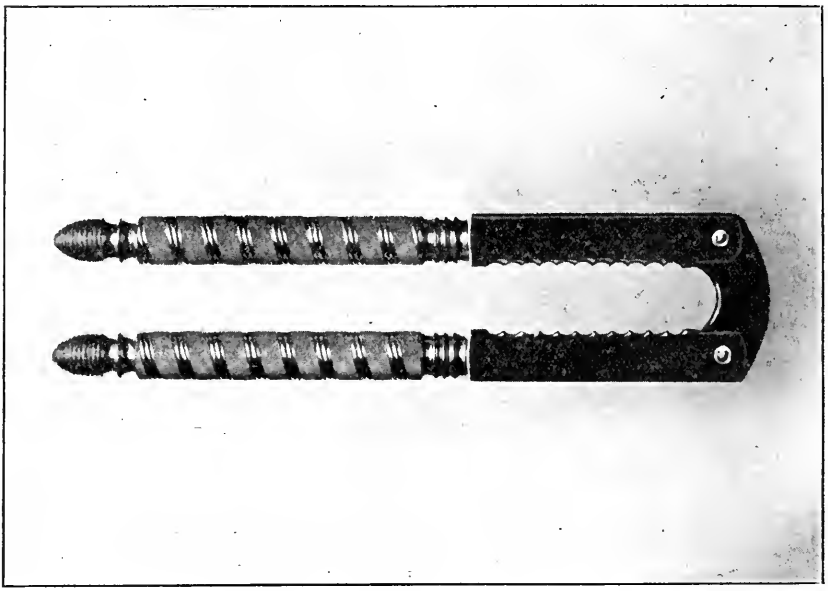

FIG. 20.—A Good Kind of Cracker.
(*Photo by S. B. Shaw.*)

trees that are worthy of being named and propagated, but they have never yet been brought to public notice. Until we get varieties of our own we must use those that have originated in other portions of the pecan belt. Fortunately we now have a rich variety list of high-class sorts for our selection. Which of these varieties will be most suitable to North Carolina conditions can only be definitely ascertained by an orchard test. From our records of growth, etc., on our State Test Farms, and from general observations throughout the whole pecan regions, I would recommend for growing in North Carolina the following varieties: Stuart, Curtis, Schley, Van Deman, Mantura and Appomattox. The first four of these varieties are pictured in Fig. 18. Below each nut is shown the kind of kernel it contains.

HOW TO CRACK PECANS.

The cracking of a nut to get the kernel out unbroken depends really more on the nature of the nut than on the skill of the cracker. Some nuts are simply poor crackers, and it is next to impossible, even with great care, to get them out whole, while others will almost roll out of their shells and say "Eat me." A good pecan nut should be easily cracked and the kernel should separate readily from the shell without breaking up. The shell should be so thin that it will break easily when two nuts are squeezed together in the palm of the hand. The term "paper shell" has been much used with pecans in this connection. The word is probably too expressive, and it is certainly overworked by some propagators in the exploiting of their own varieties. Pecan shells vary in thickness from $\frac{6}{10}$ millimeters to 2 millimeters. A hammer should not be necessary to crack pecans. A shell that is brittle is much to be preferred to one that is tough. The shell and the kernel should be as free as possible from convolutions that make one adhere to the other. If the kernel is smooth and its sutures shallow the bitter septum and linings of the shell will fall away from it when the nut is cracked.

There is no greater lover of pecan nuts than the ubiquitous small boy, and none more expert in robbing them of their toothsome stores. Fig. 19 shows one small boy's method of getting the kernels out whole. With his front teeth he bites the nut evenly about the equator, rotating it on its polar axis and biting until the crack completely encircles the shell. Taking a firm hold of each half of the shell he wiggles and pulls at the same time, and in a few moments the half-shells are drawn off like two thimbles, leaving the kernel whole. With any ordinarily good nut this method will be found quite successful, even with grown-ups. In the more conventional atmosphere of the dining or drawing room pecan kernels can be best removed from their shells by the aid of the kind of cracker pictured in Fig. 20. There are many sorts of hand crackers, but I have found this best, because it has square, cutting edges that can be used to nip off the ends of the nuts. This cracker will do the trick even when the ends of the nuts are blunt or rounding. By nipping off the ends and rolling the nut lightly between the jaws of the cracker the shell can be easily taken off, so as to leave the kernel in two unbroken halves. Fig. 21 illustrates this method of cracking. The right side of the cut shows a nut, the kernel of which has been broken to bits by attempting to crack it out without observing the foregoing precautions.

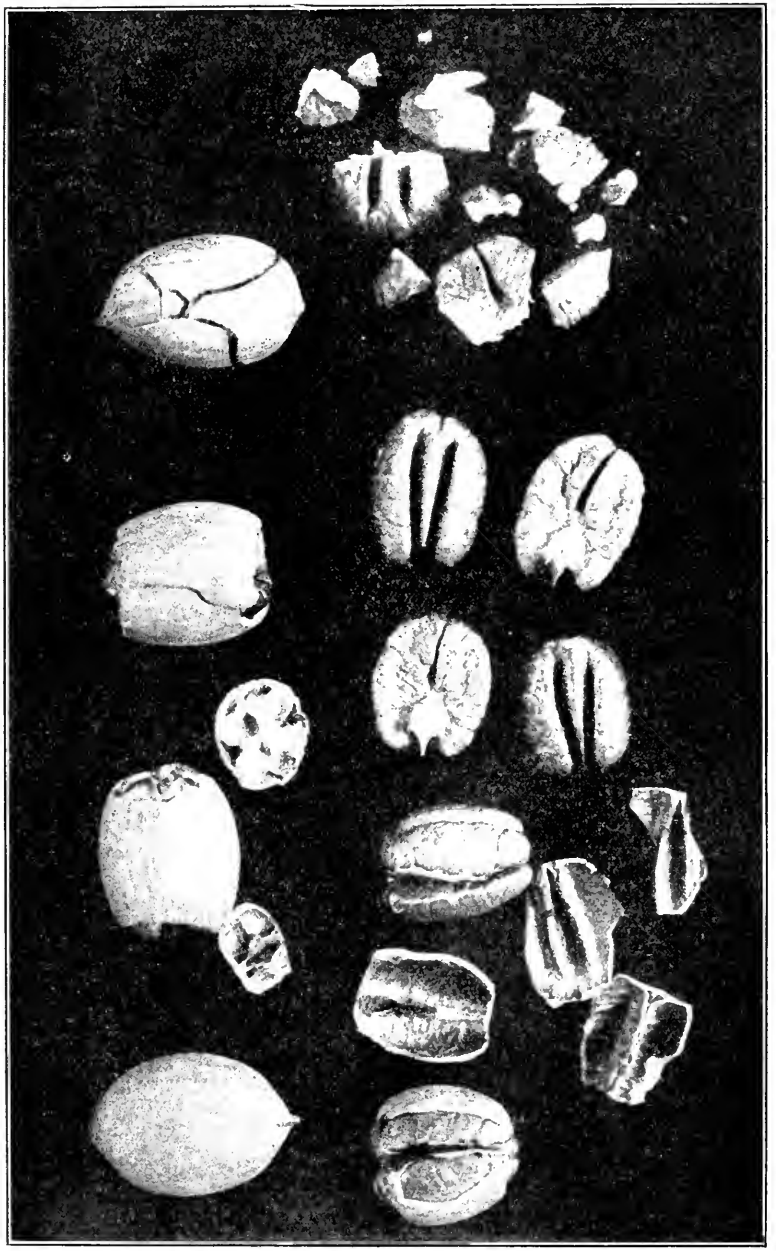

FIG. 21.—Proper and Improper Cracking of Pecans.
(*Photo by H. H. Hume.*)

PECANS AS FOOD.

Many years ago, before the study of human foods took its true place as a thing to be considered in the economy of nations, the value of foods was partly a matter of conjecture. Now scientists can tell a man with a perfect digestion almost to a grain what nourishment he will get from any given food. Among the surprises that food chemists have given the world none are of more interest than those that relate to the value of nuts as a food. Every one has heard of lost persons existing for many weeks on the nuts of the forest, but the average mind until a few years ago associated them only with the joys of circus day or the delights of a winter night before the fire. Now we know that they are more than condiments or accessories to the menu and must be regarded as very real foods. Indeed, bulk for bulk, nuts are among the most nutritive foods that we possess. All nuts yield high food value, and when properly eaten or prepared may to a large extent form a substitute for meat, because they contain much proteid and fat in small bulk.

Among the nuts that yield the greatest amount of nourishment pecans stand almost first.

EDIBLE PORTION OF NUTS PER CENT.

	Protein.	Carbohydrate.		Fat.	Mineral Matter.	Water.	Fuel Value per Pound.
		Sugar Starch.	Cellulose.				
Pecan	12.1	8.5	3.7	70.7	1.6	3.4	3.300
Chestnut	6.4	41.3	1.5	6.0	1.4	43.4	1.140
Cocoanut	6.6	13.7	8.9	56.2	1.6	13.0	2.805
Peanut	29.8	14.7	2.4	43.5	2.2	7.4	2.610
Almond	21.4	13.8	3.0	54.4	2.5	4.9	2.895

Their great food value lies largely in the abundance of fatty matter. In fact, there is no other vegetable substance in all the world's food supply that is so rich in fats as the pecan. There is an old English saying that "No man need starve on a journey who can fill his waistcoat pocket with almonds." If that can be said of almonds it can surely be said of pecans, whose fuel value, compared with almonds, is as 33 to 29, or 13.8 per cent more.

While the nutritive value of nuts is high, it cannot be said that they are as easily digested as many of our other common foods. One reason for this is their high percentage of fat. It has been estimated that one ordinarily large pecan contains as much fat as would be absorbed by two dozen well-cooked doughnuts. Another reason is be-

cause of their dense, compact structure. This can be overcome, either by thorough mastication or by grinding, as for nut butter or nut flour. Still another reason is that their nourishment is very concentrated. For example, cheese contains 35 per cent water, eggs 68.2 per cent, lean beef 75 per cent, bread 39 per cent, and pecans only 3.4 per cent. These figures show how condensed the food is within the shell of the pecan.

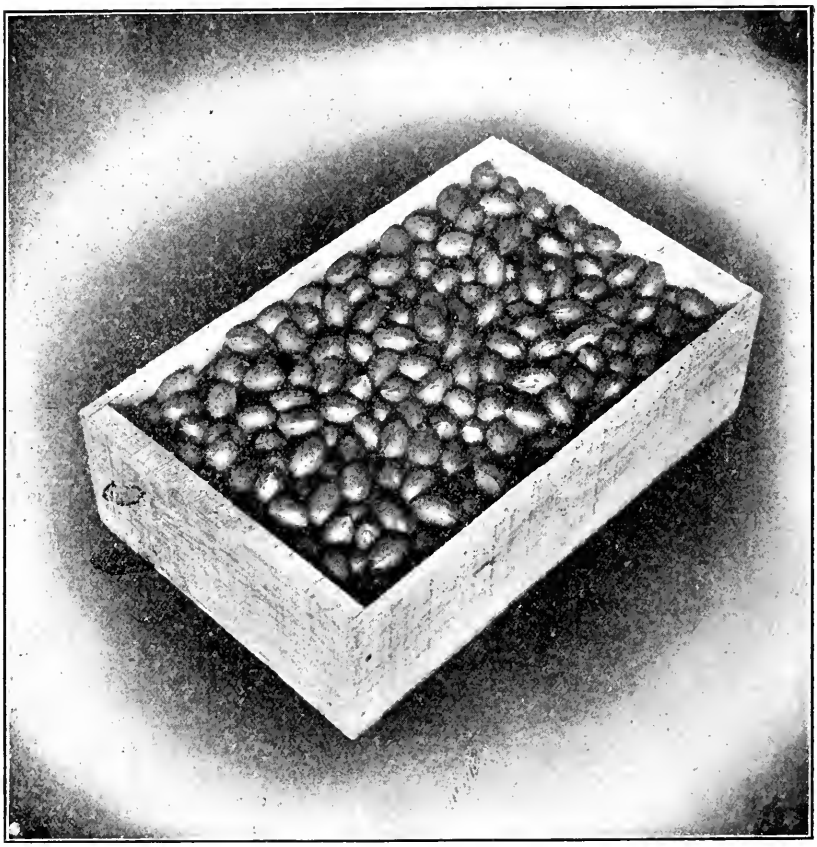

FIG. 22.—Commercial Package of Pecans.
(*Photo by S. B. Shaw.*)

All these difficulties may be readily overcome by chewing the nuts well and by eating them at meal time. Many people believe that salt eaten with nuts renders them more digestible, but a number of experiments conducted by the United States Government have failed to prove this theory. If it aids at all, it may be due to the fact that salt excites a flow of saliva which dilutes the flesh of the nut.

FIG. 23.—Pecan Grove of Mr. J. B. Wight, Cairo, Georgia, Showing Truck Crops Growing Between the Trees.

The wonderful value of the nut can scarcely be realized until we consider that it contains proteid, fat, carbohydrate and mineral matter. Its small amount of carbohydrate renders it a very useful food for the diabetic person. It has the great advantage of being compact and portable. It enters into the composition of an ever-increasing percentage of the commercial candies. It may be eaten fresh or salted; at the table or out of hand. Greater than all these uses, however, is its place in the average American household. Because of its delicious flavor, as well as its nourishing properties and its superior texture, it is utilized in soups, salads, cakes, macaroons, icings, ice creams, garnishings and almost every form of dessert. It might be said of it, as Izaak Walton said of the strawberry, "Doubtless God could have made a better berry, but doubtless He never did."

MARKETING PECANS.

The commercial pecans of the future will be standard varieties, just as our apples, pears and peaches are to-day. The time is rapidly nearing when pecan nuts will be known to the trade and asked for and sold by name, just as Bartlett pears and Albemarle apples are to-day. The painted, unsorted, heterogeneous seedlings now sold in bulk will give place to standard packages of Schleys, Van Demans and Stuarts. These and other fine varieties would scarcely appear to belong to the same species as the painted seedlings that are offered for sale to-day. Seedling nuts are rolled in a barrel with Spanish brown paint to cover up their roughness and give them a more uniform color and appearance. Most of our named varieties are so attractive in appearance that any pigment rubbed on them would lessen rather than increase their salability. Their natural purple stripes and splashes add very much to their appearance and help to distinguish one variety from another. Nuts of different varieties should not be mixed, for this detracts very much from their uniformity and salability. For the same reason, undersized, deformed or discolored specimens should be picked or screened out. Standard varieties of pecans are yet too scarce to be known on the general market. There is therefore no standard package yet for marketing pecans. Named varieties of pecans now all go to special customers and sell at from 25 cents to 50 cents per pound. In the past much higher prices than these have prevailed, but this has been largely for seed purposes. Fig. 22 shows a 10-pound box of fancy pecans put up for a special customer. A fancy trade could easily be worked up with private customers by shipping first-class named nuts in a family package somewhat of this nature.

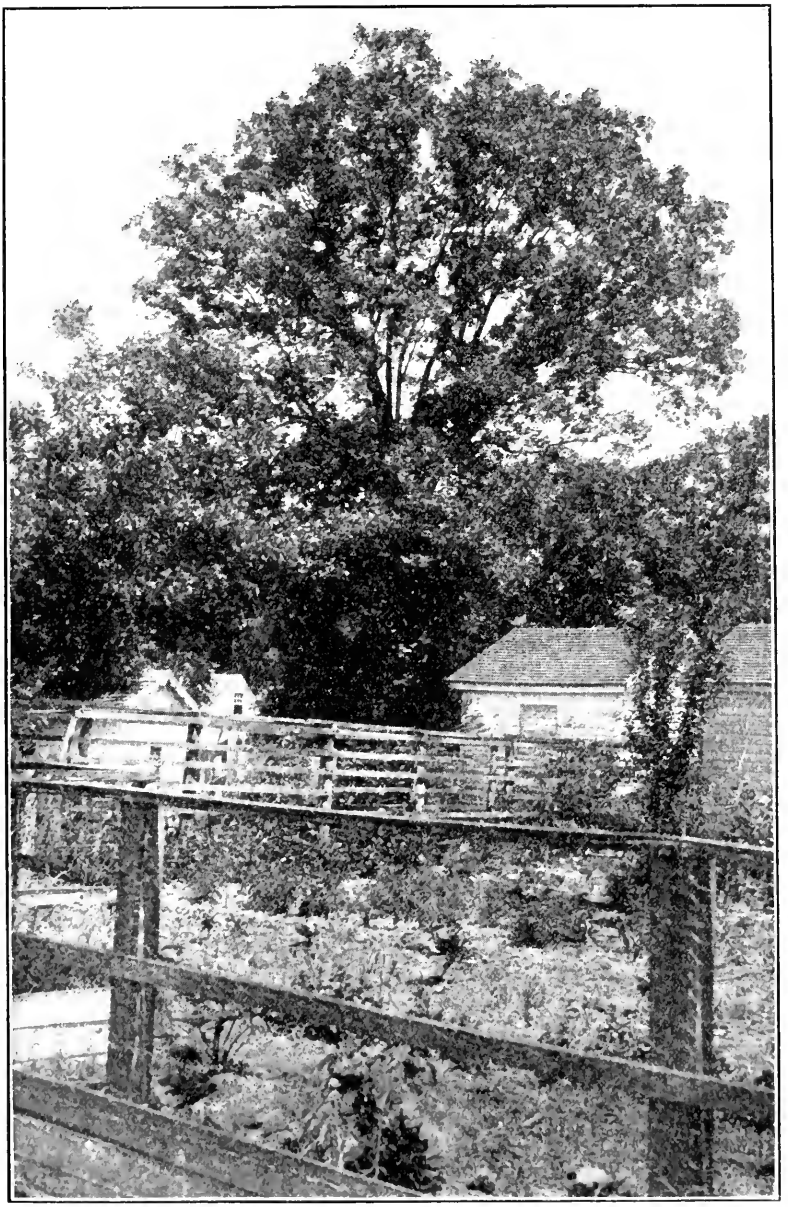

FIG. 24.—Pecan Tree at Plymouth, N. C., which bears annually about six bushels of nuts.

ENEMIES OF THE PECAN.

It must not be assumed from the foregoing that the pecan tree is without its enemies. If it were, it would differ from all other plants. Like every other thing worth growing, it also has its pests, but it appears to have less of them than most other trees. Its nuts are very attractive, and it is therefore to be expected that squirrels and small boys would make their attacks on the fruit of the tree. In common with most other trees, its leaves are sometimes attacked in summer by tent caterpillars, webworms and other general leaf-eating insects. With mature trees these insects are scarcely a consequence, but on newly set or young trees they need looking after in the latter part of the summer. There is also a little bud worm that sometimes bothers young trees by working in the buds before they leaf out. This sometimes retards the growth of newly set trees, but gives little or no trouble on established ones. The worst enemy of the pecan tree that has yet come to my notice is the beetle that is found in the woods girdling the twigs of young hickories. It does the same injury to pecan trees and is quite troublesome on small trees, especially if they are isolated. They do not seem to be sufficiently numerous to give much trouble in orchard plantings and are not very injurious to large trees. The method of combating this insect is the raking up and burning of all the twigs that fall from the trees. This destroys the little rascals before they get the opportunity of leaving the twigs and going into the soil. There are also some fungous troubles that affect the pecan and kindred trees, but these give very little trouble where trees are well cultivated and fed.

THE PECAN AS A SHADE TREE.

As a shade tree the pecan is unique. Its clean, strong, stalwart form proclaims it an aristocrat among the trees. The tree grows to be of large size and has a beautifully symmetrical form. The trunk is straight, clean and upright, carrying its lace-like foliage high out of reach and leaving the ground beneath it free and unobstructed. The pecan tree seldom throws up suckers from the collar or roots. It is thus a fine, clean tree for growing on a lawn, as its roots are deep in the soil and a lawn mower can run anywhere beneath its shade without the slightest fear of root, snag or sucker. From its natural habit, the pecan tree carries its growth up with a single leader till well out of reach, then it forks out into a beautiful spreading head, which covers a wide extent of space. The branches are strong and do not trail or droop to the ground, but retain their erect position, even when drenched with rain. The bark of the tree is light in color and comparatively smooth, and does not shed nor

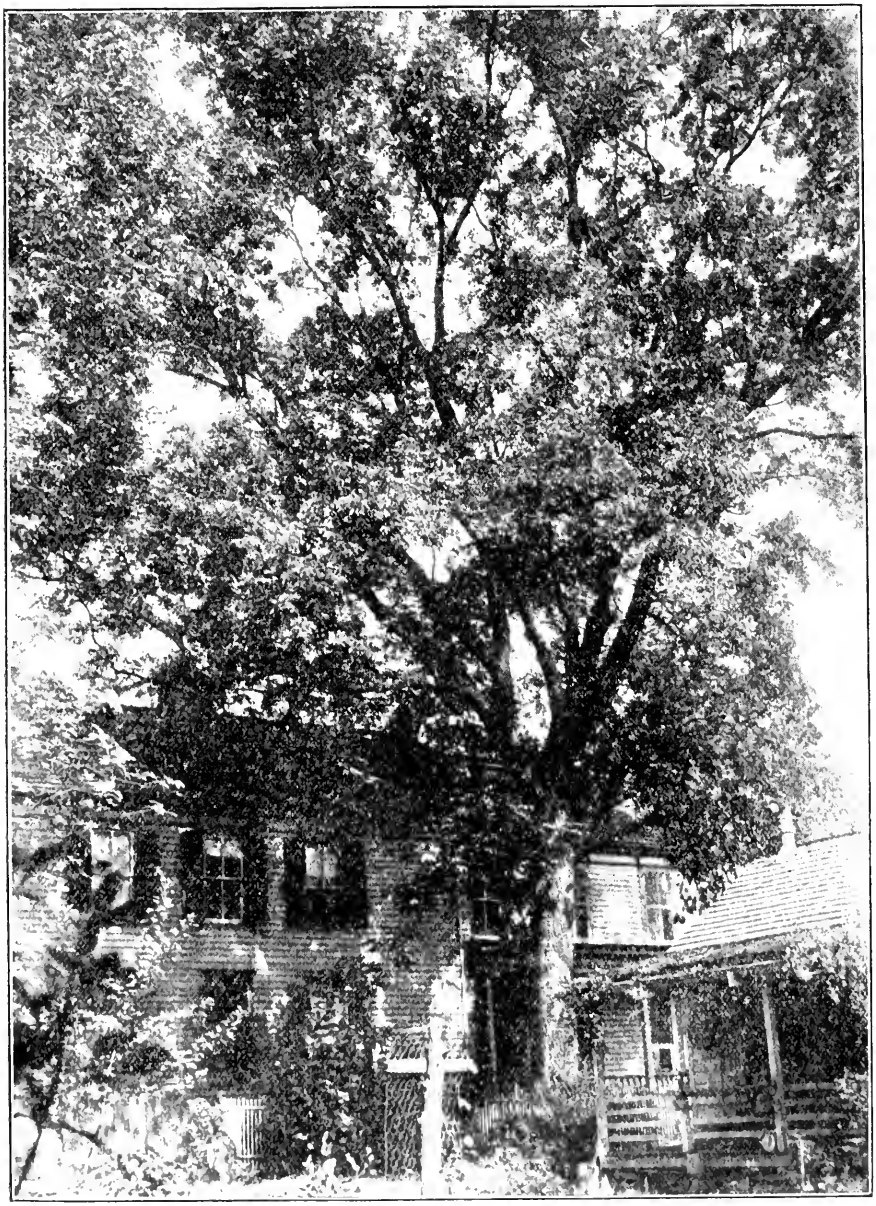

FIG. 25.—Pecan Tree in Lawn of Mr. George N. Ives, New Bern, N. C.

scale off, even in very old trees. Perhaps the most beautiful thing about the pecan tree is its handsome foliage. The leaves are compound in form and made up of numerous sickle-shaped, shining leaflets, which are symmetrically arranged, so as to give the whole leaf a beautiful, long plume-like appearance. These long plumes are so versatile that they are stirred by the slightest movements of the air. On a hot sultry afternoon they are like the quakenasp—a natural indicator of the slightest air currents. In light breezes they are in constant graceful movement, like the long, waving plumes of the ostrich. The shade afforded by a pecan tree is not the dense, heavy umbrage that excludes the sun and harbors dampness, but the light, dappled, mackerel shade that carpets the turf with wandering patches of sunshine. Lawn grasses flourish on the filtered sunshine falling through pecan foliage, and even blue grass can be made to feel at home in the Sunny South when grown under its protecting shadows. The leaves of pecan trees all shed in the fall and do not litter the grass during the growing season. The wood is tough, strong and heavy, weighing in dry condition 45 pounds per cubic foot. The limbs are seldom broken off, even in severe storms, and I have yet to see a pecan tree that has ever been uprooted. At a hundred years of age it is a mere juvenile, while during that period it has marked the passing of three generations of men. It would be difficult to find another kind of tree possessing so many of the characteristics of what might be considered the ideal shade tree.

In addition to its value as a shade tree, the pecan is a fairly early as well as a heavy producer of the finest kind of nuts. The beautiful shade tree pictured in Fig. 4 produced in 1907 400 pounds of nuts, which sold for $80. Fig. 24 shows a pecan tree in a back yard at Plymouth, N. C., that, besides giving shade for almost the whole premises, yields annually in the neighborhood of six bushels of splendid nuts. Fig. 25 shows another fine tree in the lawn of Mr. George N. Ives, at New Bern, N. C. How much better it would be to have trees of this kind in lawns and house yards, rather than the unsightly sterile mulberries that one so commonly sees. Many of the useless and ugly shade trees seen, especially in the coastal region of the Southern States, could well give place to the beautiful and productive pecan.

Nut trees about a home, in addition to their beauty and utility, are wonderfully dear to the heart of the small boy. They are some of the strong links that bind the erring hearts of growing youngsters to the dear old country home. How fondly I now remember the hickory trees on our old homestead! What joys they brought to my boyish heart each fall, and how eagerly I gathered their crop of

clean, spicy nuts. In my leisure hours I looked after their drying, and counted and weighed them out as carefully as a miser his gold. Pecan trees should be planted about every southern home for the small boy alone, if for no other reason. They are a continuous delight to growing children and do very much to endear them to the old home. I fully believe that if there were less poplars and Oderhoet mulberries and more pecans about farm homes there would be more farm-bred boys and girls in the country.

NOTICE.

WANTED.—A NATIVE NORTH CAROLINA VARIETY OF PECAN WORTHY OF BEING NAMED, to be propagated and planted in this State.

As has been said in previous pages of this Bulletin, we doubtless have in North Carolina individual pecan trees worthy of propagation. Like the North Pole, all they need is discovering. For the discoverer of them there is fame and fortune. Meritorious seedling pecans from different parts of the State have already been received at this office, but as yet the ideal nut, worthy of the Old North State, has not come to light. This Department is willing to receive, classify, list and appraise all varieties of pecans sent in, especially those originating or grown in this State. We will test and hold subject to the originator's or discoverer's order any meritorious native varieties sent to this office.

W. N. HUTT,
State Horticulturist.

Characteristics of the Ideal Pecan.

Tree—1. Hardy, vigorous and free from disease.
2. Ripens early, both wood and fruit.
3. Begins bearing early.
4. Bears regularly and heavily.

Nuts—1. Large, not more than 80 per pound.
2. Well filled.
3. Thin-shelled, crack out freely.
4. Flavor rich and fine (oily rather than starchy).

LEAF TOBACCO SALES FOR AUGUST, 1909.

Pounds sold for producers, first hand	8,857,483
Pounds sold for dealers	476,520
Pounds resold for warehouse	877,970
Total	10,211,973

SUPPLEMENT TO SEPTEMBER BULLETIN, 1909

North Carolina Department of Agriculture

SPECIAL BULLETIN

SOME COMMON BIRDS ON THE FARM

BY

T. GILBERT PEARSON

PUBLISHED AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MATTER.

STATE BOARD OF AGRICULTURE.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

SUBMITTED TO AND APPROVED BY

W. A. GRAHAM,

COMMISSIONER OF AGRICULTURE.

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SOME COMMON BIRDS ON THE FARM.

By T. Gilbert Pearson.

North Carolina is rich in wild bird life, both in the number of species which is found within her borders and the countless numbers of individuals with which some of the species are represented. The farm lands are supplied the year round with numbers of birds of great value to the agricultural interests. In winter the sounds teem with wild fowl, twenty-six kinds of ducks and seven varieties of geese being known to occur there. During the spring and fall migrations along the beaches are found swarms of plovers, snipe, and sandpipers of various names; even the handsome Hudsonian Curlew still comes to us, despite the years of incessant persecution.

About eighty species of native wild birds are known to be permanent residents of North Carolina. Perhaps eighty other varieties come to us in the spring to spend the summer months in our yards, fields, swamps, and on our seashores. Thus about one hundred and sixty kinds of birds are known to nest within the borders of the State. Add to this sixty-five species which pass in the autumn on their long trip southward to spend the cold months in a tropical climate, seventy species at least which come from the frozen North to pass the winter in this latitude, and twenty or thirty birds which have been recorded in the State as stragglers from their usual range, and a total of three hundred and thirty species of North Carolina birds is reached.

If we are to believe what many toiling scientists have revealed, what many State agricultural departments tell us, what the United States Government publications declare, and what we can all see with our eyes if we stop to observe, one great incalculable value of our birds lies in the tremendous number of harmful insects which they destroy and the vast quantities of harmful weed seeds which they consume. It is no small service that a pair of robins render when they honor you by living a summer in your garden, and each day probably eat more than their weight of worms and insects. It is no little thing to have a pair of pewees nest in a tree near your house, and every day for weeks and weeks rid the air of hundreds of harmful insects that seek to destroy the foliage or to sting the fruit of your trees. I once watched a pewee capture sixteen insects during a period of ten minutes, and in company with twenty-five witnesses saw a chipping sparrow one summer seize thirty insects in one minute.

Upon the approach of cold weather many of the birds which have fed largely upon an insect diet change the character of their food, and during the cold months subsist chiefly upon seeds, with some wild fruit and berries for dessert. Here is where the twenty-five species of native sparrows in North Carolina render their greatest service. They search the fields, eating the grass seeds which abound there. When the snows come and cover this food the tall weed stalks are still holding their stores of grain high above the snow, and to these the birds now turn. Most farmers think they have trouble enough already with the grass and weeds in their growing crops, but it would doubtless be a greater task to keep these subdued if it were not for the assistance of the birds.

Many people have failed to appreciate what a tremendous force the wild birds are for doing good to the agricultural interests of the country, simply from a failure to observe them closely. Many people rarely see wild birds except when the frightened creatures are wildly endeavoring to escape from the real or imaginary enemy who has intruded upon their solitude. But hide in a quiet place, almost anywhere in the fields or woods, and soon the birds come back to their accustomed activities. I have known men who did this to be utterly astounded at what they saw.

While we often fail to give birds credit for the good they do, but few men neglect to condemn them most heartily for any act which may be regarded as detrimental to man's interests, no matter how superficial the data may be upon which the charge is based. For example: I have known farmers, who raised bees, to shoot all the Kingbirds (bee martins) which came upon their premises, because they claimed that the birds sometimes ate bees. Apparently they failed to observe that the Kingbird ate anything else, and that they kept hawks and crows away from the poultry yard. Professor Beal, of the Agricultural Department at Washington, D. C., examined the contents of 218 Kingbirds' stomachs and found that only fourteen contained the remains of bees, most of these being drones, while 68 per cent of the Kingbirds' food was found to consist of injurious insects.

Again, it is not an unheard-of occurrence for men to order that all robins, catbirds, and mockingbirds on their places should be shot, because these birds were seen eating cultivated fruit. But did not the birds perform a great part in helping raise that fruit? Why not do as some men do in the land, who plant a few more trees or vines in order that there may be enough fruit for both the planter and the birds?

To many people there is a very great pleasure in having the birds come to visit them, even if they do eat some fruit and grain. In my garden the past spring a small patch of strawberries furnished

some acceptable food for a pair of robins which had a nest in a neighbor's yard, and it was also appreciated by two or three catbirds which came from some place nearby. As soon as the sweet corn was matured the red-headed woodpeckers and a large blackbird (grackle) visited the garden daily. But I had no desire to interrupt them. They were my guests, and by their notes, bright colors and vivacious activities gave pleasure to my family and friends who watched them. Then who would think of taking note of what a guest eats! Besides this, I knew that during the greater part of the year these birds were of much value to my neighbors and me as destroyers of insects.

Some years ago it was a common sight in North Carolina to see men and boys of evenings shooting for mere sport the bullbat or nighthawk. Often they were shot simply for the fun of seeing them fall. I have found these birds, wounded and unable to fly, lying suffering and helpless among the weeds, twenty-four hours after they had been wantonly and thoughtlessly shot down from the air. And yet these birds are so perfectly harmless and so valuable as insect destroyers that in thirty-eight States of the Union they are protected by law.

Whenever man interferes with the laws of nature he is liable to suffer for it. It is one of the divine and absolutely unchangeable laws of nature that birds are set apart to serve as a great natural check upon the hordes of insects which, like a scourge, are ever falling upon the plant life with unabated fury. To kill the birds is to allow these pests to increase. So thoughtlessly and so unceasingly have we killed our birds that every year in many sections the problem of how to raise crops successfully is becoming a most serious one. From time to time thousands of Southern farmers have gathered to discuss the question of what can possibly be done to check the onslaught of the cotton boll weevil. We now know that thirty or forty species feed upon this great plague.

Some of our government experts who have made a close study of the subject of bird destruction and the results, tell us that one-tenth of the entire agricultural products of eastern United States is annually a total loss from the ravages of insects. This percentage, too, we are told, is on the increase, owing to the decreasing numbers of birds. That many birds are far less numerous than formerly, any observant man over forty years of age will readily testify.

The early inhabitants of New England felt that they had a grievance against the blackbirds for eating corn in the fields; so laws were passed offering "a bounty of threepence a dozen for dead maize thieves." Dr. Benjamin Franklin is quoted by Peter Kalm, a Swedish naturalist, as saying that the blackbirds were thus exterminated, "but as in the summer of 1749 an immense quantity of

worms appeared in the meadows, which devoured the grass and did great damage, the people abated their enmity, for they had observed that those birds lived chiefly on these worms before the maize is ripe, and consequently extirpated them."

Of recent years the study of the relationship of birds to agriculture has revealed many facts which are having a decided influence in changing public sentiment regarding many birds which were formerly regarded as largely if not wholly detrimental. The most marked example is probably in reference to the real value of hawks and owls on the farm. There have been recorded in North Carolina nine species of hawks and eight kinds of owls. Many people have recognized but little distinction between these, and tens of thousands of these useful creatures have been killed by persons who sincerely believed they were doing the country a service. We now know that a very large per cent of the food of the sparrow hawk consists of grasshoppers and other insects. The red-shouldered hawk feeds to a large extent on field mice, shews, young rabbits, and other injurious vermin. To kill a sparrow hawk, therefore, means an increased opportunity for the grasshoppers to eat the grass, and to kill the red-shouldered hawk means that a further invitation is extended to annoying rodents to increase and gnaw the fruit trees or eat the grain in the field. We are very prone to think only of the chicken or game bird which some "chicken-eating" individual hawk takes, and at once condemn all hawks of all species. A wiser course would probably be to make some study of the order of birds known as *Raptores* with a view to learning to differentiate between our enemies and real friends.

Writing of hawks in a recent Year Book of the United States Department of Agriculture, one of the government officials says: "Of late years the acreage under cultivation in the United States has increased rapidly. With increased acreage the number of rodents has multiplied accordingly, because of the abundance of nutritious food and also because their natural enemies have been destroyed by man. The services of hawks and owls were never so much needed as now, and these faithful helpers of man are likely to be more needed in the future; yet thousands of hawks and owls are yearly slaughtered because the part they play in nature's scheme is misunderstood or ignored. Unquestionably, individual hawks that have learned their way to the poultry yard should be summarily dealt with, but because occasional individuals of two or three species destroy chickens it is manifestly unfair to take vengeance on the whole tribe. The very name of 'hen hawk' is a misnomer so far as the bird to which it is chiefly applied is concerned. Moreover, it is made the excuse by the farmer's boy and the sportsman for killing every hawk, large or small, that flies. Thousands of these useful birds are killed annually

by thoughtless men for no better reason than that, when sitting motionless, they offer an easy target for the small rifle or, flying, present a tempting mark for the shotgun. So far has popular misapprehension in regard to these birds gone that again and again States and counties have offered bounties for their heads, thus depleting treasuries and inviting heavy losses to the farmer through the increased number of insects and rodents which it is the function of these birds to hold in check."

The "Audubon Law" now protects at all times every wild bird in the State, also its nest, except game birds in their season, and the following exceptions: English sparrows, hawks, owls, crows, blackbirds, towhees and ricebirds. In days to come, when a more general knowledge of the true importance of birds to the farmer is possessed by the people of North Carolina, many of these birds will be protected by statute and by the still stronger law of public sentiment.

BOBWHITE: QUAIL: PARTRIDGE: (*Colinus Virginianus*).

Male.—Upper parts reddish brown, with broken bands of black; rump grayish brown, finely mottled and with streaks of blackish; tail gray, inner feathers with markings of buff; front of head, a band beneath the eye and line on upper breast black; throat and band over the eye white; sides chestnut, with margins of black and white; belly white, barred with black.

Female.—Similar, but with throat, forehead, and line over eye buffy. In summer both sexes have crown blacker and buffy markings are paler.

Range.—Eastern North America from Maine to Mexico.

Nest.—On the ground in grassy fields or open woods.

Eggs.—White, ten to twenty.

The most popular as well as the most important game bird in North Carolina is without doubt the Bobwhite. Probably more men in the State engage in hunting this bird than are employed in shooting all other kinds of wild birds and animals. Immense numbers are killed every year and sold in the local markets, and many persons, especially in years gone by, have found a profitable business in smuggling them, in violation of the laws, to Northern cities. The shooting privileges over large tracts of land in some sections are leased by sportsmen, the farmers receiving in return a remuneration sufficient to pay all their taxes and in many instances considerably more. Over one hundred and eighty thousand acres in Guilford County alone are thus under lease at the present time, and the amount of taxes paid for the shooting rights exceeds $8,000 annually. The lessees kill comparatively few birds, and it is a matter of common observation that the Partridge is far more abundant on leased lands than on the adjoining farms where the birds are afforded less protection.

The Bobwhite is a great destroyer of insects during the warm months. He is very fond of the chinch-bug, which annually levies a tremendous tribute from the farmers of America. Two tablespoonfuls of chinch-bugs have been found in the crop of one bird. Grasshoppers are credited with doing an annual damage of $90,000,000 to

the agricultural interests of the country, and Bobwhite is one of their most deadly enemies. The boll weevil came over the border into the United States in 1894 and was soon costing us $20,000,000 a year. The government collectors have found many partridges whose crops were filled with these weevils, which are secured late in the season when the weevil leaves the cotton and takes refuge in the leaves and rubbish on the ground.

These birds also eat the striped cucumber beetle that does such havoc to cucumbers, squashes, and other vegetables. In short, the crops and gizzards examined in great numbers in the government laboratories have yielded fifty-seven kinds of beetles, twenty-seven varieties of bugs, nine grasshoppers and locusts, and thirteen different sorts of caterpillars, besides ants, flies, wasps, and spiders.

But the good work of the Bobwhite does not end with the summer. Eighty-five different weed seeds have been found to make up in part his bill of fare. Crops have been found packed with rag-weed seeds and as many as one thousand seeds of the crab-grass have been taken from one bird. A specimen shot on Christmas day of 1901 at Kinsale, Virginia, contained about 10,000 pig-weed seeds. In Bulletin 21 of the Bureau of Biological Survey we read: "It is reasonable to suppose that in the States of Virginia and North Carolina from September 1 to April 30 there are four Bobwhites to each square mile of land, or 354,820 in the two States. The crop of each bird holds half an ounce of seed and is filled twice a day. Since at each of the two daily meals weed seeds constitute at least half the contents of the crop, or one-fourth of an ounce, a half-ounce daily is consumed by each bird. On this basis, the total consumption of weed seeds by Bobwhites from September 1 to April 30 in Virginia and North Carolina amounts to 1,341 tons."

The above facts and figures may well be used in argument to substantiate the claim by many people that the time has arrived when our beloved Partridge is of far more value to us while living than after he is dead.

NIGHTHAWK: "BULLBAT": (*Chordeiles Virginianus*).

Male.—Upper parts black, with markings of white and buff. Wing crossed by broad white bars; tail black or nearly so, with broken bars of buff, with white band at end on all but middle feathers; white throat; chin and breast black; belly barred with black and white.

Female.—No white on tail and washed with buff below.

Length.—Ten inches; expanse of wings, 23 inches.

Range.—Eastern North America; breeds from the Gulf States to Labrador; winters in South America.

Nest.—On the bare ground in fields or open woods, sometimes on flat-topped houses in cities. Eggs heavily spotted and blotched, closely resembling the ground; two in number.

The Goatsucker Family is represented in North Carolina by three distinct species. These are the Chuck-will's Widow, which is con-

fined chiefly to the eastern portion of the State. It is the largest of the three. The Whip-poor-will, which is of pretty general distribution, is the second species, and the third is the Nighthawk or "Bullbat," known to all observers of bird life from the coast to the highest mountain regions. Because of the fact that the activities of these birds are largely nocturnal much confusion has arisen as to their identification, and the writer has for many years been familiar with the query, "Are the bullbat and the whip-poor-will the same bird?" The whip-poor-will, although about the size of the nighthawk, appears in flight to be the heavier. This is probably on account of the wings being shorter. From tip to tip the wings of an average specimen measures seventeen inches, while the same measurement made of a typical nighthawk shows twenty-three inches. The whip-poor-will is decidedly a night bird and rarely makes its appearance before late dusk. Its eggs are deposited usually on old leaves generally to be found on the ground in a thicket, while the nest of the nighthawk is a smooth place on the bare ground, either in the *open* woods or fields. All of the representatives of this family feed upon insects, which they capture while on the wing. Hence the approach of winter necessarily drives them to the far South, where an insect diet may be procured.

The United States Department of Agriculture in its study of the feeding habits of birds had 87 nighthawks killed and the contents of the stomachs examined. One of the most conspicuous elements of food was found to be flying ants. In twenty-four individuals the number counted ranged from two hundred to eighteen hundred. While some ants at times have useful functions, they are as a whole annoying and harmful insects. The work done by the nighthawk in destroying the flying ant is doubly important, as it occurs just at the epoch in an ant's life when it is preparing to propagate its kind. The death of an ant at this time means the loss of hundreds or perhaps thousands of the next generation. Nighthawks eat many grasshoppers. One stomach held the remains of sixty individuals. This was probably the remains of several meals, as indicated by the presence of the mouth parts, which alone had remained in the stomach. Numbers of the birds were found to have eaten may beetles and others had consumed potato beetles. Bugs of the chinch-bug family, leaf-hoppers, and many soft-bodied dipterous insects were discovered, as well as the remains of many small insects like mosquitoes, but not fully identified.

It is evident that the nighthawk is one of the most valuable birds, and the law which protects them should at all times be carefully observed. The man who watches these birds flying about over his farm of an evening may feel well assured that they are friends and will do him no harm, but rather much good.

BROWN THRASHER.

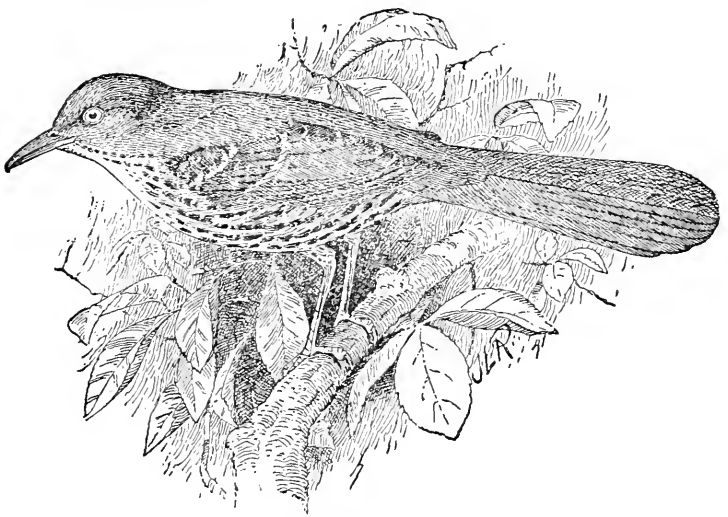
Rufus brown above, except the tips of the wing covert, which are whitish. Below the bird is white, streaked (except on the throat and belly) with black. Length near 11½ inches.

Range.—Eastern United States; breeds from Florida to Maine.

Nest.—Composed of twigs, small roots, pieces of grapevine, or other similar material, and lined with fine rootlets. It is placed in thickets, bushes, or, rarely, on the ground.

Eggs.—Generally, four in number, the ground color of light gray, thickly speckled, covered with brown.

This has been a familiar bird with the most of us since our earliest school days, when we heard the children recite the classic verses beginning: "There's a merry Brown Thrush sitting up in the tree." Although it is a comparatively common bird throughout the State in



BROWN THRASHER.

(After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.)

summer, many individuals retire southward upon the approach of cold weather, and it is probably very rare west of Raleigh during the winter weather. I saw one at Chapel Hill January 2, 1899, and the date would seem to indicate that it had taken up its abode there for the winter.

Being largely a ground-inhabiting species, the Brown Thrasher naturally feeds upon a great many insects which can be gathered there. They are known to destroy cutworms, cankerworms, and caterpillars of many kinds. Grasshoppers, crickets, grubs and beetles are eaten. Dr. Sylvester Judd, of the United States Department of Agriculture, has given an interesting summary of the contents of 121

stomachs of the Brown Thrasher which he has examined. He states that 36 per cent of the food was vegetable and 64 per cent was animal. It eats much wild fruit and occasionally cultivated fruit is attacked. Besides weed seeds of various kinds the bird comes to the borders of the fields and picks up stray grains of corn dropped in harvesting season. It also frequents public roads and gathers grain scattered in the dust. Locally, and, so far as I have ever been able to learn, sparingly the Thrasher pulls up sprouting corn and other grain. One hears very little complaint of this, however, and the bird is regarded of sufficient value to be protected at all times by the law of the State.

The Thrasher consumes a tremendous amount of food daily. The writer was especially impressed with this fact a few years ago while watching a pair of the birds feed their young in the yard of Mr. Robert U. Garrett, at Asheville. The nest was in a thorn bush about seven feet from the ground and directly in front of my window, which gave me abundant opportunity for observing the actions of the parent birds. They began feeding their young before 6 o'clock in the morning and continued until about 8 in the evening. Through my field glasses I determined the fact, for the birds often alighted near me, that they sometimes carried two or three insects or worms at once. I watched them for hours on different days and, keeping careful record, found that one parent averaged a trip to the nest with food every ten minutes and the other bird averaged one every *two and one-half minutes.* If they did this during the entire fourteen days the young were in the nest, counting that they carried only one article of food each trip, it would mean that the young were fed 6,880 worms and soft-bodied insects before they ever left the nest. Doubtless 50,000 or 75,000 insects were destroyed by that one Thrasher family the summer of 1902.

Meadow Lark (*Sturnella magna*).

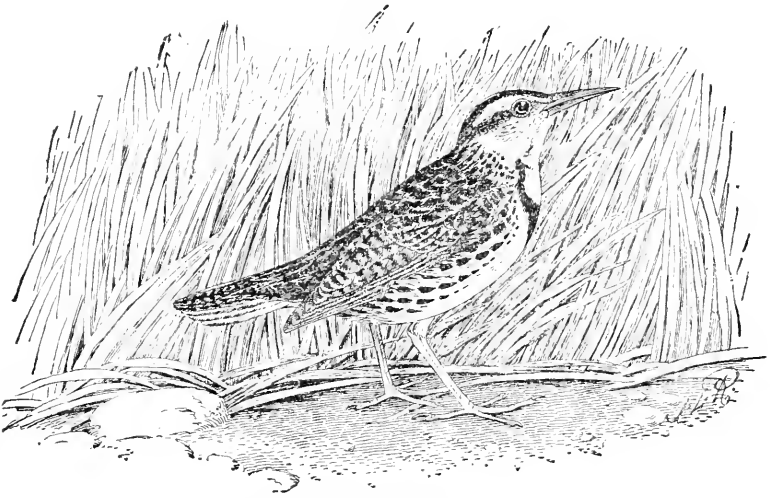
Upper plumage brownish, with dark-streaked, pale-edge feathers; outer tail feathers with much white; a light yellowish line from the bill down the top of the head and a similar stripe over the eye; a dark line behind the eye; yellow below with a large black crescent on breast; sides lighter with prolonged black spot. Winter plumage: feathers of black more widely margined with brown, giving a suggestion that brown is the prevailing color; the yellow of the plumage duller; length 10¾ inches.

Range.—Eastern North America; breeds from the Gulf of Mexico to New Brunswick.

Nest.—Of grasses, usually arched over; located on the ground, often beneath a bunch of grass or small pine sapling.

The Meadow Lark or Old-field Lark, or, as it is often called, "Fee Lark," is a familiar acquaintance of virtually every farm boy in the State. Its loud, clear call in the spring is known to all whose business or pleasure takes them to the fields. Its clear,

far-reaching whistle of "laziness will kill you" is enough to arouse in the mind of the hearer more than a passing notice. It is a common bird throughout eastern United States in the summer months, and winter finds it still inhabiting most suitable localities from the District of Columbia southward. Living as it does on the ground, it is seldom seen perched aloft unless for the purpose of singing, or when resting after its search for food. In flying it proceeds by alternately sailing and beating its wings rapidly. The nest is an oven-like structure concealed under a tuft of grass or small bush, and the eggs, which are four or five in number, are beautifully spotted from Nature's bounteous palette.



MEADOW LARK.

(After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.)

The Lark is essentially a bird of the fields, but in the open pine woods of the East it finds a territory suitable for its occupancy. When on the ground it does not hop like many small birds, but walks like a crow or chicken, occasionally expanding its tail feathers with a sudden jerky movement which displays well the outer white tail feathers of that member.

Our Meadow Lark is a decidedly handsome bird, and probably in part for this reason and because it affords a rather easy mark for the gunner, many are shot for the mouthful of flesh to be found beneath their beautiful feathers. A parasitic worm often found in the small of the back deters many experienced persons, however, from pursuing the bird persistently.

Few birds are more constant eaters of insects than the Lark. Even in winter when snow lies thickly on the ground many stomachs

have been found to be filled largely with insects which have been procured about manure piles, the edges of straw stacks and similarly exposed places. Two hundred and thirty-eight Meadow Lark stomachs were examined by the United States Biological Survey. They had been killed in various localities and at all seasons of the year. The object of the experiment was to determine as accurately as possible the facts regarding the bird's food. The results were carefully tabulated and the following interesting results were obtained:

MONTHS.	Stomachs Examined.	Animal Food.	Grain.	Weed Seeds.	Total.
January	13	24.36	75.28	.36	100
February	1	.00	25.00	75.00	100
March	12	73.14	17.00	9.86	100
April	28	77.51	15.10	7.39	100
May	8	97.99	1.88	.13	100
June	20	95.79	2.10	2.11	100
July	18	97.32	.00	2.68	100
August	28	99.35	.00	.65	100
September	29	99.20	.40	.40	100
October	40	94.39	.61	5.00	100
November	22	77.08	6.50	16.42	100
December	19	39.22	32.70	28.08	100
Year	238	72.95	14.71	12.34	100

The above shows that nearly three-fourths of the Meadow Lark's food for the year consists of insects, about 12 per cent of weed seeds, and 15 per cent is grain. The record of grain may raise a question as to the bird's possible injury to crops. A glance at the table, however, shows that almost the entire amount of grain was eaten during the months of December, January, February, March, and April, and was apparently largely gleaned from the stubble fields. The following is a list of the insects identified from these stomachs:

No. 1.—*Orthoptera.*

Red-legged grasshoppers,
Meadow grasshoppers,
Other grasshoppers,
Crickets.

No. 2.—*Coleoptera.*

Weevil,
Billbug,
Curculio,
Clover weevil,
Fire-fly family,
Lady birds,
Scarred snout beetle,
Leaf-eating beetle,
Flea beetle,
Darkling beetle,
Rove beetle,
Longcorn beetle,
Tiger beetle,
May beetle,
Ground beetle,
Click beetle.

No. 3.—*Lepidoptera.*

Butterflies,
Moths,
Cutworm,
Army worm.

No. 4.—*Hemiptera.*

Stilt bug,
Soldier bug,
Assassin bug,
Chinch-bug,
Spittle insects,
Tree hoppers,
Jumping plant-lice.

No. 5.—*Hymenoptera.*

Ants,
Wasps,
Stinging ants,
Ichneumon flies.

No. 6.—*Miscellaneous Animal Food.*

Ticks,
Snails,
Thousand-legs,
Small batrachians,
Sawbugs,
Spiders and cocoons.

It is rather a remarkable fact that the Lark, being a ground-feeding bird, should destroy so few beneficial insects. This may possibly be explained by the fact that many of the useful kinds have a disgusting odor. The one fact alone that the bird eats chinch-bugs is enough to make us his friend forever, for we cannot lose sight of the fact that this troublesome bug in the United States during the past half century has destroyed grain to the estimated value of over $330,000,000. Of late it has also been discovered that the Lark is a wonderful enemy of the boll weevil. Professor Beal, of Washington, D. C., estimates that in the great hay-producing sections of the country this bird annually saves two and one-half tons of hay in each township as a result of destroying grasshoppers.

But the story of the good which the Meadow Lark does is not yet all told. We noticed that it eats weed seeds. Here are some of the seeds found in the stomachs of those 238 specimen birds:

Pigeon grass,
Panic grass,
Smart weed,
Rag weed,
Gromwell seed,
Black mustard,
Bayberry.

What a wonderful record for good the Meadow Lark has to its credit. Does it occasionally pull up some sprouting grain? Such statements have at times been in circulation. However this may be, careful observers all appear to unite in voting it a good and useful bird, and in nearly all States in the Union it is guarded by statutes the year through. The following States only have not as yet enacted laws for its protection, viz.: Florida, North Carolina, Georgia, Alabama, Louisiana, Tennessee, Missouri, and Idaho.

THE WOODPECKERS.

In North Carolina the following species and climatic varieties of woodpeckers are to-day recognized by naturalists:

Hairy Woodpecker (*Dryobates villosus,* Linn).

Southern Hairy Woodpecker (*D. v. audubonii,* Swains).

Downy Woodpecker (*Dryobates pubescens,* Linn).
Red-cockaded Woodpecker (*Dryobates borealis,* Vieill).
Yellow-bellied Sapsucker (*Sphyrapicus varius,* Linn).
Pileated Woodpecker, "Logcock" (*Ceophloeus pileatus,* Linn).
Red-headed Woodpecker (*Melanerpes eruthrocephalus,* Linn).
Red-bellied Woodpecker (*Melanerpes Carolina,* Linn).
Flicker: "Yellow Hammer": (*Colaptes auratus,* Linn).

Woodpeckers are as a rule solitary birds and are seldom seen associated in greater numbers than the individuals of one family. They are wonderfully adapted for performing their part in the economy of nature, which is to guard the trunks and limbs of trees from the undue increase of insects. All our woodpeckers are provided with four toes on each foot, two of which point forward and the other two backward. This arrangement gives them great power in clinging to vertical surfaces of trees. They are also aided by the stiff tail feathers, which serve as a substantial brace beneath. The stout chisel-like beak enables them to rapidly dig larvæ from the bark and wood and also provides them a means of readily excavating their nesting cavities. Woodpeckers have no power of song, their method of attracting the attention of others of their kind being a few calls and a loud tattoo beaten by the bill on some resounding limb, loose shingle, or tin coping of a house. All lay pure white eggs and deposit them on a thin layer of fine chips in the bottom of their nesting holes.

Many farmers look with the eye of suspicion upon the movements of woodpeckers when seen frequenting fruit and shade trees and pecking holes in them. Close observation reveals the fact, however, that these birds rarely injure a healthy tree, and with the exception of one species the holes they make seem to be almost entirely for the purpose of dislodging and devouring wood-loving larvæ.

The following are perhaps the four best known species in the State:

DOWNY WOODPECKER (*Dryobates pubescens*).

Upper plumage black, with (in the male) a red band across the back of head; middle of the back white; wings spotted with white; the outer tail feathers barred with white. There is also a white stripe above and one below the eye. Length about 6¾ inches.

Range.—Eastern North America from the Gulf to Labrador.
Nest.—In cavities of trees.
Eggs.—Four or five, glossy white.

The Downy, which is the smallest of our woodpeckers, is the common little "Sapsucker" seen in summer, frequenting the woodlands, orchards, and shade trees. Often one detects its presence first by hearing the busy *tap, tap,* of his bill as he works industriously at his daily task of collecting grubs and larvæ. He is especially attracted by neglected orchards where the old trees harbor a vast num-

ber of insects and tree vermin. The Downy is fond of the society of other small birds, and after the summer household duties are finished may frequently be seen in company with nuthatches and chickadees. Often these merry parties are joined by flocks of bright-colored warblers during their fall migration, and for days such avian bodies may be seen associated pleasantly. This bird usually excavates a hole in some dead limb as the cold weather approaches, to be used as a roosting place in winter.

The relation of the Downy Woodpecker to the orchard has been made a subject of careful study by a number of naturalists. One of the interesting observations made is that it pierces great numbers of cocoons of the codling moth, which are usually concealed under flakes of bark and thus escape the observation of many other birds. It destroys the wood-boring beetles and their larvæ in great quantities, and possesses the wonderful faculty of being able to locate with great accuracy the exact spot at which to dig with the least labor to secure its prey. It also eats many bark beetles and weevils and is a large consumer of the round-headed apple borer which infest fruit trees.

It is a well-known fact that a favorite place for the wooly aphis is at the scars made by pruning. Here they are often found in clusters, and some entomologists are of the opinion that their presence greatly retards if it does not even prevent the speedy healing over of these wounds. The Downy greatly enjoys the flavor of the wooly aphis.

This woodpecker at times has the habit of making large numbers of holes in the bark of apple trees. These are generally not over an inch apart and are arranged in parallel rows around the tree. The holes are round, which distinguish them from the holes made by the real Sapsucker, which will be discussed later. As this work is done in the autumn when the sap is not running, it is evidently not that fluid which the bird is seeking. If this is not done to secure the insects, but to obtain some portion of the tree, it is evidently the cambian layer of the bark. The writer has examined scores of fruit trees on which the Downy has thus demonstrated his ability as a chiseler of bark, but has never seen one which died from the attacks. In fact, one close observer declares that the trees thus favored with the Downy's attentions seem to be actually invigorated rather than injured.

The amount of work which this bird is capable of doing in a day is truly wonderful. Mr. Vernon Bailey, of Washington, D. C., once watched a bird of this species as it went about its daily toils. He found that between the hours of 9:40 A. M. and 12:15 P. M. it traveled about over one hundred and eighty-one trees and made twenty-six separate excavations for food.

All persons interested in the preservation of forests must be friends of this bird. It eats the very destructive bronze birch borer,

the maple borer, and the pine weevil. This last-named insect infests particularly the buds of the topmost shoots of pine trees, thus causing the tree to constantly send out side shoots, which of course makes a crooked tree and largely destroys its value for lumber.

Although about three-fourths of the food of the Downy has been shown to consist of insects, it eats in their seasons certain berries and wild fruits. It has been known to feed upon buds and petals of flowers, wild strawberries, pokeberries, poison ivy berries, sumac berries, and beech nuts.

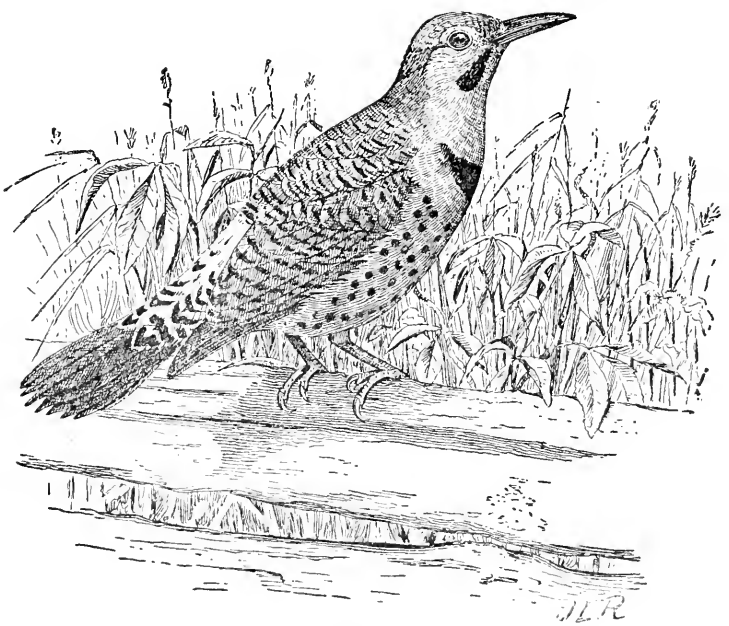
FLICKER: "YELLOW HAMMER": (*Colaptes auratus*).

Upper parts brownish gray, barred with black; rump white; top of head ashy gray, a scarlet band (in the male) across the back of head; inner surface of wings yellow; tail black above, yellow below, with black tip; a broad black crescent on breast; belly and sides thickly spotted with black. Length about 12 inches.

Range.—North America, west to Rocky Mountains and north to Alaska.

Nest.—In cavities of trees.

Eggs.—Four to seven, glossy white.



FLICKER.

(*After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.*)

No bird in America has so many local names as the Flicker. Some of these are Highholder, Wake-up, Walk-up, Pigeon, Woodpecker, and Yawker-bird. At Cape Hatteras it is generally called Wilchrisen. It is one of the best known of our native birds, and this

fact, together with its loud, characteristic calls, has doubtless given rise to the various names by which it is known. The Flicker is exceedingly sociable at times, and has the habit of entering the barns and other outbuildings. While a student at the University of North Carolina I knew flickers to frequently go into the New East Building through open windows. There is a church in the woods on Roanoke Island, or was some years ago, which the flickers often entered. They also dug many large holes in the posts which supported the roof of the porch in front. I know of no reason for this habit of going in buildings. Perhaps it is in quest of food, maybe it is out of simple curiosity, or possibly it is in an endeavor to find some snug winter quarters, away from the cold winds.

Although the Flicker is a true woodpecker, it is far more of a ground-feeding bird than any other species of this family. They may often be started from the ground in the fields or open woods where they have been feeding on grasshoppers or other insects.

The Bureau of Biological Survey of the United States Department of Agriculture examined carefully the contents of 394 flickers' stomachs taken in 28 States, including Canada. It was found that about 50 per cent of their food consists of ants. The tremendous number of these troublesome little pests which are killed may be illustrated by the fact that two stomachs were found to contain over 3,000 ants each. Flickers also eat various insects and occasionally fruit in limited quantities. The fruit and berries consumed appears to be largely wild in character, as shown by the following list of vegetable food found in the northern flickers examined:

Cultivated cherry,	Sumac,	Mulberry,
Choke cherry,	Black alder,	Spice-bush,
Wild black cherry,	Smilax,	Cedar,
Elder,	Blackberry,	Sassafras,
Dogwood,	Raspberry,	Persimmon,
Cornel,	Waxmyrtle,	Apple,
Pepperidge,	Blueberry,	Pear,
Virginia creeper,	Pokeberry,	Seeds,
Hackberry,	Service-berry,	Sweet fern,
Poison sumac,	Magnolia,	Polygonum,
Poison ivy,	Wild grape,	Clover,
	Huckleberry,	Mullein.

The services which flickers render in destroying the ground-inhabiting ants may be better appreciated by looking carefully into the relationship existing between ants and the destructive plant-lice with which their lives are curiously associated. The world-known scientist, Professor Comstock, in his "Manual of the Study of Insects," says:

"It is easy to see what benefit ants derive from this association with plant-lice, and how they should learn that it is worth while

for them to care for their herds of honey-producing cattle. Little has been done, however, to point out the great benefit that accrues to the plant-lice from this relationship. It seems fair to assume that the plant-lice are greatly benefited, else why has the highly specialized apparatus for producing the honey-dew been developed?

"Writers long ago showed that ants protected plant-lice by driving away from them lady-bugs and other enemies. Recently, however, Professor Forbes has demonstrated that, in certain cases at least, a more important service is rendered. In his studies of the corn plant-louse he found that this species winters in the wingless, agamic form in the earth of previously infested corn-fields, and that in the spring the plant-lice are strictly dependent upon a species of ant, *Lasius alienus,* which mines along the principal roots of the corn, collects the plant-lice, and conveys them into these burrows, and there watches and protects them. Without the aid of these ants the plant-lice were unable to reach the roots of the corn. On page 631 it is stated: 'Ants take very good care of their cattle (aphids), and will carry them to new pastures if the old ones dry up. They also carry the aphid-eggs into their nest and keep them sheltered during the winter, and then carry the young plant-lice out and put them on plants in the spring.' "

Mr. William Dutcher, president of the National Association of Audubon Societies, writes: "If the Flicker had no other valuable economic quality, it would deserve protection because it is an enemy of the ant family."

RED-HEADED WOODPECKER (*Melanerpes erythrocephalus,* Linn).

Adult: head, neck and throat red; general upper plumage bluish black, except rump, upper tail coverts and portion of wings, which are white; lower breast and belly white. In first plumage young have grayish brown head and neck, and irregular bars of black on white of the wing. Length about 9¾ inches.

Range.—Breeds from Florida to New York; winters from Virginia southward.

Nest.—In cavities of trees or poles.

Eggs.—Four to six, glossy white.

Throughout the larger portion of North Carolina the Red-headed Woodpecker is a more or less common resident. It inhabits cultivated fields in many places, and its usual perch is on an upright fence stake or a dead tree in some clearing. It is often seen along railroads, where the telegraph poles are used as stations of outlook. This woodpecker also is found in the towns of the State, particularly those favored with large shade trees. In collecting food it does not, as a rule, traverse the trunks and limbs of trees after the manner of the Downy, or dig in the earth like the Flicker. While at times it catches insects on the bark of trees, and seizes grasshoppers and beetles in the grass, its favorite method of the chase is to dart out

from some post of observation and capture passing insects on the wing, as do the Kingbird and Pewee. In considering the economic value of a bird as a destroyer of insects there must be borne in mind the fact that not all insects are injurious to man's interests and some are of real value. The Red-head is known to kill certain beneficial forms, such as tiger beetles and various predaceous ground species. It has also been accused of killing the young of other birds, although there appears to be little data on which to found an opinion that this habit is widespread or universal. Its vegetable food is varied, con-

RED-HEADED WOODPECKER.

(After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.)

sisting mainly of fruit, berries, and beech-nuts. The writer has often seen it feeding upon acorns of various kinds, and there is a pretty common belief that at times it stores acorns for winter use in convenient crevices of trees or posts.

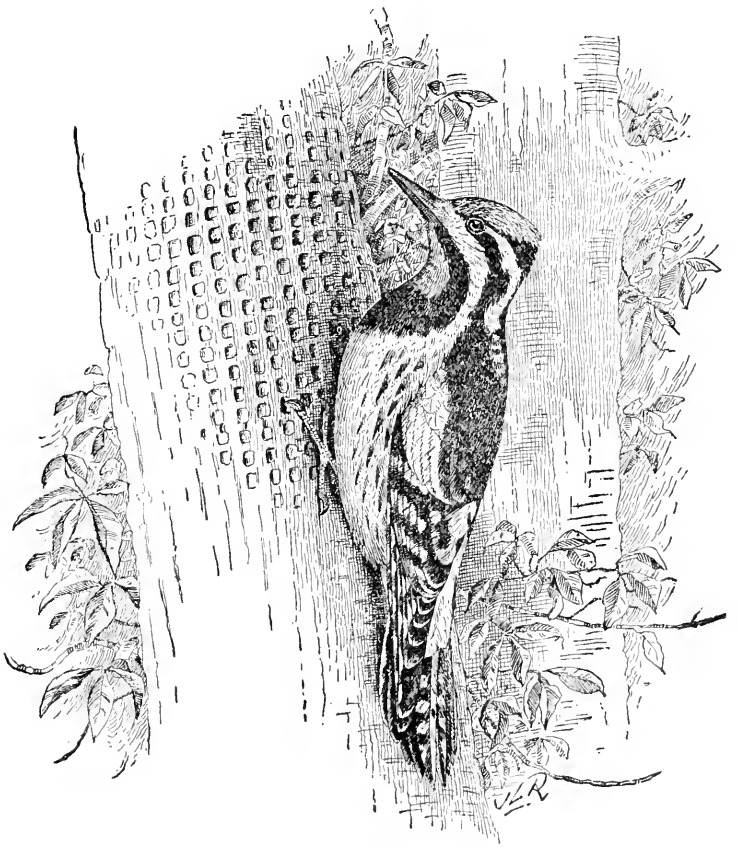
YELLOW-BELLIED SAPSUCKER (*Sphyrapicus varius,* Linn).

Top of head scarlet; back barred with black and yellowish white; white spots on wings; white line under eye; throat red (white in female); breast black, belly yellowish white; sides streaked with black.

Range.—Eastern North America; breeds generally from the higher North Carolina mountains northward. Winters from Virginia to Central America.

Nest.—In cavities of trees.

Eggs.—Five to seven, glossy white.



YELLOW-BELLIED WOODPECKER.

(After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.)

The Sapsucker is generally seen in North Carolina about the time of the first cold days of autumn. It is decidedly retiring in its habits, and one may live a week among the trees of the barn-lot without being noticed. It haunts the trunks of trees, appearing to prefer those of dense foliage. The male may be readily distinguished from the other smaller woodpeckers by the bright red feathers of the throat.

The Sapsucker's food consists in part of many varieties of such wild berries as it is able to find in the autumn and winter. It eats insects when these are accessible. Its chief diet, however, consists of the inner layer of bark of a variety of trees and the sap which it is enabled to collect by means of numerous small holes excavated through the bark for this purpose. Among other trees, it is known to attack the apple, sugar-maple, mountain ash, and hemlock. In the spring of 1891 I watched with much care the actions of a Sapsucker, and the following brief account of what occurred is taken from the writer's book, "Stories of Bird Life":

"For several years a Sapsucker (possibly not the same bird always) has each season visited a small balsam growing in a frequented lawn near my home. In the autumn it begins its attack and a few small holes are dug through the bark, but by far the larger amount of his work is done in the spring. This year when the sap first began to rise the Sapsucker came out of the woods and commenced operations on the balsam. He is a wonderful carpenter, and the way he made the chips fly with his sharp bill was astonishing. Hour after hour he toiled on, cutting scores of holes through the bark to the solid wood beyond. In a few days hundreds of these little wells had been sunk and the sap rose in them in abundance.

"The bird would cling to the side of the tree, braced by his tail, and drink the sweet juice from the holes, one after another. As they ran dry, day by day, other holes were chiseled. Usually these openings were made in rings about the tree or in rows up and down its side. I counted forty-two holes in one vertical line. These were mostly about the size of a lead pencil, but a few were an inch and a quarter long and three-fourths of an inch wide. Some of the holes are less than a foot from the ground and they occur at intervals for twenty feet, or fully two-thirds the distance to the top. The perforations were confined chiefly to the trunk of the tree, and in only one case was a limb assailed.

"During the month of March new holes were made daily and on the 29th the bark showed 1,671 unhealed openings, which had been made this spring. Hundreds of old scars bear mute testimony to the workings of the Sapsucker in previous years."

Trees which have been attacked by the bird sometimes die, but the one referred to above is now (September, 1909) still alive and flourishing.

ENGLISH SPARROW (*Passer domesticus,* Linn).

General color suggests grayish chestnut; back streaked with black; top of head gray and rump gray, whitish below, except throat and breast (in male only) black. Length about 6½ inches.

Range.—A large part of Europe and Asia. Naturalized in America, New Zealand, Japan, Australia, and elsewhere.

Nest.—Sticks, twigs, grass, and feathers, and situated in any available place.

Eggs.—Four to six, finely and evenly spotted.

It was in the year 1851 that the English Sparrow was introduced into America. They were liberated first in Brooklyn, N. Y., and later in other eastern cities. Many thought the bird would prove a great friend to man by destroying caterpillars which infested the trees of the parks and gardens. In this the stranger was largely a failure; but as a fighter of other birds, a disturber and broiler of the town, and a general all-round nuisance, he has been a pronounced success. His unprepossessing manner, his habit of feeding among filth, his rolling in the dust of the city streets, and his harsh, never-ending chirps, have all combined to bring upon his head the abuse of a long-suffering Nation.

This sparrow is exceedingly hardy and is apparently little affected by climatic conditions, being equally at home in the biting winds of a Quebec street or panting in the throbbing heat of a Tampa house-top. Because of their wonderful adaptability to environment the species has spread with marvelous rapidity throughout North America, although in many sections they are as yet confined to the towns and cities. Traps, poisons, and guns are brought to bear upon them in untold numbers, but the English Sparrow holds its own and defiantly builds its nest in the veranda trellis, roosts behind the window-blind, and at the peep of day shouts its "get up" call to its sleepy tormentors.

Occasionally one meets with a friend of the sparrow who, if he be a gardener, will tell of the cabbage worms which this bird destroys; or, if he be a farmer, he may show you in dollars and cents how the sparrow has been worth his weight in silver by eating the worms from his tobacco plants. Such friends, however, are rare. On the whole, he has been voted a nuisance by nearly all the State legislatures in the Union, and chiefly on account of his presence Congress has enacted a law prohibiting the importation to America of any wild birds or animals without the consent of the proper government authorities. The effect of the English Sparrow on American bird life has thus become a most pronounced one. One should be careful not to confuse this imported species with any of our native sparrows, all of which are of the first importance as destroyers of insects and consumers of noxious weed seeds.

BLUEBIRD (*Sialia sialis*, Linn).

Upper parts bright blue; throat, breast, and sides dull brick-brown; belly white. The blue of a female has a grayish tinge, and colored underparts are paler.

Range.—United States and Southern Canada.

Nest.—Of grass, in bird boxes or holes of trees and stumps.

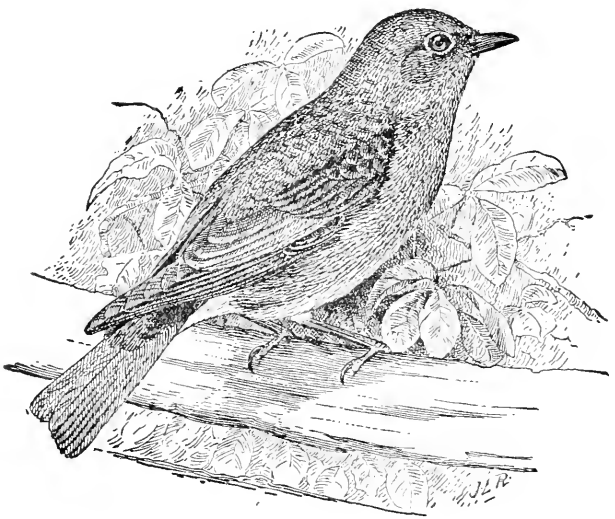
Eggs.—Four to six, pale blue, sometimes white.

Early in the year 1895 a prolonged cold spell, accompanied with an abundance of snow and ice, restricted the food supply of the Bluebird to such an extent that large numbers succumbed to famine

and cold. As many as fifteen individuals were found dead in a single hollow of a tree in Guilford County. For several years after this catastrophe a question often heard was: "What has become of the Bluebird?" Normal food and climatic conditions are again resulting in the bird once more assuming something like its usual numbers.

The Bluebird seems equally at home in the farmyard or in the field or open woods, remote from human habitation. Always it is the same cheerful, inoffensive little creature, whose very appearance is calculated to cheer the heart. They mate early in the spring. are affectionate parents, and care well for their young.

It is said that geese, swan, eagles, and some other birds mate for life, and if one is killed the survivor will rarely mate again. The



BLUEBIRD.

(After Beal, Farmers' Bulletin No. 54, Office of Experiment Stations, U. S. Department of Agriculture.)

Bluebird does not take matrimonial matters so seriously. The writer one spring placed a bird box on a tree in a yard near where two Bluebirds had made their appearance. They at once took possession of it, and in time four blue eggs were deposited. Then a cat climbed the tree and caught the female on the nest. The male was much distracted the next day and mourned constantly for his loss. The day succeeding, however, he found a second mate. She laid five eggs and in turn suffered the same fate as the preceding female. Then I shot the cat. A third wife built her nest in the box and successfully reared her young.

People living in towns, unfortunately, do not have the pleasure of the Bluebird's company as much as in former years. This is due to the inroads of the English Sparrow. My observation has been that in a fair fight the Bluebird can hold its own with the doughty little Britishers, but nevertheless, sooner or later, the latter usually become masters of the situation, and the Bluebird retires to the more peaceful environment of the open country.

So far as is generally known, the Bluebird does not steal fruit or eat the crops of the farmer. Its vegetable food consists of the berries of the poison ivy, cedar, and such other vines and trees as provide food for birds during the winter. I have seen it eat mistletoe berries. In the Bureau of Biological Survey at Washington the contents of 300 Bluebirds' stomachs showed that 76 per cent of their food for the entire year consisted of insects and their allies; 28 per cent of their food was beetles of various kinds. The bird is a great destroyer of grasshoppers, and during August and September 60 per cent of its diet is of this character. The Bluebird appears to be popular and beneficial wherever found, and should be encouraged at all times to dwell on the farm.

HOW TO ATTRACT BIRDS.

Much may be done with a very little trouble to induce many species of wild birds to come about the house. A short observation is sufficient to demonstrate the facts relative to what birds really require if they are to stay about you. The conditions plainly necessary are: First, food; second, reasonable security from enemies; third, suitable nesting places. Much food may be provided about a farm by simply letting Nature have her own way to a degree. Do not cut down all the wild cherry trees; leave a few for the birds. Let some blackberries grow here and there. If a haw or sumac is growing near the house do not remove it. Plant a few sunflowers in the corner of the garden or along the edge of the field; they will take up little space and yield abundant food for the chickadee, goldfinch, titmouse, nuthatch, and cardinal. In winter a little beef or sheep fat tied to the limb of a tree will be deeply appreciated by the Downy Woodpecker and Titmouse. A little broken refuse grain and chaff in winter will likewise furnish comfort to the snowbirds and various native sparrows, if it is thrown out where they can get it.

Birds do not care to remain long about a house if there is grave danger from enemies. The most terrible of all destructive agencies to the average farmland bird is the domestic cat. This creature pounces with great frequency on the birds while they are feeding or hopping along the ground; it catches innumerable young shortly after they have left the nest and are as yet unable to fly; it eats the little ones in the nest or catches the old one as she broods by night.

All extra and stray cats about a house should be killed, not sent away to plague some other neighborhood; it is a mercy to the cats and a help to the birds.

Birds need cover into which they can dart upon the sudden appearance of a hawk, cat, or other enemy. Cedar trees, honeysuckle vines, or other shrubbery afford them much protection.

If we would see birds to the best advantage in summer we must have them nesting not far away. If suitable places can be found many birds prefer to build their nests somewhere near the homes of man. If the veranda has a climbing rose the Yellow Warbler will often build in it. The Thrasher will nest in the brush-heap or in the mass of vines in the back lot or fence corner. By putting up a small box on a pole the Bluebirds will accept the invitation of free rent and will pay you handsomely for your favor by catching thousands of insects in your garden. Gourds or boxes on high poles will, in many parts of the State, attract colonies of Purple Martins that will drive hawks away from the chickens and rid the air of many insects.

So much good will result to the man who is kind to the birds it is a great wonder all persons do not realize the fact and profit thereby.

THE BULLETIN

OF THE

NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. OCTOBER, 1909. Number 10.

ANNUAL REPORT

OF

FARMERS' INSTITUTES,

BY

T. B. PARKER

DIRECTOR OF FARMERS' INSTITUTES.

PUBLISHED MONTHLY AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MAIL MATTER.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, N. C., October 25, 1909.

SIR:—I herewith hand to you my report of the Farmers' and Women's Institutes for the current year and suggest the same be used for the October Bulletin.

Respectfully submitted,

T. B. PARKER,

State Director of Farmers' Institutes.

To HON. W. A. GRAHAM,

Commissioner of Agriculture.

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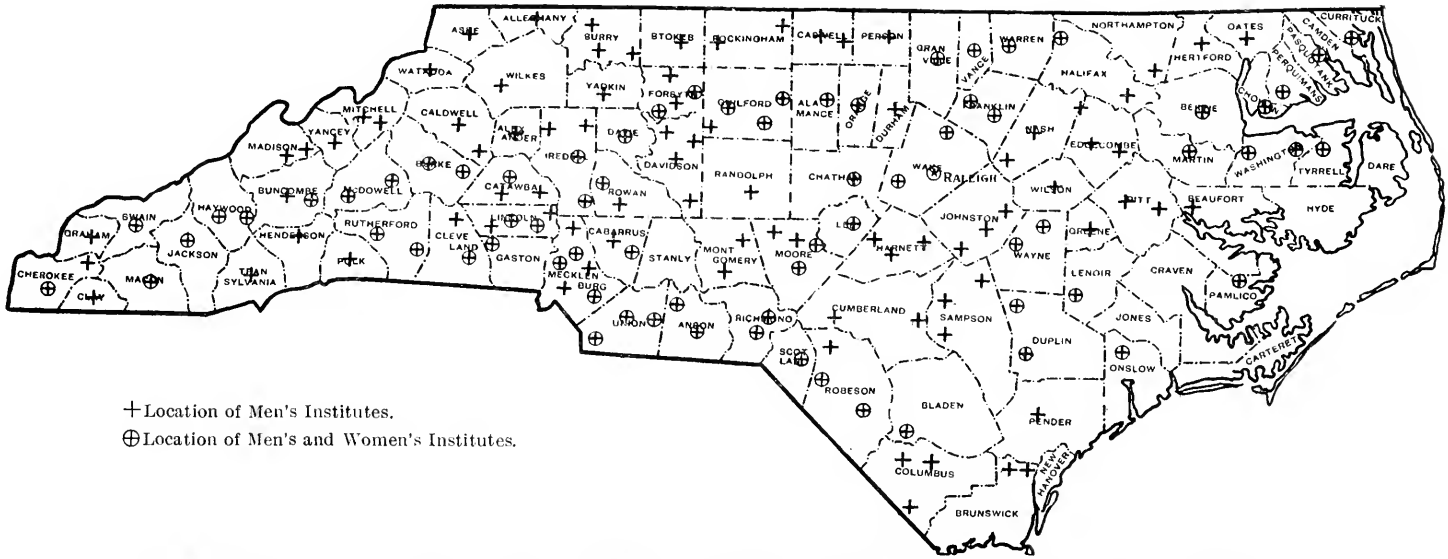


+Location of Men's Institutes.

⊕Location of Men's and Women's Institutes.

1909 Map Showing Location of Farmers' Institutes for Men and Women Held Under the Auspices of the State Board of Agriculture.
T. B. PARKER, Director of Institutes.

REPORT OF FARMERS' INSTITUTE WORK, 1909.

By T. B. PARKER, Director.

During the Institute year, from December 1, 1908, to November 1, 1909, there have been held 247 institutes under the direction of the State Department of Agriculture. In addition to the above, the State Department of Agriculture assisted in 12 institutes held under the auspices of M. V. Richards, Industrial Agent for the Southern Railway, and 8 special institutes in Brunswick, Cabarrus and Bladen counties.

Of the above institutes held under the direction of the State Board of Agriculture, 159 were regular Farmers' Institutes for men, 73 institutes for women, 12 Orchard Demonstration Institutes, 2 Corn Judging Day Institutes, and one Round-up Institute, or Farmers' Convention, of three days, holding separate meetings for both men and women.

Institutes have been held during the year in 93 of the 98 counties—all except Carteret, Camden, Craven, Dare and Jones.

With each year the number of institutes increases, as the following table shows:

1898— 28 institutes in 27 counties.
1903— 17 institutes in 16 counties.
1904— 58 institutes in 58 counties.
1905— 79 institutes in 76 counties.
1906—136 institutes in 91 counties.
1907—169 institutes in 93 counties.
1908—234 institutes in 95 counties.
1909—247 institutes in 93 counties.

To the above should be added the 12 institutes that were held in conjunction with Mr. M. V. Richards, Industrial Agent for the Southern Railway, the 8 special institutes, and also 2 institutes held for the colored people, making a total of 269 institutes held, which is 35 more than were held up to December 1 of last year, and last year exceeded any previous year by 66.

Notwithstanding this increase in number of institutes, applications for others came in, but too late to get in the regular schedules.

From the expressions of appreciation given at the institutes and the general uplift in agricultural methods in sections where institutes have been held most, it is evident that the work is held in high esteem by our best farmers. The scope of this work should be increased as rapidly as means and suitable lecturers will permit. Already in many counties the farmers are asking for an increased number of institutes for next year.

In our institute work the newspapers of the State have given us valuable assistance by calling the attention of their readers to the institutes, announcing dates and places of institutes, printing the programs and emphasizing their importance. I am glad to acknowledge this work of helpfulness from the editors of the State press.

MEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
July 20	Alamance	Mebane	Parker, Shaw, Newman, Jeffrey.
Aug. 12	Alexander	Taylorsville	Newman, Robinson, Roberts.
Aug. 2	Alleghany	Sparta	Scott, Roberts, Reimer.
Aug. 5	Anson	Wadesboro	Hutt, Heiges, Finley, Jeffrey.
Aug. 6	Anson	Diamond Hill	Hutt, Heiges, Finley, Jeffrey.
Aug. 3	Ashe	Jefferson	Scott, Roberts, Reimer.
July 29	Beaufort	Washington	Sherman, Petree, McLendon.
Jan. 19	Bertie	Windsor	Parker, Sherman, Burgess.
Aug. 3	Bladen	Bladenboro	Hutt, Jeffrey, Hartman.
Aug. 13	Brunswick	Leland	Sherman, Barlow, Layton.
Aug. 12	Buncombe	Leicester	Burgess, Wilder, Chrisman.
Aug. 18	Buncombe	Swannanoa	Parker, Stevens, Conover.
Aug. 3	Burke	Connelly Springs	Parker, Stevens, Conover.
Aug. 4	Burke	Morganton	Parker, Stevens, Conover.
July 31	Cabarrus	Concord	Burgess, Chrisman, Browne.
Aug. 21	Cabarrus	Mount Pleasant	Stevens, Conover.
Aug. 6	Caldwell	Lenoir	Scott, Roberts, Robinson, Reimer.
Aug. 7	Caldwell	Granite Falls	Scott, Roberts, Robinson, Reimer.
July 15	Caswell	Leasburg	Scott, Reimer.
July 16	Caswell	Yanceyville	Scott, Reimer.
Aug. 2	Catawba	Hickory	Parker, Stevens, Shaw, Conover.
Aug. 9	Catawba	Shuford's Farm	Newman, Hartman, Roberts.
Aug. 11	Catawba	Sherrill's Ford	Newman, Robinson, Roberts.
July 24	Chatham	Pittsboro	Hutt, Conover.
Aug. 7	Cherokee	Andrews	Parker, Stevens, Conover.
Aug. 9	Cherokee	Murphy	Parker, Stevens, Conover.
Jan. 25	Chowan	Edenton	Parker, Sherman, Burgess.
Aug. 10	Clay	Hayesville	Parker, Stevens, Conover.
Aug. 7	Cleveland	Casar	Burgess, Michels, Wilder.
Aug. 19	Cleveland	Shelby	Hutt, Heiges, Jeffrey.
Aug. 14	Columbus	Whiteville	Sherman, Barlow, Layton.
Aug. 16	Columbus	Chadbourn	Sherman, Barlow, Layton.
Aug. 17	Cleveland	Tabor	Sherman, Barlow, Layton.

MEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
July 20	Cumberland	Raeford	Burgess, Chrisman, Browne.
Aug. 18	Cumberland	Fayetteville	Sherman, Barlow, Layton.
Jan. 21	Currituck	Currituck	Parker, Sherman, Burgess.
July 20	Davidson	Lexington	Scott, Reimer.
July 21	Davidson	Enterprise	Scott, Reimer.
July 26	Davidson	Denton	Burgess, Chrisman, Browne.
July 27	Davidson	Thomasville	Burgess, Chrisman, Browne.
July 27	Davie	Mocksville	Parker, Shaw, Newman, Jeffrey.
July 16	Duplin	Calypso	Sherman, Newman.
July 17	Duplin	Rose Hill	Sherman, Newman.
July 13	Durham	County Home	Scott, Reimer.
July 23	Edgecombe	Conetoe	Sherman, Barlow, McLendon.
July 26	Edgecombe	Whitakers	Sherman, Petree, McLendon.
July 27	Edgecombe	Test Farm	Sherman, Petree, McLendon.
July 22	Forsyth	Winston-Salem	Scott, Reimer.
July 24	Forsyth	Kernersville	Shaw, Newman, Jeffrey.
July 26	Forsyth	Rural Hall	Scott, Reimer.
July 26	Forsyth	Clemmonsville	Parker, Shaw, Newman, Jeffrey.
July 20	Franklin	Franklinton	Hutt, Petree, Conover.
July 21	Franklin	Louisburg	Hutt, Petree, Conover.
Aug. 16	Gaston	Cherryville	Hutt, Heiges, Finley, Jeffrey.
Aug. 20	Gaston	Dallas	Burgess, Wilder, Chrisman.
July 19	Gates	Gatesville	Sherman, Barlow, McLendon.
Aug. 6	Graham	Robbinsville	Parker, Stevens, Conover.
July 17	Granville	Oxford	Hutt, Petree, Conover.
July 31	Greene	Grimsley's Church	Sherman, Petree, McLendon.
July 19	Guilford	High Point	Scott, Reimer.
July 21	Guilford	Gibsonville	Parker, Shaw, Newman, Jeffrey.
July 22	Guilford	Pleasant Garden	Parker, Shaw, Newman, Jeffrey.
July 23	Guilford	Guilford College	Parker, Shaw, Newman, Jeffrey.
July 22	Halifax	Scotland Neck	Sherman, Barlow, McLendon.
July 10	Harnett	Rock Branch	Parker, Hutt.
Aug. 20	Harnett	Coats	Sherman, Barlow, Williams.
Aug. 21	Harnett	Lillington	Sherman, Barlow, Williams.
Aug. 16	Haywood	Waynesville	Parker, Stevens, Conover.
Aug. 17	Haywood	Canton	Parker, Stevens, Conover.
Aug. 11	Henderson	Fletcher	Burgess, Wilder, Chrisman.
July 20	Hertford	Winton	Sherman, Barlow, McLendon.
July 29	Iredell	Mooresville	Parker, Shaw, Newman, Jeffrey.

MEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
July 31	Iredell	Statesville	Parker, Shaw, Newman, Jeffrey.
Aug. 13	Iredell	Eupeptic Springs	Newman, Robinson, Roberts.
Aug. 14	Iredell	Harmony	Newman, Robinson, Roberts.
Aug. 14	Jackson	Sylva	Parker, Stevens, Conover.
Aug. 4	Johnston	Kenly	Sherman, Petree, McLendon.
Aug. 5	Johnston	Smithfield	Sherman, Petree, McLendon.
Aug. 6	Johnston	Benson	Sherman, Petree, McLendon.
July 26	Lee	Courthouse	Hutt, Conover.
July 13	Lenoir	Holy Innocents	Sherman, Parker.
Aug. 6	Lincoln	Bess' Chapel	Burgess, Michels, Wilder.
Aug. 13	Lincoln	Iron Station	Hutt, Heiges, Finley, Jeffrey.
Aug. 10	Lincoln	Denver	Newman, Roberts, Robinson.
Aug. 14	Lincoln	Lincolnton	Heiges, Finley, Jeffrey.
Aug. 13	Macon	Franklin	Parker, Stevens, Conover.
Aug. 13	Madison	Marshall	Burgess, Wilder, Chrisman.
Aug. 14	Madison	Mars Hill	Burgess, Wilder.
Jan. 30	Martin	Williamston	Parker, Sherman, Burgess.
Aug. 19	McDowell	Old Fort	Parker, Stevens, Conover.
Aug. 20	McDowell	Marion	Parker, Stevens, Heiges, Conover, Jeffrey.
July 30	Mecklenburg	Derita	Shaw, Parker, Newman, Jeffrey.
Aug. 3	Mecklenburg	Sharon	Burgess, Michels, Wilder.
Aug. 4	Mecklenburg	Capps Schoolhouse	Burgess, Michels, Wilder.
Aug. 11	Mecklenburg	Matthews	Hutt, Heiges, Finley, Jeffrey.
Aug. 12	Mecklenburg	Paw Creek	Hutt, Heiges, Finley, Jeffrey.
Aug. 20	Mecklenburg	Huntersville	Burgess, Wilder, Chrisman.
Aug. 17	Mitchell	Bakersville	Burgess, Wilder, Chrisman.
Aug. 18	Mitchell	Spruce Pine	Burgess, Wilder, Chrisman.
July 21	Montgomery	Star	Burgess, Chrisman, Browne.
July 23	Montgomery	Mount Gilead	Burgess, Chrisman, Browne.
July 19	Moore	Carthage	Burgess, Chrisman, Browne.
July 22	Moore	Elise	Burgess, Chrisman, Browne.
July 27	Moore	Cameron	Hutt, Conover, Good Roads, Boykin.
July 28	Moore	Southern Pines	Hutt, Conover.
July 24	Nash	Nashville	Sherman, Petree, McLendon, Barlow.
Aug. 3	Nash	Stanhope High School	Sherman, Petree, McLendon.
Aug. 11	New Hanover	Castle Hayne	Sherman, Barlow, Layton.
July 21	Northampton	Rich Square	Sherman, Barlow, McLendon.
Feb. 3	Onslow	Richlands	Parker, Sherman, Burgess.
July 19	Orange	Hillsboro	Shaw, Parker, Newman, Jeffrey.

MEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
Feb. 1	Pamlico	Bayboro	Parker, Sherman, Burgess.
Jan. 22	Pasquotank	Elizabeth City	Parker, Sherman, Burgess.
July 14	Person	Roxboro	Scott, Reimer.
Aug. 12	Pender	Burgaw	Sherman, Barlow, Layton.
Jan. 23	Perquimans	Hertford	Parker, Sherman, Burgess.
July 28	Pitt	Greenville	Sherman, Petree, McLendon.
July 30	Pitt	Grimesland	Sherman, Petree, McLendon.
Aug. 9	Polk	Columbus	Burgess, Wilder, Chrisman.
July 24	Randolph	Ashboro	Burgess, Chrisman, Browne.
July 29	Richmond	Hoffman	Hutt, Conover.
Aug. 4	Richmond	Rockingham	Hutt, Jeffrey.
July 31	Robeson	Maxton	Hutt, Conover.
Aug. 2	Robeson	Lumberton	Hutt, Hartman, Jeffrey.
Aug. 19	Robeson	Red Springs	Sherman, Barlow, Layton.
July 17	Rockingham	Ruffin	Scott, Reimer.
July 23	Rockingham	Ellisboro	Scott, Reimer.
July 28	Rowan	Mount Ulla	Parker, Shaw, Newman, Jeffrey.
July 28	Rowan	China Grove	Burgess, Chrisman, Browne.
July 30	Rowan	Salisbury	Burgess, Chrisman, Browne.
Aug. 18	Rutherford	Ellenboro	Hutt, Heiges, Jeffrey, Finley.
Aug. 19	Rutherford	Rutherfordton	Hutt, Heiges, Finley, Jeffrey.
Aug. 7	Sampson	Newton Grove	Sherman, Barlow, McLendon.
Aug. 9	Sampson	Spring Branch	Sherman, Barlow, McLendon.
Aug. 10	Sampson	Salemburg	Sherman, Barlow, McLendon.
July 30	Scotland	Laurinburg	Hutt, Conover.
July 29	Stanly	Albemarle	Burgess, Chrisman, Browne.
July 24	Stokes	Danbury	Scott, Reimer.
July 27	Surry	Pilot Mountain	Scott, Reimer.
July 28	Surry	Franklin Schoolhouse	Scott, Reimer.
July 29	Surry	Dobson	Scott, Reimer.
Aug. 11	Swain	Bryson City	Parker, Stevens, Conover.
Aug. 11	Transylvania	Brevard	Burgess, Wilder, Chrisman.
Jan. 27	Tyrrell	Columbia	Parker, Sherman, Burgess.
Aug. 7	Union	Marshville	Hutt, Heiges, Finley, Jeffrey.
Aug. 9	Union	Waxhaw	Hutt, Heiges, Finley, Jeffrey.
Aug. 10	Union	Monroe	Hutt, Heiges, Finley, Jeffrey.
July 19	Vance	Henderson	Hutt, Petree, Conover.
July 22	Wake	Wake Forest	Hutt, Petree, Conover.
July 23	Wake	Apex	Hutt, Petree, Conover.

MEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
July 15	Warren	Littleton	Hutt, Petree, Conover.
July 16	Warren	Warrenton	Hutt, Petree, Conover.
Jan. 28	Washington	Creswell	Parker, Sherman, Burgess.
Jan. 29	Washington	Plymouth	Parker, Sherman, Burgess.
Aug. 5	Watauga	Boone	Scott, Roberts, Reimer.
July 14	Wayne	Eureka	Sherman, Parker.
July 15	Wayne	Rosewood	Sherman, Parker.
July 30	Wilkes	W. W. Finley's Farm	Scott, Reimer.
Aug. 2	Wilson	Wilson	Sherman, Petree, McLendon.
July 31	Yadkin	Yadkinville	Scott, Reimer.
Aug. 16	Yancey	Burnsville	Burgess, Wilder, Chrisman.

ASSISTANCE RECEIVED FROM THE U. S. DEPARTMENT OF AGRICULTURE.

Through the courtesy of Dr. S. A. Knapp, in charge of Demonstration Work for the United States Department of Agriculture, we are indebted to Mr. C. R. Hudson and Mr. C. S. Millsaps for valuable services. We are also indebted to Congressmen Small, Thomas, Godwin and Grant for lecturers secured from the United States Department of Agriculture.

INSTITUTES, LECTURERS AND SUBJECTS.

INSTITUTE LECTURERS.	SUBJECTS.
B. BARLOW Botanist, State Department of Agriculture.	Value of Legumes to the Farmer. Weeds and How to Eradicate Them.
J. L. BURGESS Agronomist, State Department of Agriculture.	Relation of Crop Varieties to Soil Types. Seed Selection. Green Manuring.
T. E. BROWNE Farmer.	Peanut Culture. Corn Culture. Commercial Fertilizers.
DR. W. G. CHRISMAN State Veterinarian.	The Need of More Live Stock and How to Have Them. Rational Treatment of Live Stock. Some of the Common Diseases of Live Stock and How to Treat Them.
J. A. CONOVER Dairy Expert in charge of Dairy Demonstration Work in North Carolina for the State and United States Departments of Agriculture.	Farm Dairying. How the Dairy Demonstration Work of the State and United States Departments of Agriculture May Help North Carolina Dairymen.
MISS JOSEPHINE EVANS Teacher of Domestic Science, Raleigh High School.	What to Eat and How to Prepare It. Friends and Foes of Housekeepers.
WALTER W. FINLEY Farmer.	Corn Culture.
DR. W. J. HARTMAN Assistant Veterinarian, State Department of Agriculture.	Diseases of Farm Live Stock.
S. B. HEIGES Farmer and Agricultural Writer.	Soil Improvement. Corn Culture. Seed Selection.
MRS. SUE V. HOLLOWELL	The Influence of the Woman in the Home. The Purposes and Aims of the Women's Institutes.
W. N. HUTT Horticulturist, State Department of Agriculture.	Orchard Management. The Farm Fruit Garden. Soil Improvement. Commercial Apple Growing.
MRS. W. N. HUTT	Foods, Their Cooking and Use. The Prevention of Disease in the Home.
J. S. JEFFREY Poultryman, North Carolina Agricultural Experiment Station.	Farm Poultry. Farm Butter Making.
N. A. LAYTON Farmer.	The Farm Fruit Garden. Oat Culture.
DR. W. J. MCLENDON Farmer.	Cotton Culture. Soil Improvement.
F. T. MEACHAM Superintendent Iredell Test Farm, State Department of Agriculture.	Wheat Culture. Oat Culture. Corn Culture. Terracing. The Use of Farm Machinery.
JOHN MICHELS Professor of Animal Husbandry and Dairying, North Carolina College of Agriculture.	Farm Dairying. The Importance of Live Stock in North Carolina Agriculture. Feeding Farm Live Stock.
C. L. NEWMAN Professor of Agriculture, North Carolina College of Agriculture.	Cotton Breeding. Soil Improvement. Winter Gardening. The Cowpea. Commercial Fertilizers.

INSTITUTES, LECTURERS AND SUBJECTS.

INSTITUTE LECTURERS.	SUBJECTS.
T. B. PARKER, Director of Farmers' Institutes and Demonstrator State Department of Agriculture.	Commercial Fertilizers. Corn Culture. Soil Improvement by Legumes. Alfalfa.
W. A. PETREE, Farmer.	Tobacco Culture.
JOHN ROBINSON, Farmer.	The Advantages of Cattle on the Farm.
MISS JOSEPHINE SCOTT, Teacher in Greensboro Graded Schools.	The House-fly. Suggestions in Household Work. The Home Garden.
R. W. SCOTT, Farmer.	Corn Culture. How a Farmer May Succeed in North Carolina without Growing Cotton or Tobacco. The Advantages of a Diversified Agriculture.
S. B. SHAW, Assistant Horticulturist, State Department of Agriculture.	The Farm Vegetable Garden. Fruit Growing. Seed Selection.
FRANKLIN SHERMAN, JR., Entomologist, State Department of Agriculture.	Insect Pests and How to Combat Them. Suggestions for the Improvement of Farm Homes.
DR. F. L. STEVENS, Professor of Botany and Plant Diseases, North Carolina College of Agriculture.	Plant Diseases and Spraying. Some PreventableDiseases. The Value of an Agricultural Education (Illustrated).
MRS. F. L. STEVENS	Home Nursing. Saving Steps in the Home. The Improvement of the Farm Home (Illustrated).
C. B. WILLIAMS, Director Agricultural Experiment Station, North Carolina Agricultural and Mechanical College.	Commercial Fertilizers and Their Use. The Improvement of Corn and Cotton by Seed Selection.
T. B. WILDER	How to Build Wire Fences. The Care and Use of Farm Machinery. Sheep Raising.

COUNTY AND LOCAL MEN'S ORGANIZATIONS.

There are Farmers' Institute committees in 96 of the 98 counties in the State, and in a number of counties where more than one institute has been held annually for several years there have also been organized local committees. In most counties there has been no effort to extend the work of the committee beyond selecting the places where institutes are to be held, suggesting subjects for discussion and advertising the institutes. However, in some localities more active organizations have been formed, which in addition to their duties along other agricultural lines have taken hold of the institute work in their localities and are co-operating with our State institute organization with very gratifying results. Notably is this true with the Farmers' Club at Mebane, an organization that is making for better agricultural conditions in that section. I com-

mend the example of this farmers' club to the farmers of the State, and would be glad if a similar organization would be formed in every community. The results would soon be seen in better farms, better homes, better contented people and more prosperous communities. Another result would be the asking for a greatly increased number of institutes in the State.

CHAIRMEN OF COUNTY AND LOCAL FARMERS' INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Alamance	C. F. Cates	Mebane.
Alexander	J. N. Smith	Taylorsville, R. F. D. 1.
Alleghany	S. F. Thompson	Walls.
Anson	Dr. W. J. McLendon	Wadesboro.
Ashe	John Dent	Jefferson.
Beaufort	W. D. Grimes	Washington.
Bertie	C. W. Spruill	Quitsna.
Bladen	R. B. Cromartie	Elizabethtown.
Brunswick	Jack Johnson	Winnabow.
Buncombe	R. P. Hayes	Asheville.
Burke	J. E. Coulter	Connelly Springs.
Cabarrus	A. H. Litaker	Concord, R. F. D. 5.
Caldwell	George Goforth	Lenoir.
Camden	W. G. Ferebee	Gregory.
Caswell	T. P. Womack	Yanceyville.
Caswell	E. W. Lee (Local, Leasburg)	Leasburg.
Catawba	C. M. Beatty (Local, Sherrill's Ford)	Sherrill's Ford.
Catawba	John W. Robinson	Newton.
Chatham	W. B. Wilson	Patmos.
Cherokee	W. P. Walker	Andrews.
Chowan	Z. W. Evans	Tyner.
Clay	W. T. Bumgarner	Hayesville.
Cleveland	A. A. Warlick	Casar.
Columbus	D. Boughner (Local, Chadbourn)	Chadbourn.
Columbus	Minos Meares (Local, Tabor)	Tabor.
Columbus	Dr. W. Ross Davis (Local, Whiteville)	Whiteville.
Craven	J. M. Spencer	New Bern.
Cumberland	W. H. Downing	Fayetteville.
Cumberland	McLean Campbell (Local, Raeford)	Raeford.
Currituck	J. J. Ferebee	Shawboro.
Davidson	J. W. Lambeth (Local, Thomasville)	Thomasville.
Davidson	P. J. Leonard	Lexington.

CHAIRMEN OF COUNTY AND LOCAL FARMERS' INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Davidson	H. M. Skeen (Local, Denton)	Denton.
Davie	S. A. Woodruff	Mocksville.
Duplin	J. A. Shine	Faison.
Duplin	J. T. Albriton (Local, Calypso)	Mount Olive.
Duplin	Maury Ward (Local, Rose Hill)	Rose Hill.
Durham	E. J. Parrish	Durham.
Edgecombe	G. T. DeBerry	Tarboro.
Edgecombe	N. B. Dawson (Local, Conetoe)	Conetoe.
Forsyth	N. H. Smith (Local, Kernersville)	Kernersville.
Forsyth	A. B. Atwood	Winston-Salem.
Forsyth	W. A. Phelps (Local, Clemmons)	Clemmons.
Forsyth	L. A. Strupe (Local, Rural Hall)	Tobaccoville.
Franklin	T. B. Wilder	Louisburg.
Gaston	J. Q. Rhyne	Lowell.
Gates	Lycurgus Hofler	Gatesville.
Graham	G. B. Walker	Robbinsville.
Granville	E. G. Moss	Creedmoor.
Greene	J. T. Frizzell	Snow Hill.
Guilford	J. Franklin Davis	Guilford College.
Guilford	W. C. Michall (Local, Gibsonville)	Gibsonville.
Guilford	C. E. Hockart (Local, Pleasant Garden)	Pleasant Garden.
Halifax	J. R. Sherrod	Enfield.
Harnett	C. McArtan	Lillington.
Harnett	T. D. Stewart (Local, Coats)	Coats.
Haywood	Dr. G. D. Green	Waynesville.
Haywood	M. F. Albright (Local, Canton)	Canton.
Henderson	J. P. Fletcher	Fletcher.
Hertford	W. P. Shaw	Winton.
Hyde	Chas. Brin	Swan Quarter.
Iredell	J. W. Sherrill	Statesville.
Iredell	W. W. Holland (Local, Eupeptic Springs)	Charles.
Iredell	J. T. Tharpe (Local, Harmony)	Harmony.
Jackson	G. P. Miller	Sylva.
Johnston	W. M. Sanders	Smithfield.
Johnston	N. R. Pike (Local, Kenly)	Bagley.
Johnston	J. F. Lee (Local, Benson)	Benson.
Jones	K. R. Hay	Mayesville.
Lee	W. I. Brooks	Jonesboro.
Lenoir	G. F. Loftin	Kinston.

CHAIRMEN OF COUNTY AND LOCAL FARMERS' INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Lincoln	C. W. Beam (Local, Bess' Chapel)	Cherryville.
Lincoln	T. H. Proctor (Local, Denver)	Denver.
Lincoln	H. S. Robinson	Lincolnton.
McDowell	Dr. R. J. Burgin	Marion.
Macon	Arthur Siler	Franklin.
Madison	J. F. Bryan	Marshall.
Madison	A. F. Sprinkle (Local, Mars Hill)	Mars Hill.
Martin	P. R. Rives	Goose Nest.
Mecklenburg	R. N. Capps (Local, Capps Schoolhouse)	Pineville.
Mecklenburg	W. C. Clark (Local, Sharon)	Charlotte.
Mecklenburg	B. J. Hunter (Local, Derita)	Derita.
Mecklenburg	J. F. Ewart (Local, Huntersville)	Huntersville.
Mitchell	S. M. C. Green	Toecane.
Mitchell	L. A. Berry (Local, Spruce Pine)	Spruce Pine.
Montgomery	W. G. Carter (Local, Elise)	Carter's Mills.
Montgomery	R. A. Bruton (Local, Mt. Gilead)	Mt. Gilead.
Montgomery	J. L. Stewart (Local, Star)	Star.
Moore	T. D. McLain	Carthage.
Nash	S. F. Austin	Nashville.
Nash	S. H. Brantley (Local, Stanhope High School)	Springhope.
Nash	M. J. Battle (Local, Whitakers)	Whitakers.
New Hanover	Wm. Gregerson	Wilmington.
Northampton	J. W. Jessups	Rich Square.
Onslow	Dr. J. L. Nicholson	Richlands.
Orange	S. W. Andrews	Hillsboro.
Pamlico	O. J. Rock	Reelsboro.
Pasquotank	R. N. Morgan	Elizabeth City.
Pender	W. M. Hand	Burgaw.
Perquimans	M. H. White	Hertford.
Person	J. A. Long	Roxboro.
Pitt	J. F. Evans	Greenville.
Pitt	Alston Grimes (Local, Grimesland)	Grimesland.
Polk	T. T. Ballinger	Tryon.
Randolph	E. J. Coltrane	Ashboro.
Richmond	W. I. Everett	Rockingham.
Robeson	E. F. McRae	Maxton.
Rockingham	J. V. Price	Madison.
Rowan	H. M. L. Agner	Salisbury.

CHAIRMEN OF COUNTY AND LOCAL FARMERS' INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Rowan	G. Hauck (Local, China Grove)	China Grove.
Rowan	J. K. Goodman (Local, Mount Ulla)	Mount Ulla.
Rutherford	W. K. McDowell	Island Ford.
Sampson	S. H. Hobbs	Clinton.
Sampson	J. W. Bryan (Local, Newton Grove)	Newton Grove.
Sampson	E. A. Jackson (Local, Spring Branch)	Cooper.
Scotland	W. N. McKenzie	Gibson.
Stanly	G. T. Dunlap	Norwood.
Stokes	I. G. Ross	Walnut Cove.
Surry	S. C. Franklin	Mount Airy.
Surry	W. J. Herring (Local, Mount Airy)	Mount Airy.
Swain	R. L. Sandidge	Bryson City.
Transylvania	W. H. Grogan	Brevard.
Tyrrell	W. W. Sawyer	Columbia.
Union	T. J. W. Broome	Monroe.
Vance	J. B. Allen	Henderson.
Wake	W. B. Upchurch	Apex.
Wake	R. P. Hunt (Local, Wake Forest)	Youngsville.
Warren	H. T. Macon	Warrenton.
Warren	P. R. Perkinson (Local, Wise)	Wise.
Washington	T. W. Blount	Roper.
Watauga	T. C. Baird	Valle Cruces.
Wayne	H. D. Ham	Goldsboro.
Wilkes	J. G. Hackett	North Wilkesboro.
Wilson	A. B. Deans	Wilson.
Yadkin	John F. Long	Chestnut Ridge.
Yancey	W. B. Banks	Burnsville.

STATE FARMERS' CONVENTION.

State at Large	T. W. Blount, President	Roper, N. C.
State at Large	T. B. Parker, Secretary	Raleigh, N. C.
State at Large	I. O. Schaub, Assistant Secretary	West Raleigh, N. C.

WOMEN'S INSTITUTES, 1909.

The importance and worth of women's institutes cannot be estimated in money value. Their objects and purposes are more far-reaching than are those of men's institutes. Not only are the women instructed how to do certain kinds of work in a more thorough and time and strength saving manner, but they receive instruction in many things that lie at the very foundation of health and human happiness. The importance of home sanitation, hygiene, a knowledge of preventable diseases and other things of equal importance are called to their attention. The progressive and thinking women of our State, realizing the value of these institutes, are showing a willingness to co-operate with us in this work to the extent that women's institutes will soon be as widely asked for and as well attended as the institutes for men.

We began holding women's institutes in 1906, in which year there were 21 held in 19 counties. In 1907 we held 50 in 38 counties; in 1908, 68 were held in 46 counties; and in 1909 we held 73 in 51 counties, which, according to the report of Hon. John Hamilton, Farmers' Institute Specialist for the United States Department of Agriculture, was one-tenth of all the women's institutes held in the United States last year. The women's institutes are held at the same places and on the same days that the men's meetings are held, and often a joint meeting of the two is held in the afternoon, when subjects of mutual interest are discussed.

The following is a partial list of the subjects discussed at the women's institutes:

What to Eat and How to Prepare It.
Suggestions in Household Work.
Friends and Foes of Housekeepers.
The Influence of the Woman in the Home.
Foods, their Cooking and Use.
Home Nursing.
The Farm Fruit and Vegetable Garden.
Farm Poultry.
Butter-making on the Farm.
Home Conveniences.
Literature in the Home.
Home Sanitation.
Educating the Girls on the Farm.

WOMEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
July 20	Alamance	Mebane	Mrs. Hollowell, Miss Evans.
Aug. 5	Anson	Wadesboro	Mrs. Hutt, Mrs. Hollowell.
Aug. 6	Anson	Diamond Hill	Mrs. Hutt, Mrs. Hollowell.
Jan. 19	Bertie	Windsor	Mrs. Stevens, Mrs. Hollowell.
Aug. 3	Bladen	Bladenboro	Mrs. Hutt, Mrs. Hollowell.
Aug. 18	Buncombe	Swannanoa	Mrs. Stevens, Miss Evans.
Aug. 3	Burke	Connelly Springs	Mrs. Stevens, Miss Evans.
Aug. 4	Burke	Morganton	Mrs. Stevens, Miss Evans.
Aug. 21	Cabarrus	Mount Pleasant	Mrs. Stevens.
Aug. 2	Catawba	Hickory	Mrs. Stevens, Miss Evans.
July 24	Chatham	Pittsboro	Mrs. Hutt, Miss Scott.
Aug. 7	Cherokee	Andrews	Mrs. Stevens, Miss Evans.
Aug. 9	Cherokee	Murphy	Mrs. Stevens, Miss Evans.
Jan. 25	Chowan	Edenton	Mrs. Stevens, Mrs. Hollowell.
Jan. 21	Currituck	Currituck	Mrs. Stevens, Mrs. Hollowell.
July 27	Davie	Mocksville	Mrs. Hollowell, Miss Evans.
July 16	Duplin	Calypso	Mrs. Hollowell, Miss Evans.
July 17	Duplin	Rose Hill	Mrs. Hollowell, Miss Evans.
July 26	Forsyth	Clemmons	Mrs. Hollowell, Miss Evans.
July 24	Forsyth	Kernersville	Mrs. Hollowell, Miss Evans.
July 20	Franklin	Franklinton	Mrs. Hutt, Miss Scott.
July 21	Franklin	Louisburg	Mrs. Hutt, Miss Scott.
Aug. 16	Gaston	Cherryville	Mrs. Hutt, Mrs. Hollowell.
July 17	Granville	Oxford	Mrs. Hutt, Miss Scott.
July 21	Guilford	Gibsonville	Mrs. Hollowell, Miss Evans.
July 22	Guilford	Pleasant Garden	Mrs. Hollowell, Miss Evans.
July 23	Guilford	Guilford College	Mrs. Hollowell, Miss Evans.
Aug. 16	Haywood	Waynesville	Mrs. Stevens, Miss Evans.
Aug. 17	Haywood	Canton	Mrs. Stevens, Miss Evans.
July 29	Iredell	Mooresville	Mrs. Hollowell, Miss Evans.
July 31	Iredell	Statesville	Miss Evans.
Aug. 14	Jackson	Sylva	Mrs. Stevens, Miss Evans.
July 26	Lee	Courthouse	Mrs. Hutt, Miss Scott.
July 13	Lenoir	Holy Innocents	Mrs. Hollowell, Miss Evans.
Aug. 13	Lincoln	Iron Station	Mrs. Hutt, Mrs. Hollowell.
Aug. 14	Lincoln	Lincolnton	Mrs. Hutt, Mrs. Hollowell.
Aug. 13	Macon	Franklin	Mrs. Stevens, Miss Evans.
Jan. 30	Martin	Williamston	Mrs. Stevens, Mrs. Hollowell.
Aug. 19	McDowell	Old Fort	Mrs. Stevens, Miss Evans.

WOMEN'S INSTITUTES, 1909.

Date.	County.	Location.	Lecturers Supplied by the State.
Aug. 20	McDowell	Marion	Mrs. Stevens, Mrs. Hollowell, Mrs. Hutt, Miss Evans.
July 30	Mecklenburg	Derita	Miss Evans, Mrs. Hollowell.
Aug. 11	Mecklenburg	Matthews	Mrs. Hutt, Mrs. Hollowell.
Aug. 12	Mecklenburg	Paw Creek	Mrs. Hutt, Mrs. Hollowell.
July 27	Moore	Cameron	Mrs. Hutt, Miss Scott.
July 28	Moore	Southern Pines	Mrs. Hutt, Miss Scott.
Feb. 3	Onslow	Richlands	Mrs. Stevens, Mrs. Hollowell.
July 19	Orange	Hillsboro	Mrs. Hollowell, Miss Evans.
Feb. 1	Pamlico	Bayboro	Mrs. Stevens, Mrs. Hollowell.
Jan. 22	Pasquotank	Elizabeth City	Mrs. Stevens, Mrs. Hollowell.
Jan. 23	Perquimans	Hertford	Mrs. Stevens, Mrs. Hollowell.
July 29	Richmond	Hoffman	Mrs. Hutt, Miss Scott.
Aug. 4	Richmond	Rockingham	Mrs. Hutt, Mrs. Hollowell.
July 31	Robeson	Maxton	Miss Scott.
Aug. 2	Robeson	Lumberton	Mrs. Hutt, Mrs. Hollowell.
July 28	Rowan	Mount Ulla	Mrs. Hollowell, Miss Evans.
Aug. 18	Rutherford	Ellenboro	Mrs. Hutt, Mrs. Hollowell.
Aug. 19	Rutherford	Rutherfordton	Mrs. Hutt, Mrs. Hollowell.
July 30	Scotland	Laurinburg	Mrs. Hutt, Miss Scott.
Aug. 11	Swain	Bryson City	Mrs. Stevens, Miss Evans.
Jan. 27	Tyrrell	Columbia	Mrs. Stevens, Mrs. Hollowell.
Aug. 7	Union	Marshville	Mrs. Hutt, Mrs. Hollowell.
Aug. 9	Union	Waxhaw	Mrs. Hutt, Mrs. Hollowell.
Aug. 10	Union	Monroe	Mrs. Hutt, Mrs. Hollowell.
July 19	Vance	Henderson	Mrs. Hutt, Miss Scott.
July 22	Wake	Wake Forest	Mrs. Hutt, Miss Scott.
July 23	Wake	Apex	Mrs. Hutt, Miss Scott.
July 15	Warren	Littleton	Mrs. Hutt, Miss Scott.
July 16	Warren	Warrenton	Mrs. Hutt, Miss Scott.
Jan. 28	Washington	Creswell	Mrs. Stevens, Mrs. Hollowell.
Jan. 29	Washington	Plymouth	Mrs. Stevens, Mrs. Hollowell.
July 14	Wayne	Eureka	Mrs. Hollowell, Miss Evans.
July 15	Wayne	Rosewood Academy	Mrs. Hollowell, Miss Evans.

COUNTY AND LOCAL WOMEN'S ORGANIZATIONS.

The plan of organization of the women's institutes is the same as for men. A live, interested woman is selected for chairman, and she is given the assistance of the best committee that can be selected for that purpose. However, as the women's institute is largely in the initiative stage, there has not yet developed the progress of extension work that we are expecting within the next few years, when the importance of the work will become more widely appreciated and more fully understood.

CHAIRMEN OF COUNTY AND LOCAL WOMEN'S INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Alamance	Miss Eula Dixon	Snow Camp.
Alexander	Mrs. J. T. Rowland	Taylorsville.
Anson	Mrs. J. G. Boylin	Wadesboro.
Bertie	Mrs. E. L. Gatling	Windsor.
Bladen	Mrs. Nicie Powell	Bladenboro
Buncombe	Mrs. R. L. Thrash	Asheville.
Burke	Mrs. Jas. Harberson	Morganton.
Cabarrus	Mrs. C. H. Barnhardt (Local, Mount Pleasant)	Mount Pleasant.
Cabarrus	Mrs. R. A. Brown	Concord.
Camden	Mrs. E. I. Sawyer	
Catawba	Mrs. J. W. Robinson	Newton.
Catawba	Mrs. John Shuford (Local)	Hickory.
Chatham	Mrs. J. A. Pearley	Pittsboro.
Cherokee	Mrs. Donald Wilson	Andrews.
Cherokee	Miss Carrie Hatchett (Local, Murphy)	Cobbs.
Chowan	Mrs D. G. Bond	Edenton.
Cleveland	Mrs. Frank Elam	Cleveland Mills.
Columbus	Mrs. E. H. Miller	Chadbourn.
Cumberland	Mrs. J. H. Currie	Fayetteville.
Cumberland	Mrs. John Moore (Local, Raeford)	Raeford.
Currituck	Miss Nettie Dozier	Coinjock.
Davidson	Mrs. C. V. Wilson	Lexington.
Davidson	Miss B. E. Meacham (Local, Linwood)	Linwood.
Davie	Mrs. Sarah Hanes	Mocksville.
Duplin	Mrs. Hettie Barbee (Calypso)	Calypso.
Duplin	Mrs. P. C. Fussell (Rose Hill)	Rose Hill.
Durham	Mrs. P. H. Massey	Durham.
Forsyth	Mrs. Jule Koiner	Kernersville.
Forsyth	Miss Minnie Hauser (Local, Clemmons)	Winston-Salem.

CHAIRMEN OF COUNTY AND LOCAL WOMEN'S INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Franklin	Mrs. W. J. Strickland (Louisburg)	Katesville.
Franklin	Mrs. J. H. McGee (Local, Franklinton)	Franklinton.
Gaston	Mrs. Martin Rudisill	Cherryville.
Granville	Mrs. E. N. Clement	Oxford.
Guilford	Mrs. J. F. Homewood (Gibsonville)	Burlington.
Guilford	Mrs. J. C. Neely (Local, Pleasant Garden)	Pleasant Garden.
Guilford	Mrs. Franklin Davis (Local, Guilford College)	Guilford College.
Halifax	Mrs. W. L. Wiggins	Littleton.
Harnett	Mrs. S. H. Washburn	Lillington.
Iredell	Mrs. R. W. Orr	Statesville.
Iredell	Mrs. T. J. Williams (Local, Mooresville)	Mooresville.
Jackson	Mrs. E. L. McKee	Sylva.
Johnston	Mrs. D. J. Wellons	Smithfield.
Johnston	Mrs. R. H. Gower	Clayton.
Lee	Mrs. J. H. Henley	Sanford.
Lenoir	Miss B. L. Elmore	Kinston.
Lincoln	Mrs. Chas. Lee Hoover	Lincolnton.
Lincoln	Mrs. Lee Dellinger (Local, Iron Station)	Iron Station.
McDowell	Mrs. J. C. Crawford	Sugar Hill.
McDowell	Mrs. H. A. Westerman (Local, Old Fort)	Old Fort.
Martin	Mrs. W. T. Taylor	Robersonville.
Mecklenburg	Mrs. H. Howland	Charlotte.
Mecklenburg	Mrs. J. A. Stevens (Local, Matthews)	Matthews.
Moore	Mrs. H. F. Seawell	Carthage.
Moore	Mrs. McPherson (Local, Cameron and Southern Pines).	
Onslow	Mrs. J. E. Rhodes	Richlands.
Orange	Mrs. H. D. Woods	Cedar Grove.
Pamlico	Mrs. G. T. Farnell	Bayboro.
Pasquotank	Mrs. R. N. Morgan	Elizabeth City.
Perquimans	Mrs. Carrie Perry	Belvidere.
Richmond	Mrs. W. R. Coppedge	Rockingham.
Richmond	Mrs. John Barrington (Local, Hoffman)	Hoffman.
Robeson	Mrs. W. C. Hamer	Maxton.
Robeson	Mrs. Howell (Local, Lumberton)	Howellsville.
Robeson	Mrs. N. C. Stubbs	Buie.
Rowan	Mrs. M. E. Heller	Faith.
Rowan	Mrs. L. E. Fisher (Local, China Grove)	China Grove.
Rowan	Miss Mattie Miller (Local, Mount Ulla)	Mount Ulla.
Rutherford	Mrs. H. S. Toms	Rutherfordton.

CHAIRMEN OF COUNTY AND LOCAL WOMEN'S INSTITUTE COMMITTEES.

County.	Chairman of Committee.	Post-office.
Rutherford	Mrs. L. C. Daily (Local, Ellenboro)	Ellenboro.
Scotland	Mrs. A. McNeill	Laurinburg.
Stokes	Miss D. B. Petree	King.
Swain	Mrs. A. M. Frye	Bryson City.
Tyrrell	Mrs. C. W. Swain	Jerry.
Union	Miss Annie Broadaway (Local, Marshville)	Marshville.
Union	Miss Emma Richardson (Local, Waxhaw)	Waxhaw.
Union	Mrs. R. W. Williams	Wingate.
Vance	Miss Nettie M. Allen	Henderson.
Wake	Mrs. W. G. Clements	Morrisville.
Warren	Mrs. R. L. Pinnell	Warrenton.
Washington	Mrs. B. F. Spruill	Creswell.
Washington	Mrs. M. M. Satterthwaite (Local, Plymouth)	Plymouth.
Wayne	Mrs. H. H. Overman (Local, Eureka)	Eureka.
Wayne	Miss Mary Pearson (Local, Rosewood)	Pikeville.

WOMEN'S BRANCH OF FARMERS' CONVENTION.

State at Large	Mrs. W. N. Hutt	Raleigh.

DEMONSTRATION RAILWAY CARS.

In 1908 the State Department of Agriculture operated its first demonstration train for institute work. The project was such a success and there were so many calls for the "Demonstration Train" that this year two trains were put on. These were kindly tendered by the management of the Seaboard Air Line and by the Southern Railway.

The demonstration cars operated on the Seaboard Air Line from Littleton and Bladenboro, in the eastern part of the State, to Rutherfordton, in the western section, a distance of over 800 miles, round

IMPLEMENT DEMONSTRATION.

trip, holding thirty institutes. On the Southern the demonstration cars were run from Hillsboro, in the central part of the State, to Murphy, in the extreme southwestern section, nearly 900 miles, round trip, holding institutes at 27 places.

A passenger coach and an express or baggage car was furnished by each of the above lines of railway. In one end of the passenger coach was fitted up an oil stove, a kitchen cabinet, sink, ice-box, together with various utensils intended to lighten woman's work in performing her kitchen work. In this car the women held their meetings, the lecturers demonstrating the advantages of the implements shown, as well as giving lectures on the regular subjects assigned them.

The baggage or express car was filled with improved farm implements and was in charge of a competent man, who explained the workings of the implements to interested visitors. A day was usually given to each place where the institute was held in order to give ample time for the inspection of the implements and also to give them an actual field demonstration wherever teams were provided.

The following manufacturers and dealers very generously loaned implements, utensils, etc., for the institute cars, which kindness on their part is very much appreciated:

S. L. Allen & Co., Philadelphia, Pa., agricultural implements.

Bateman Manufacturing Company, Grenloch, N. J., agricultural implements.

Creamery Package Company, Chicago, Ill., dairy implements.

H. E. Bell, Burkeville, Va., hay racks.

Cole Manufacturing Company, Charlotte, N. C., guano distributors, corn, cotton and grain planters.

Wm. J. Oliver Plow Company, Knoxville, Tenn., plows.

Raney Cannery Company, Chapel Hill, N. C., canning outfits.

Standard Oil Company, Baltimore, Md., oil stoves, heaters and lamps.

Job P. Wyatt & Sons, Raleigh, N. C., agricultural implements, incubators, brooders, stalk choppers, etc.

G. L. Vinson, Raleigh, N. C., kitchen sinks, etc.

Hart-Ward Hardware Company, Raleigh, N. C., household utensils.

Royal & Borden Company, Raleigh, N. C., kitchen cabinet, etc.

ORCHARD SPRAYING DEMONSTRATIONS, 1909.

BY FRANKLIN SHERMAN, JR., ENTOMOLOGIST.

During 1909 the work in Apple Spraying Demonstrations has been continued along the same lines as in 1908, except that whereas these demonstrations were held in five counties in 1908, the work has been extended to include *twelve* counties in 1909.

The orchards in which the demonstrations have been given, together with the dates on which the public meetings were held, are indicated in the following table:

County.	Owner of Orchard.	Address.	Date of Public Spraying Demonstration.
Alamance	L. W. Holt	Burlington, R. F. D.	February 9.
Bertie	C. H. Warf	Aulander	February 20.
Catawba	L. J. Yount	Hickory, R. F. D.	February 20.
Cleveland	L. S. Hamrick	Shelby	February 17.
Davie	J. D. Hodges	Mocksville, R. F. D.	February 12.
Guilford	D. W. Ramseur	Greensboro, R. F. D.	February 10.
Johnston	W. T. Stallings	Clayton, R. F. D.	February 18.
Lincoln	D. C. Warlick	Lincolnton	February 15.
McDowell	H. M. Croom	Old Fort	February 20.
Robeson	W. M. Roberts	Red Springs	February 16.
Rutherford	M. O. Dickerson	Rutherfordton	February 18.
Scotland	W. DeB. McEachin	Laurinburg	February 15.

As was the case in 1908, this work is done in co-operation with the Division of Horticulture, that Division giving demonstrations in the *pruning* of fruit trees, while we (the Division of Entomology) gave demonstrations in the *spraying*.

Two parties were placed in the field, one holding demonstrations in four of the more eastern counties, and the other party holding the demonstrations in the counties west of Raleigh.

While the above table shows the date of the *public* demonstrations, it should be noted that the work was not completed until each of these places had been visited and the trees sprayed *twice more*, making a total of *three sprayings* for the trees in the test at each of these twelve places. Hence, in these twelve demonstrations we have made visits and sprayed trees no less than *thirty-six times*.

From three to five trees are used in the work at each place. One of these is sprayed on only one side each time, in order to see if

there will be noticeable difference between the sprayed and unsprayed halves of the same tree. The other trees are completely sprayed exactly as recommended for regular orchard practice.

The material used in all this work is the Bordeaux mixture and Paris green, prepared after the methods in common use among progressive fruit-growers throughout the country. Our object has been merely to demonstrate in a practical way the efficiency of spraying and the profit to be derived from it.

ORCHARD DEMONSTRATION.

The attendance at these demonstrations varied from about a dozen (in localities where fruit-growing is unimportant) to over one hundred in the counties where there is a keen interest in fruit-growing.

Reports on the results of this work are not yet all in, only one man having given the final result. Here is what he says:

REEPSVILLE (OR LINCOLNTON), N. C., October 14, 1909.

DEAR SIR:—One tree that you sprayed all over was not a fair test, as part of it died this summer and the other part is not healthy. The Mammoth Black Twig, which was half sprayed and half not, shows marked difference; the leaves on the side that was sprayed are much greener and more free from rust than the unsprayed. We gathered some Blackburns from a tree that you sprayed that were as fine as I have ever seen, and they had no worms. Everybody who has seen the apples from the sprayed and unsprayed trees says that it pays to spray. The people around here have taken an interest in the spraying. Very respectfully, D. C. WARLICK.

Reports from the other eleven persons have been requested and will no doubt be of the same general tenor as the above. A report

in middle July showed that favorable results were then evident in all the places but one (Rutherfordton). A final report on the results

THE NOON HOUR AT A FARMERS' INSTITUTE IN THE COUNTRY.

of the work for this year cannot be made until the apples have been gathered.

LECTURES DELIVERED AT WOMEN'S INSTITUTES.

MEATS IN THE DIETARY.

BY MRS. W. N. HUTT.

Long centuries ago was it that some poor hungry savage pulled from the water his first oyster and ate it raw. That is supposed to have been man's first taste of animal food. Later he captured the cave beasts. These, too, he ate raw—and drank their blood. But as the years rolled on he learned that flesh tasted better and kept longer when heat had altered its flavor and flame had seared its sides. Ever since then man has eaten his meat cooked. He did not know why he ate it at all; he simply knew that it appeased his hunger and strengthened him.

To understand the nourishing power of meat it is necessary to know something of the structure of flesh, which, unlike that of vegetables, is not made of grains of nourishment with its indigestible walls of cellu. Practically speaking, every bit of meat is capable of digestion and absorption into the body.

STRUCTURE OF MEAT.

Did you ever boil a piece of beef until it came apart in strings? These strings are fibers, and if you had a microscope you would see that these same fibers or strings of meat are made up of many little bundles of tubes, all held together by a connective tissue. The walls of these tubes are made of a form of proteid. Inside these tubes or muscle fiber is the juice which contains in solution, water, more proteid and extractives. This latter it is which produces the flavor of the various meats, and without it meat would be almost tasteless.

The connective flavor it is from which we get our gelatine, and imbedded in it are tiny cells of fat. The amount of fat varies in different meats, being almost entirely absent in the breast of chicken and in greatest abundance in pork or goose.

Just as vegetables start their chemical digestive changes for absorption into the body in the mouth, so meat begins its changes in the stomach. Meat is the most easily digested form of tissue builder we have. All animal food is most easily digested when raw and the rarer cooked meats more digestible than the well done. This is a good thing to know when you have to prepare the meals for those whom dyspepsia has in its iron grasp or who are recovering from a long illness.

Cooking develops the flavor of meat and also destroys any living thing that might be in it. This is especially true of pork, and is the reason that we cook it so thoroughly.

A good way to prepare beef for a weak digestion is to scrape a steak in one direction with a blunt knife, getting out all the fiber, but leaving the connective tissue. Season the pulp with salt and pepper, make it into little cakes about an inch thick, put it on a hot frying-pan without either grease or water, letting it remain long enough to sear well, turn, set back on the stove until the outside of the meat is gray, add a little piece of butter, and serve. Remember, this is not frying the meat; it is only searing it.

The digestibility of the meat depends on the length of the fiber, the density of the flesh, the amount and kind of fat and on the method of cooking. Suppose you decide to kill that old hen that is the great grandmother of all the other hens. You send Sambo out to get it, and he makes a mistake and gets the nice fat young one. It is all tender, and so you cook it well, but quickly. Next day, however, you make no mistake, and kill the old hen. The muscles

of the breast are not exercised and the fiber is short, therefore it is comparatively tender. The old legs, however, that have scratched for many a brood, are tough, because age and work have thickened the walls of the fibers. It has needed much strength, and so the connective tissue is firm and hard. Therefore, you say to yourself, "How am I to get that bird tender enough to eat? Shall I ever be able to cook it so that the connective tissue will change and let the fibers loosen up and their walls soften?" Of course you will. The first consideration is to cook it slowly, as all tough flesh should be. If you boil it either whole or in pieces, let it cook up for a few minutes, then let it simmer a long time. If you want it roasted, steam it until tender and then bake it. Put it in a covered dish in a mild oven for several hours. If, however, you want it fried, steam it well, then cut it up, and all you have to do about frying is to let it brown in the skillet. If ever you have many to fry, as for a picnic, it saves time and trouble to steam the hens until tender, then cut them up and put in a pan in a very hot oven, basting often with butter or grease until brown.

Now, suppose you have butchered that old steer that has been pulling the plow for John this many a year. The fat is too yellow. That may be because of his feed, but probably is because of his age. The walls of the fibers are thickened and hard and the connective tissue is tough, especially on the legs. Pounding will make it more tender, because that will break down the tissue; but it will also let out many of the valuable extractives and mineral matter. Cutting across the grain will be a help also, but we must depend on cooking to really soften it, and that must be long and slow. Had you killed that steer when he was four or five years old and had never allowed him to work, but just graze and enjoy himself, then you would have had the king of meats; from his ribs would have come the juiciest, the most nutritious and most easily digested of our meats.

If, again, you had killed him very young and had called it veal, you would have had some delicious eating, but, like lamb or young pig, it would have been hard to digest. Just why we do not know, unless it is that the fibers elude the teeth and are therefore not chewed. In roasting veal cut a pocket in it and stuff it with a chicken dressing that is well flavored with grated onion.

If you had cast your eye on the fat old pig and he had met the fate of the chicken and steer, you would have had a meat that certainly tasted well, but that is more abused by doctors and dietitians than any other. If a certain amount of beef took two hours to digest, the same amount of pork would take three and a half hours. This is due to the fact that every particle of meat is surrounded with a coating of fat and it is hard for the digestive juices to get at it. It contains a very small amount of proteid, more fat than the stomach can relish or digest, is not as nutritious as other meat, and people who live on it to the exclusion of other meats are usually pale and unable to resist disease. The value of pork lies in the fact that it takes salt or smoke so well. There is one notable fact about pork in the form of breakfast strip, and that is that the smoking and salting have made the fat granular, in which form it is not hard to digest and can be eaten by people whose digestion would not allow other forms of fat.

A young or an unthinking housekeeper is apt to cook meat and vegetables just alike. Since, however, their structure and general characteristics are different, the method of preparing them for eating must be different.

Summing up the meats and vegetables as far as they are of interest to the homemaker, the differences are important.

Vegetables should be cooked at a high temperature and meat should be cooked slowly.

Vegetables are more digestible when well cooked and meats when rare, it being only for other reasons that we cook them well.

Vegetables contain more carbohydrate, and meat, proteid; those vegetables, like peas and beans, which contain the most proteid having less than those meats which contain least.

Vegetable proteid is hard to digest, often one-third or more of it not being absorbed into the body, while animal proteid is, as a rule, almost entirely assimilated.

An altogether vegetable diet is too bulky and an exclusively animal food is too concentrated. Strength and energy are very different things, and a vegetarian may be strong, but still lacking in the energy that animal proteid gives. The vegetable-eating races of the world have never been the prominent ones.

In short, a mixed diet is best for human beings and the best physical health is maintained only when we have enough and to spare of a well-balanced diet.

THE DANGER OF THE HOUSE-FLY.

BY MISS JOSEPHINE SCOTT.

Just as soon as the farmer finds that some pest is destroying or damaging his crops, he begins at once to try some means of destroying that pest. He makes this attempt because he can see with his own eyes that his crop will be cut short or even destroyed if the destroyer is allowed to go on unchecked. When it comes to some danger, the result of which cannot be *seen*, we often let it alone, simply because we cannot *see* the damage done. You remember that for a long time it was not known that malaria is contracted only through the bite of a certain kind of mosquito. When this fact was established, then we began to study about the mosquito, which were malarial and which were harmless, and the conditions under which the malarial kind breed. It has been proved, also, that yellow fever is not contracted by contact with yellow-fever patients, neither is it carried in clothing; but that a mosquito which abounds in yellow-fever regions conveys it by its bite.

The danger of the common house-fly to mankind was unsuspected until about twenty years ago. Later, during the Spanish War, it was clearly shown that the cause of the spread of the typhoid fever, which killed so many of our men, was due to flies. This insect is so active in the spread of typhoid fever that it is often spoken of as the "typhoid fly." The fly is responsible for diseases which can be spread by the taking in of germs with food or drink. Some of these germs are dysentery, cholera, typhoid fever and tuberculosis. During the Civil War there was an outbreak of gangrene among some of the wounded in a hospital. The physicians used, as they thought, all precautions to prevent its spread, but they were not effectual. In recent years it is known that this gangrene was spread by the flies, they lighting upon the sore, getting its poison upon their feet, then flying to the wound of another patient, there to deposit the germs from the gangrenous patient.

The head of a fly is covered with stiff bristles like a head of ripened wheat; the foot ends in a pair of pincers, the mouth and head being rough. When you push a stiff-bristled broom in a pile of refuse and then lift it, some of the dirt comes too. That is just the way the fly does; when it leaves the refuse, some filth sticks to its body. Set the broom down, and the dirt shakes off. Just so with the fly, when it walks about a trail of filth is left behind. Perhaps some one in your vicinity has typhoid fever or some intestinal trouble. The patient's excreta is not properly disinfected. Flies visit these discharges, get the germs on their bodies, fly at once to your kitchen or dining-room, crawl over your food or fall in the milk, leaving behind them the germ of disease. Then you may wonder how the disease was contracted. Is it any wonder?

In Chicago 19 out of every 100 babies die from diseases carried by flies. In the congested districts of Manhattan Island 65 out of every 100 deaths of babies were caused in the same way. This was the proportion for the four hot months of 1906, from intestinal trouble. Most of baby's "second summer complaint" is carried by flies. Haven't you seen baby asleep with his little mouth open, and dozens of flies crawling into it, over his face and into his nose? Those very flies that are buzzing so busily around your baby may have

just come from feasting on a consumptive's sputum, leaving a trail of tuberculosis on the lips to be drawn in with the next breath. Watch them swarm over baby's bottle. How do you know but what they have just dined on the sore of a cat or dog, or swarmed over the festering corpse of some animal, or even the exposed human excreta? They may not have been to any germ-bearing material, but as they are flies, you may rest assured that they have been into some filth somewhere.

"Hitherto the fly has been regarded complacently as a harmless nuisance, and considered to be an annoying creature with great persistence and excessive familiarity. Regarded in the light of recent knowledge, the fly is more dangerous than the tiger or the cobra. Worse than that, he is, at least in our climate, more to be feared than the mosquito, and he may easily be classed the world over as the most dangerous animal on earth," says Mr. Jackson, who has conducted some investigations on this subject.

When we realize the danger of the house-fly, then it is up to us to do all we can to exterminate it. Flies breed only in filth, so wherever flies exist there is filth. Flies during the larval life live almost exclusively on horse manure. If you can dispose of this manure so that flies cannot get to it to lay eggs, then the solution of the fly question is easy. The stables should be cleaned twice a week, and air-slaked lime sprinkled around. The manure should either be removed or shut up in a place to which flies cannot obtain access. It isn't always so on the farm that this can be done often enough to be effectual, and so the question which comes to every housekeeper is how to destroy the flies. It is in the home that most care should be exercised, since it is there that disease is contracted by eating infected food. In the first place, there should be as little as possible around the home to attract flies. By this I mean that all slops, etc., should be kept in a covered receptacle, and no dishes of food left uncovered. Then wire doors and windows, especially in the dining-room and kitchen, are a necessity. Even with these doors and windows, flies are likely to get in, especially if the children open the doors often. Then there are the sticky papers and traps. Personally, I like the "Black Flag" insect powder better than anything we have ever used. The room has to be closed tightly, and all dishes covered to prevent the powder getting on them. Then the powder is sprinkled around the room, and in a short time the flies will have fallen so they can be swept up and burned. Burning them is necessary, as they revive when thrown out in the fresh air. Another destroyer is the "Daisy Fly Killer," advertised in nearly all papers. This is an ornamental, inexpensive little affair, and can be used where the powder cannot, or even where one would not care to put sticky paper. There are other methods of killing flies, for nearly every housekeeper wants to get rid of the pests.

Now that we know what the fly really is, and its bad record, it becomes more necessary to wage an everlasting fight against our dangerous enemy.

SAVING STEPS.

BY MRS. F. L. STEVENS.

Plan and economy of effort are essentials if the duties which come each day to the farm housewife in a busy home are to be met and dispatched with ease. The excessive fatigue at the close of a long day devoted to housework is very often due to unnecessary steps, unnecessary expenditure of energy which could easily be obviated by a little foresight and plan.

To simplify the household work as much as is possible is a woman's first duty. We all know that there are many women doing every day many, many

unnecessary things. Oftentimes the unnecessaries are to be found in the superfluous and frequently unbeautiful decoration and ornamentation in the home, which could be dispensed with to advantage. One good woman complained to me a short while ago of the excessive burden of her daily work, and when I looked about her home I could readily understand what her burden was, for hers was a house literally loaded with useless and many unbeautiful objects. There were draperies, heavy carpets and quantities of cheap, useless bric-a-brac everywhere. A good, conscientious housewife, such as I knew this woman to be, would find the burden of housekeeping simply unbearable. Then, let us rid our homes of all unessentials in the household equipment, both for the sake of health and beauty. Fancy what dust and germ collectors the articles in the house I have just referred to may become.

Oftentimes, by plan and forethought, much labor can be saved in the preparation of meals. If the housewife will plan at least a day's meals in advance she can often find ways while preparing one meal to make fine progress in preparation of the next meal.

Then this simplifying process may go further, and include the household sewing. The devotion and mother-love often displays itself in unwise expenditure of time and money in children's clothing. Not long ago I met a tired little mother with two small, sturdy boys, who were much the worse in disposition and comfort for the stiffly starched, beruffled blouses they wore. I made a mental estimate of the total outlay involved in those blouses, and found that there had been spent for the ornamentation at least sixty cents in money and fully three hours of time in the two garments. The money expended, with a trifle more added, would have bought a year's subscription to a good magazine and the time spent in recreation would have resulted in two happier boys, and a mother with a year's good reading matter and at least three hours of healthful recreation to her credit. This incident merely serves to illustrate the point that I wish to make, that if we try we may find many an opportunity to simplify the sewing, thereby saving time for other more useful things. If we would only bear in mind that Nature has made all children beautiful, and that the fuss and furbelows of dress only detracts from their natural charm!

The housewife, then, who is to get the greatest value at the least expenditure of energy will eliminate the unessentials in every phase of the household life.

In a well-planned home the kitchen, where the housewife spends the greater part of every day, should have first consideration; and here let me say that a model kitchen should be a small room. The man who builds a "large, roomy" kitchen for his wife is adding many unnecessary steps in the course of a day's work. The kitchen should be well lighted and well ventilated, with an air shaft over the stove to carry off surplus heat and odors. The arrangement of the furniture is worth consideration, for by placing the table, shelves and cupboards so compactly and with reference to the number of steps to and from the stove—which, by the way, should be a range whenever practicable—much unnecessary labor may be saved.

There are a few inexpensive devices, too, for the kitchen that will save steps. A table with rollers—one that can be moved about easily—will be found a great convenience. A plain stool, such as is used in offices, adjusted to a computable height with reference to the table, that may be pushed under the table when not in use, will prove a wonderful relief to a tired back. So many duties can be performed while sitting in this manner, such as washing dishes, preparing vegetables, etc. I know one woman who did the greater part of the weekly ironing sitting upon a stool of this kind. Along with the good kitchen range that I have referred to I would add an oil stove of a good make, which may be purchased at a cost of from fifty cents up, according to the size, also a fireless cooker. The fireless cooker may be made at home from a box or discarded trunk, which is filled with chopped hay or shredded newspapers, with which tightly covered vessels containing food which has been brought to a boiling point and boiled for some minutes is placed. The box is then covered tightly with a pad or blankets and allowed to remain untouched for several hours. The Department of Agriculture, Washington, D. C., has issued a bulletin (Farmers' Bulletin No. 29), which contains directions for making a fireless

cooker. A kitchen sink, where there is no water supply, simply a device for carrying away waste water, will be found a wonderful saver of energy. These sinks may be bought at small expense, and any man who is at all apt with tools can adjust the waste-pipe. A hinged shelf with an adjustable support will be found useful in the kitchen or dining-room. A kitchen cabinet, to hold supplies necessary in the preparation of a meal, can be made at home by the "handy-man," and will be well worth time spent in its construction. A window cupboard is another simple device that might be used to advantage. It is simply a small box, fitted with one or more shelves and nailed or screwed just outside the window with the open side toward the window-sash, so placed as to not interfere with raising or lowering the window. When the window is raised the shelves are accessible from the room and when lowered the window forms a door to the cupboard. A sash curtain drawn across the window will shut the cupboard from view, and when placed in a well-shaded window forms a delightful, cool, convenient place for food. These window cupboards are wonderfully convenient in a dining-room.

What to do with floors, whether kitchen, parlor or spare bedroom floors, is a vexing question in the farm home. Into many of these homes carpets have not yet found their way, for which we should be duly thankful; but the care of a bare floor, the weekly or semiweekly scouring is a serious matter. As a solution of this problem I wish to suggest staining the floors, and will give a formula for a stain which I have used successfully upon a number of floors. This stain may be used in every room in the house. To one gallon of boiled linseed oil and one pint of turpentine add burnt umber stain in sufficient quantity to give the desired color. Apply with a cloth or brush to a clean, dry floor. Allow several hours to dry before using. To clean a stained floor, wash with warm water to which has been added several tablespoons of kerosene. Kerosene alone is excellent for cleansing stained floors. For a parlor or spare bedroom floor that does not require frequent cleansing, floor wax will give a beautiful polish when used with this stain. The formula for the floor wax is as follows: Into a quart of turpentine shave beeswax in sufficient quantity that when thoroughly dissolved it will be of a creamy consistency. The mixture must stand several days before using, since the beeswax dissolves slowly. If wanted promptly, the beeswax may be melted and added to the turpentine while hot. When mixing, however, the ingredients should be kept away from the fire. Apply the mixture with a cloth when the stain has become thoroughly dried, after which polish with a cloth. Bags from discarded odds and ends of clothing, made to draw over a broom, will be very useful in caring for stained floors. Brooms are made from felt for this purpose costing eighty cents, but the home-made bag is quite successful.

There are many useful, inexpensive kitchen utensils, such as egg beaters, potato mashers, separators, measuring cups, food choppers, many costing but a few cents, which would do much to lighten the work; but these articles must be seen to be appreciated. I should like to mention the necessity of a water supply in the country home; but possibly the time is not yet here when we can urge this convenience. However, I am familiar with many locations throughout the State where the spring is in such a position with reference to the house that the water could be easily piped to the house without a penny of cost other than the iron pipe.

As I said in the beginning, as housewives we need just to simplify, then classify our duties. I would not advise carrying this simplifying process to the extent as did one woman of whom I heard who gave her husband a bunch of grapes for dinner and while he ate them read a poem to him. There are, however, many processes going on daily in all of our homes that could be safely and wisely eliminated.

SWEEPING AND DUSTING.

BY MRS. W. N. HUTT.

When I was a little girl I used to listen to the story of the woman who swept and sent the dust flying into the air and made her family cough and sneeze. No one could sit and ruminate in comfort because she had to sweep under his chair. In short, every one around her was unhappy because she swept, swept, swept. When she got old she was all bent up from not properly holding the broom, I suppose, and when she died she was turned into a witch and forever after had to sweep the cobwebs off the moon.

Poor thing! Perhaps she did not know any better. She did not live in the day and age when it was fashionable to keep eyes open and to get the greatest amount of work with the smallest amount of energy. The new automatic sweeping machines that are being introduced all over the country cannot but be a great saving of strength, backache and germs to many women. As the end of the suction pipe is run over the unclean surface every loose particle of dirt is drawn down the tube, and thus the process of dusting as well as of sweeping is accomplished. The motive power may be hand, electricity, steam, water, or, as on a farm, the gasoline engine that fills the silo.

However, all of us do not possess these machines, and the problem is for us to find the easiest and best method of doing our work now. I do not want to be fussy, always talking about germs, but for fear there is just one person who does not know what they are, I am going to tell it again. They are tiny forms of life, so small that we need a microscope to see them, and they produce most of our diseases. Some of that dust that Freddie is breathing in *may* not hurt him at all, but it *may* give him diphtheria. There is no sense in taking useless risks.

When you sweep do so with just as little dust as possible. When "sister" wants to help mother with her own small broom, teach her to hold it so that the particles of dust are not sent flying into space. This is done by partly dragging the broom. Teach her also to stand upright and not bend over, cramping her lungs and straining her back.

Many good housekeepers sweep the carpet with a damp broom and then go over it with a damp clean cloth. Dry floors, of course, have to be swept with a dry clean broom. If the boards are smooth a cloth bag of any soft white material placed over the broom saves after-dusting and is better. This method should always be used for both carpet and floor in a sick-room, if it is necessary to have a carpet there. The cloth should be dampened to catch any stray germs.

It might be interesting to tell the children some rainy Sunday about the dust and how it is almost everywhere. If we take dust away from any place it is dark there, because it is on the dust that light travels. Did you never watch a sunbeam in a dark room and see the dancing particles of dust revealed there? Before the words "Let there be light" were spoken, it was necessary that dust be there, so it has been with us a long time. If balloonists go very high the sky becomes dark and finally almost black, because there is so little dust to scatter the rays of light.

What we object to is dust in the wrong place. There we call it dirt. If we have to choose between too much dust and too little outdoor air, let us choose the first. Sunlight is the greatest thing we know to kill the harmful in dust, so fling open your blinds, push up your curtains and windows and let God's sunlight in. What do you care for faded carpets? You can buy more, or you can do without them, but you cannot buy back the little life that is once gone.

Rugs are easier on the housewife and cleaner than carpets. There are many devices to keep the dust from rising—salt, tea leaves, etc.—but perhaps the best is newspapers torn fine and dampened, scattered over the carpet and swept out with the dust.

It is sometimes easier to prevent dirt than clean it. Were it alone it could be wiped off, but uniting with the greasy vapors of the kitchen it goes through the house and settles everywhere, unless an open window allows it to escape. Water cannot be applied to waxed wood, but on all painted, varnished, oiled or stained surfaces water with soap or ammonia may be used. Kerosene or turpentine on a soft rag cleans polished surfaces with rubbing. Almost any good polished furniture is improved by rubbing it hard with a soft rag on which are a few spoonfuls of boiled linseed oil. White or very light painted surfaces can be cleaned with whiting. It should be applied with a woolen cloth and the water should not be allowed to stand on it in spots or to run. Rinse it in clean water and wipe.

The troublesome dust spots on floors or carpets usually have grease as their basis. Remove the grease with ammonia, chloroform, ether, alcohol, gasoline, turpentine, benzine or naphtha, rubbing it well and in a large circle. Then the dust can be removed by washing in clear or slightly soapy water. Ox-gall soap is old fashioned and good for cleaning carpets. It does not fade if used continually, as do ammonia or salt.

When you dust use a dampened cloth. If the furniture is varnished use a little oil instead. Wash out the dust cloths and do not let them hang for the dust to get around the house again. Burn up your feather duster. All it does is to scatter the dust from one place to another. At a recent meeting of doctors the question came up, "What is the greatest distributer of disease?" The answer that received most attention was, "A feather duster in the hands of a nigger porter."

SANITATION.

BY MRS. SUE V. HOLLOWELL.

To cure disease was the voice of the past; to prevent disease is the voice of to-day. When we take into consideration the pain endured, the lives yielded up, the waste of time, the money expended in answer to the voice of the past, we turn with gratitude to the voice of to-day, and are ready to put aside all prejudices, because of the lives that have been sacrificed upon the altar of prejudice; all ignorance, because the adage, "When ignorance is bliss it is folly to be wise," is a fallacy that has worn well because it sounded well; and this bit of stupidity, added to a great deal of selfishness, has proved a dangerous thing. We are ready to lay aside ignorance, and eagerly listen to the voice of to-day, if it does tell us incomprehensible things about "germs," "animalcules," the wonderful healing properties of such simple things as fresh air, sunshine, nourishing food, sleeping in well-ventilated rooms, free from dust which finds lodgment over the windows, under the carpets and mattings, back of picture frames, in the books and photo albums, that furnish a home for the germs, and every time we open the windows and doors the air that should be life-giving—and is, in its purity—is filled with germs. In the September number of the *Woman's Home Journal* is a most excellent article on the "Education of the Nose" as a means of detecting enemies of health. This is a timely article. Every one who travels is disgusted with the odors in railway stations that emanate from the water-closets; the musty, mildew smell that greets us in the hotel bed, in the towel, even in the water pitcher that is filled day after day without being washed, by ignorant house-maids, who suppose because they are kept filled with water they do not need cleansing. The odor that greets one in the upstairs hotel porches from innumerable outside closets is most disgusting of all, because it could so easily be prevented by the use of fine sand, dry earth, solution of carbolic acid or kerosene; and yet they are left open as a breeding place for flies—a propagating plant for disease, dispensed by these same flies, on our food, milk pails, water-buckets and baby bottles.

So much for the educated nose. But what about the specific causes of diseases that have no odor? In typhoid fever the water that contains the typhoid bacilli may be ordorless and tasteless. If we drink it, wash our milk cans and dishes in it, or even use it in brushing our teeth, how great is the danger. The only thing that can save us from its ravages is a strong, healthy organism, with a standing army of blood cells that may be able to cast out the invading germs, should they find tissue upon which they can thrive. The only humane thing to do is to use every preventive from spreading by disinfecting the excreta before it leaves the sick-room, washing of the bed linen in carbolic solution and careful boiling, disinfecting the hands and care of the finger nails, destroying food taken from sick-room. These rules will hold good in all communicable diseases.

The voice of to-day says prevent disease by careful attention to details.

After a six weeks' trip through North Carolina observation has led me to this conclusion, that cleanliness—in the home, the school and the churches—would do more to eradicate disease than all other methods combined. What do I mean by cleanliness in the home? Clean air, clean beds that are permeated with sunshine at least once a week and thoroughly aired every day; no carpets unless they can be taken up and cleaned regularly. If there is no water supply in the house—and the exception is where they have, and not the rule—there should be two sanitary closets on the outside, kept free from odors by the free use of dry earth and lime; hickory or oak wood ashes can be used. A drain pipe should be in every kitchen; but where there is none, dish water, soap-suds and the like should never be poured in the same place until the soil becomes soured and makes a hotbed for germs. Lime should be used freely, as it keeps the soil about the premises in healthy condition. Every church and schoolhouse should be provided with the closets and the same precautions taken as in the house, and even more so, because the flies are always there ready to carry any germ they find in the excreta.

Now I come to the most far-reaching, most important of all the diseases produced by carelessness, and that is hookworm—important because other diseases are recognized by every sensible man and woman, which, for no reason except prejudice, even members of the medical profession refuse to recognize its existence. People afflicted with it seem to think it a disgrace, and refuse to be treated for it. With Dr. Stiles, I believe the extermination of the hookworm would settle two very important problems—that of child labor and compulsory education. Of child labor, because no manufacturer in the twentieth century, with every effort being put forth by church and State to help the child, would employ a child under fourteen years old if they could get the children over fourteen years to do the work. Again I quote Dr. Stiles: Thirty per cent of children born on the farm die before they are twenty-one years old. As to compulsory education: Beyond doubt disease of all kinds blunts the intellect as well as the body; especially is this true in hookworm disease. I know a boy sixteen years old who had hookworm for eight years. He would not go to school, he could not work. After three months' treatment, he plowed from sunrise until sunset, and has expressed a desire to go to school when the school term begins. North Carolina provides public schools for her children. If they are well physically and mentally, they will find a way to attend school, without being forced to do so by law.

Sanitation is the only permanent cure for hookworm. I need not go into a description of the disease. *The Progressive Farmer* has recently published articles that fully describe it. Soil pollution is the direct cause; therefore, every woman who keeps a home, patronizes a school or attends a church should be interested in the extermination of this disease. It is a broad field for home missionary societies, because many of the hookworm victims cannot read or write, and do not even know where the trouble lies. County physicians should give the treatment and explain the danger of soil pollution. Teachers should give talks on health and how to preserve it by prevention of

disease. Manufacturers should build tenant-houses with an eye to healthfulness of employees. Where there are cases of hookworm, insist upon treatment—at the expense of the company, if need be. Sermons should be preached from every pulpit on sanitation. What was good for the Jews in the way of cleanliness, handed down through the generations, is good for the Gentile. Whenever we begin to appreciate the blessedness of health and what it means to our people, what it means in our own homes, we will become our brother's keeper as much for our own safety as for the protection of our brother.

PREVENTABLE DISEASES.

BY DR. F. L. STEVENS, N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

I wish to talk to you about three human diseases that are preventable.

Before we consider the diseases themselves, let us consider for a moment two chief causes of such diseases, namely, bacteria.

Bacteria are very small, mocroscopic plants, the smallest living things in the world. They are so small that it is almost impossible to comprehend their size. They ordinarily measure only one-fifty-thousandth of an inch in length. This is smallness beyond comprehension. Perhaps it will aid if I tell you that from two to four hundred such bacteria placed end to end would reach only a distance equal to the thickness of ordinary writing paper.

In spite of their very small size, they are able to cause diseases in man, owing to the fact that as they grow they produce extremely powerful poisons—poisons more powerful than any others known in the world. Bacteria also multiply with extreme rapidity. Under favorable conditions they double in number each fifteen minutes. This means that the progeny of one may in six hours equal more than 16,000,000.

The two human diseases concerning which I wish to speak are typhoid fever and tuberculosis—diseases which you recognize as of extreme destructiveness in this State, as they are everywhere else.

Moreover, these are diseases which are almost entirely preventable. That is, we now know enough of them to almost entirely stamp them out if the knowledge which we have would be put in practice. I wish briefly to call your attention to the chief steps which must be taken to lessen the ravages of these diseases in your homes.

First, concerning typhoid fever. This disease is always caused by a bacterium (bacillus) which always develops in myriads in the intestine of the sick individual. These bacteria are then discharged from the patient in the excrement and, finding their way outdoors, may in some manner gain access to water used for drinking purposes. If water so polluted be drunk by a healthy person, this person is thereby exposed to typhoid. The germ may also pass from the sick person to the healthy person by the aid of the common house-fly, also by infected water coming in contact with milk and thereby infecting the milk. For the reasons given above, the following rules, quoted partially from the leaflet of the North Carolina Board of Health, should be obeyed in all cases of typhoid fever:

1. Cover *immediately* upon their passage the body discharges, to prevent access of flies.

2. As soon as possible thoroughly disinfect the discharges by mixing in equal quantity with them one of the following: (a) freshly-made milk of lime or "whitewash" (unslaked lime); (b) a 5 per cent solution of carbolic acid; (c) a 1-to-1,000 solution of corrosive sublimate; (d) a 1 per cent solution of formaldehyde. After standing a half-hour (covered all the time), the mixture should be *buried* (never thrown on the surface of the ground) at a distance from the well of not less than 150 feet.

3. Provide in the sick-room a wooden tub one-third full of either of the three last-named solutions, and drop therein as soon as removed everything in the way of body or bed-clothing, handkerchiefs, towels, etc., that have come in contact with the patient, and keep them submerged until they can be boiled, washed and dried in the sun.

4. All remnants of food that may for any reason be carried into the sick-room must be burned.

5. The nurse should wash her hands and dip them into one of the solutions, preferably corrosive sublimate, after every "changing" of the patient. She should never draw water from the family well unless a pump is used. In case it should be absolutely necessary she should disinfect her hands as above before doing so.

6. The soiled linen of the patient should never be washed at or near the well or spring. The greatest care should be observed to prevent the drainage or seepage through the soil into the well or spring from accumulations of filth of all kinds. As soon as a case of typhoid fever appears in a family all drinking-water should be boiled until a report on the same can be obtained from the State Biologist, the family physician making application to the Secretary of the State Board of Health for permit and sterilized bottle.

7. As the germ is present in the intestine in the preliminary stages and for several weeks after convalescence is established and the patient practically well, extra care of surface privies should be observed. Every evacuation should be immediately and completely covered with lime or dry powdered earth. This should be a routine practice at all times. Access of fowls should be provided against.

8. As recent observations show the disease to be transmitted by personal contact, all persons should be excluded from the sick-room except those necessary to the proper care of the patient. After recovery or death the room and its contents should be thoroughly disinfected as after any other communicable disease.

Summary.—Prompt disinfection of all discharges from the body of the patient: protection of the same against flies; special care as to the drinking-water; scrupulous cleanliness in every respect; avoidance of unnecessary contact; general disinfection at end of case.

Like typhoid fever, consumption is also caused by a germ, and the disease can never originate without this germ. If we will put into practice the knowledge which we have we can, to a very large extent, do away with the terrific annual loss from consumption.

The germ is largely given off by the patient through the sputum, and is largely carried by the wind and by flies. The following quotations from the North Carolina Bulletin leaflet are some of the chief rules for the protection of our people from tuberculosis:

"The sputum or spit of a consumptive should always be destroyed before it can dry and assume the form of dust. Indoors he should spit directly into the open fire, if there be one, or into a spittoon or spitcup containing some disinfectant, 5 per cent carbolic acid, 2 per cent formaldehyde or one-to-two-thousand corrosive sublimate. Plain water would be much better than nothing, as it would keep the sputum moist and for so long a time innocuous. The contents of the spittoon should be burned or buried and the vessel scalded with boiling water. Away from home, especially in public places of all kinds, he should religiously abstain from spitting on the floor or the sidewalk. He should always use some form of pocket spittoon, of which there are many varieties that can be obtained at a trifling cost, or expectorate upon pieces of rag or soft paper, which should be kept wrapped up in paraffin paper or other impervious material until they are burned.

"A consumptive should never cough, sneeze, talk loudly or laugh towards any one near at hand, but turn away his face, or hold his handkerchief in front of his mouth.

"No consumptive should ever be kissed upon the lips—better not at all. Regard for the safety of his dear ones ought to make him refuse absolutely to be kissed.

"Persons waiting upon consumptives should wash their hands frequently, always before eating. They should abstain from sharing with them articles of food sent to their room.

"The tuberculous patient should have his own toilet articles, tableware and linen, and no one else should use them. In cleansing them they should be boiled, or at least washed with boiling water.

"His underclothes, night-clothes and bed linen should never be mixed with the linen of the family, but immediately upon removal be dropped into a tub of water and kept wet until they can be boiled and washed.

"His room should be as airy and bright with sunshine as possible, having a southern exposure when feasible. It should be kept thoroughly ventilated, with at least one window open day and night, winter and summer.

"No one, if it can be avoided, should sleep in the same room with a consumptive, never in the same or another bed very close to his. Besides the risk of catching the disease, the second person would consume a large part of the oxygen of the air which he so much needs."

It should be the duty of every person having consumption in their household or neighborhood to write to the North Carolina Board of Health, Raleigh, N. C., and obtain free of charge their leaflet concerning causes and prevention of consumption. Likewise, application may be made for their leaflet concerning typhoid fever and the leaflet concerning hookworm.

STATE FARMERS' CONVENTION.

(ROUND-UP INSTITUTE.)

At the instance of the faculty of the North Carolina College of Agriculture and Mechanic Arts, in co-operation with other interested parties, the State Farmers' Convention was organized six years ago. Subsequently, at the 1906 meeting, the Farmers' Convention was affiliated with and made a part of the Farmers' Institute work conducted by the State Department of Agriculture, and the State Director of Farmers' Institutes made secretary of the convention.

From the first meeting the convention has grown in popularity and usefulness. The attendance this year was by far the largest the convention has ever enjoyed. By a vote the convention is to be of three days' duration the coming year.

The want of space forbids a more extended notice of the convention and the very interesting and important topics discussed during its four days' meeting.

PROGRAM SEVENTH MEETING NORTH CAROLINA STATE FARMERS' CONVENTION, NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS, RALEIGH, N. C., AUGUST 24, 25, 26, 27, 1909.

PROGRAM.

TUESDAY, AUGUST 24.

11:00 A. M.—Address of Welcome by Major W. A. Graham, State Commissioner of Agriculture.
Annual Address by the President of the Convention.
2:15 P. M.—Reclaiming Soil, Mr. R. W. Scott, Alamance County.
Discussion by Mr. J. P. Wyatt, Wake County.
The Crime of Gullying, Prof. C. L. Newman, A. and M. College.
Discussion by Mr. R. W. Pou, Iredell County.
Crop Varieties and Soil Types, Mr. J. L. Burgess, State Department of Agriculture.
Soil Preservation, Mr. E. E. Miller, Managing Editor *Progressive Farmer*.
General Discussion.
8:00 P. M.—Progress in Agricultural Education, President D. H. Hill, A. and M. College.
Agriculture's Debt to Science (Lantern Lecture), Dr. F. L. Stevens, A. and M. College.

WEDNESDAY, AUGUST 25.

7:30 to 10:00 A. M.—Live-stock judging:
Cattle—Prof. John Michels.
Horses—Dr. W. G. Chrisman.
Hogs—Prof. R. S. Curtis.
Poultry—Prof. J. S. Jeffrey.
10:00 A. M.—How to Make Two Bales of Cotton to the Acre, Mr. W. A. Simpkins, Wake County.
Discussion by Mr. T. J. W. Broome, Union County.

What Shall the Farmer Do With His Cotton Seed? State Chemist B. W. Kilgore, State Department of Agriculture.
Discussion by Mr. W. D. Troutman, Iredell County.
Peanuts as a Farm Crop, Supt. T. E. Browne, Hertford County.
Discussion by Mr. Thomas W. Blount, Washington County.
2:15 P. M.—Doubling the Corn Yield, Mr. C. R. Hudson, State Demonstration Agent.
Discussion by Mr. John F. Latham, Beaufort County.
Insects Injurious to Corn, Prof. R. I. Smith, A. and M. College and Experiment Station.
Preparation of Land for Corn, Mr. B. S. Skinner, Superintendent College Farm.
Discussion by Mr. J. D. Sessoms, Cumberland County.
General Discussion by all Corn Growers.
8:00 P. M.—The Importance of Education in Agriculture, Mr. F. S. White, Commissioner of Agriculture, Rock Island and Frisco Lines, St. Louis, Mo.
Farm Methods, Dr. S. A. Knapp, U. S. Department of Agriculture.

THURSDAY, AUGUST 26.

7:30 to 9:30 A. M.—Dairy Demonstration at College Dairy.
9:30 A. M.—Dairy Development in North Carolina, Mr. J. A. Conover, State Department of Agriculture.
Discussion by Mr. W. W. Finley, Wilkes County.
Economical Feeding of Dairy Cattle, Prof. John Michels, A. and M. College and Experiment Station.
Necessity of Good Farm Equipment, Mr. John W. Robinson, Catawba County.
Discussion by Mr. W. C. Andrews, Orange County.
Feeding Cotton-seed Meal to Horses and Hogs, Prof. R. S. Curtis, Experiment Station.
Suggestions for Selecting a Breeding Animal, Dr. W. J. Hartman, State Department of Agriculture.
2:15 P. M.—Legumes as Farm Crops, Mr. T. B. Parker, State Department of Agriculture.
Discussion by Mr. C. C. Moore, Mecklenburg County.
Building Good Roads, Prof. W. C. Riddick, A. and M. College.
Factors Affecting the Maturity of Corn, Director C. B. Williams, Experiment Station.
Grasses and Haymaking, Mr. R. L. Shuford, Catawba County.
Agricultural Extension Work, Prof. I. O. Schaub, A. and M. College.
8:00 P. M.—Improvement of Farm Homes, Mr. Franklin Sherman, Jr., State Department of Agriculture.

FRIDAY, AUGUST 27.

7:30 to 9:30 A. M.—Demonstration of Tests for Tuberculosis in Cows, Doctors Hartman, Roberts and Chrisman.
9:30 A. M.—Commercial Fruit Growing, Prof. W. N. Hutt, State Department of Agriculture.
Lettuce Growing in Eastern Carolina, Mr. W. H. Bray, Craven County.
2:15 P. M.—Handling and Selling Tobacco, Mr. J. O. W. Gravely, Nash County.
Improvement of State Horticulture, Mr. S. B. Shaw, State Department of Agriculture.
Election of Officers and Other Business.

WOMAN'S DEPARTMENT FARMERS' CONVENTION.

PROGRAM.

TUESDAY, AUGUST 24—11 A. M.

The Chairman's Address, What Women Gain by Conference, Mrs. W. N. Hutt, Chairman of the Woman's Branch of the Farmers' Institutes for North Carolina.

Address of Welcome on Behalf of the Women of Raleigh, Mrs. Josephus Daniels.

Address of Welcome on Behalf of Raleigh Woman's Club, Mrs. T. P. Jerman.

Response, Mrs. Cotten, Cottendale.

Literature on the Farm, Mrs. F. L. Stevens, Raleigh.

The Home Garden, Mrs. W. W. Smith, Raleigh.

WEDNESDAY, AUGUST 25—10:30 A. M.

Farming as a Profession for Women, Miss Eula Dixon, Alamance County.

Pin-money, Mrs. Redfern, Wadesboro.

Discussion led by Mrs. W. W. Smith.

The Farm Mother, Mrs. Elam, Cleveland County.

Co-operation of the Mother with the Teacher, Miss Henrietta Holmes, Fayetteville.

Discussion led by Mrs. J. S. Jeffrey, West Raleigh.

May the Woman of the Farm Have Hobbies? Mrs. W. L. Wiggins, Littleton.

Discussion led by Mrs. Benehan Cameron.

Recreation for the Children on the Farm, Mrs. Elmina Garrett, Graham.

THURSDAY, AUGUST 26—10:30 A. M.

Teaching Domestic Science in the Graded and High Schools, Miss Josephine Evans, Raleigh.

Sanitation, Mrs. W. R. Hollowell, Goldsboro.

The Common House-fly, Miss Josephine Scott, Alamance County.

Patent Medicines, Mrs. W. N. Hutt, Raleigh.

The Cost of Household Plumbing, Mr. G. L. Vinson, Raleigh.

FRIDAY, AUGUST 27—10:30 A. M.

Election of Officers and Other Business.

THE FARM MOTHER.

BY MRS. ELAM.

The Farm Mother? Who is she and where may we find her? In the home of the farmer, be it cabin or palace. What does she do? Ah! that is a task never completed. Who could tell what she does? She is always a busy woman, whether it be her choice or not.

In the capacity of "mother" woman finds her greatest glory. This capacity gives us the power to sympathize, to appreciate; it broadens our horizon, makes us more rounded in our development, increases our chances for usefulness and deepens our power of enjoyment.

All mothers are builders to some extent, but farm mothers more than any others, because the children are so much more dependent on them for entertainment and information.

Mothers, do we realize that we are the architects of Fate? Day after day we are steadily building. Whether we would or not, this mighty work goes on; and when we consider how long this "temple" we are working at must

stand, how important that we make it beautiful. The artist paints a picture which will last only a few years. The work of the sculptor may stand for a few centuries; the Egyptians hewed out of marble a work that will probably stand as long as the world stands. But long, long after the work of the artist and sculptor has vanished; long after the pyramids of Egypt have crumbled into dust, the character we are building must stand.

Artists of soul are we,
Moulding life and destiny;
Workers at a task sublime
Which defies the touch of time.

Ah, then, mothers, build carefully, so that the light of Eternity will reveal a structure fit to grace and adorn the temple of the King.

Farm mothers, do we realize the importance of this God-given task? The building for Eternity. The all-important thought for our children is their morals. Have we ever known a person of low moral standing to accomplish a good, great or lasting deed?

Education is the one means of moral uplift; without this all-important factor little can be accomplished. No teacher is so important or can accomplish so much as the mother. As she goes about her thousand daily duties she, ofttimes unconsciously to herself as well as the child, puts before it ideals which make a lifelong impression. She can teach lessons teachers and text-books never reach. The teacher in the school and the teacher in the home (the mother) must be closely associated for best results. Next to "mother" the teacher has best influence. Without the sympathy and support of the mother the teacher in the school is at sea. The mother can inspire the child with the thirst for knowledge, present the highest and best ideals to his vision. If discouraged, the mother can clear and brighten the way, and self-confidence is soon regained. If a child is timid and retiring, who can remedy the failing so readily as the mother? In every phase of the farm life who is so important a factor as the farm mother?

Then how very important is the training of the mother! By growing vegetables and plants the farm mother adds dollars and cents to the income of the farmer as well as knowledge in agriculture to the minds of the children. By carefully caring for the cows a nice sum can be realized from well-made butter. No employment on the farm pays better dividends than the time given to poultry, and where is the child who does not become interested in caring for poultry? Little girls, especially, like to care for the fowls, and boys are more interested in cows and horses, and take pride in their success. The extra fruit can be marketed fresh from the vines or trees in most places, but if there is no market near, the careful housewife, with the aid of the children, can make it into delicious jellies, preserves and marmalades. She will find sale for it, too.

The whole family can help in the preparation of the fruit for the making of these delicacies; while at work with their hands their minds can be employed with discussing the latest books, stories, some event in history, or perhaps some member of the family may read aloud, and you have killed two birds with one stone.

In all this work there is a twofold accomplishment, for is not the training of the child in the important work on the farm and the making of the farm products into marketable form a twofold accomplishment?

Have our farm mothers had the training they should have? Have we had the opportunity to obtain it? Does the training we can obtain here in our own State compare favorably with that of other States? Let us take a little visit into some of the other States, and see the result of the comparison.

In Michigan there is a Teachers' and Patrons' Association in each county. It backs a rural lecture course, with topics divided equally between home and school consideration.

Nebraska has the Home Economic Association.

In Illinois there is the Domestic Science Association, with the women meeting out in every farming district.

The University of Wisconsin has a short course for women, called the Housekeepers' Conference.

Cornell University, in New York State, has added a feature, The Farmers' Wives' Reading Course, to reach the woman who cannot come to college.

How is the comparison, sisters?

The study of domestic science is transforming the social conditions for the farm mother. It is reducing the weary routine of housework to direct methods. It is lifting the woman's vision from the drudgery of the kitchen to the beauty of the meadow and the orchard in their springtime bloom. Does the driven farm mother think she has no time for all this? Perhaps she hasn't now, but method shortens labor.

In some States the traveling library is in operation. The free traveling library movement originated in the State of New York in 1892. The State Librarian of Albany started the plan and sent the books traveling. Now any household can get a box of books on application at Albany. Out from Hagerstown, Md., a covered wagon starts once a week. It is the traveling library as Maryland has adopted it, with the wagon interior filled with book shelves and the librarian *en route*.

In just seven years (1892, when the traveling library plan originated, till 1899) thirty-two States had adopted the commission. Sisters of the farm, is it not time for us to try some measure by which we can bring about some of the advantages the other States are now enjoying?

We have a network of telephone systems bringing the farm mother into closer contact with the city and town and neighbors. We have the still greater advantage, the rural free delivery mail system that brings us the daily paper telling us what has happened around the world in the last twenty-four hours. We have a climate and rainfall that give us advantages beyond many other States.

Farm mothers, let us awaken from this Rip Van Winkle sleep and help to bring about advantages existing in our sister States and make this, the Old North State, the Great Old North State.

RELATION OF SOIL TYPES TO CROP VARIETIES.

BY J. L. BURGESS, AGRONOMIST, N. C. DEPARTMENT OF AGRICULTURE.

Every farmer knows that all of his acres are not alike. Some are poorer than others from lack of one or more of the elements of plant food. Some fail to respond favorably from a surplus of moisture or some other abnormal condition. In one way and another nature, to say nothing of the ruthless hand of the husbandman, has developed in our fields and forests various and varying soil conditions that are easily read in the character of the vegetation produced.

One has only to observe a little and he will find that a number of the leading soil types or "kinds of land" in his locality bear a vegetation all but peculiar to themselves. Should the vegetation be composed largely of red cedar, hack-berry, elm, hickory, and black walnut, an examination will generally show the presence of a calcareous or limy soil, derived, perhaps, from a rotten limestone or a highly calcareous igneous rock. Other illustrative examples might be cited among vegetation growing in the wild, but we are more interested in domesticated plants.

Among these, expensive experience has taught farmers all over the country that certain crops were nearly always grown at a loss on certain lands, regardless of the care and attention given them. In the black belt of Alabama and Mississippi the farmers have not ceased for years to grow cotton. Some

time ago I asked one of the best of these farmers how many good crops he could count on getting in five years. His reply was: "If I can get one in ten years I am doing well." Some years ago alfalfa was accidentally introduced into the limestone soils of the black belt and success has finally come to the farmers of that section. This type of soil is the native home of alfalfa, melilotus, etc., and these legumes alone have raised the price of these fertile lands from five to fifty dollars an acre.

Not only the crop in general is determined, or should be determined by the soil type, but the quality of product is frequently affected by the soil environment. It has been found in forestry investigations that two nuts taken from the same hickory tree and planted on two distinct soil types, the one will develop a tree with wood having great strength and elasticity, while the other will produce a tree with wood lacking in these qualities, but possessing great polishing powers.* In the coastal plain there are two types of soil that are distinct, yet possessing some points of close similarity. One of these is known as the Norfolk, the other as the Orangeburg, fine sandy loam. When sugar-cane is grown on the Orangeburg soil the syrup manufactured from it has a dark-red color, while that produced from cane grown on the Norfolk soil has a beautiful amber color, thus giving it a much higher market value. The same is true in regard to tobacco, peaches, apples, oranges and other fruits; the soil type has a most pronounced influence on the quality of the product.

But the most important discovery in this field is not general adaptation of plants to soil types, not that some soils will grow some crops better than they will grow others, but that certain soil types are better suited to the production of some *varieties* of crops than are other soils. It appears from our study of the subject that when a crop is grown continuously on a definite soil type for a number of years and careful seed selection is practiced during its growth, that there is a strong tendency for the plants to become attached to the conditions existing in this soil; they make for themselves a congenial home, become adapted to the given soil condition, adjusted to the environment, so that nothing interferes seriously with their proper performance of duty.

Looking at the proposition from a different angle we might say that the soil type which is the result of the combination of a number of factors so influences the crop that grows on it that the plants undergo, or may undergo, a gradual change which fits them more and more to grapple with the new conditions of fertility under which they are placed.

Speaking broadly, soil types are eternal things, whereas plant varieties are subject to easy and rapid change, being influenced by every radical change of environment. This influence is shown in a variety of ways, as in the change in shape of stalk, size of fruit, size of leaf and, generally, decreased prolificacy. While it is the influence on the prolificacy in which we are chiefly concerned, the influence on the quality of the product is by no means unimportant.

It is well known that the agricultural press spreads before the farmers yearly the names of a large number of varieties of corn, cotton, wheat, etc. The good qualities of these varieties are enlarged upon, but no indication is given as to whether they will make good yields on your particular farm or on any one of the half dozen kinds of land found on it. Yet the best of these varieties have been developed, so far as our present knowledge is concerned, on a distinct and definite type of soil and under a definite fertilizer and cultural treatment. Unfortunately, however, this most essential information is rarely found in the press, because the originators of these varieties either think it useless to give it or feel that their varieties will do well under all sorts of conditions.

In the case of live stock, each breed or strain is developed to meet some special demands; so, also, in plants, in general, a variety is a result of a definite set of environmental conditions that have combined to produce the variations that go to make the new strain. The variety, then, is the result either of changed natural conditions or of effort along lines carefully laid with a

*Collier Cobb: Geology and the Lumber Trade.

view to adapt and adjust strains of plants to new environmental conditions. The variety thus developed is, in the nature of the case, adapted to the surroundings where it has been making its best yields. The mere existence of these varieties carries with it the suggestion that they are not all equally well suited to all climatic and soil conditions, and that each one has doubtless proven to be the best variety in its native locality. We are to assume, then, that these are all good varieties when grown under favorable soil and climatic conditions. Again, since varieties of plants are generally developed in a given locality under given soil and climatic conditions, it follows that they will make as good if not better yields when propagated under soil and climatic conditions similar to those under which they have been developed.

Heretofore, much stress has been laid on the financial loss sustained from poor cultivation and lack of proper fertilization; but little attention has been called to the millions lost each year by using not only poor seed, but seed grown under an entirely different environment from that under which we are forced to place it.

It has been demonstrated that a change of soil environment of some of these varieties decreases the yield in case of cotton over $30 per acre. We could cite instance after instance where, by actual measurement, farmers have lost thousands of dollars in a single year by growing a variety of cotton, corn, wheat or some other staple crop on a soil type to which it was by no means adapted. It has been estimated on the most conservative data that the farmers of the State lose annually upwards of ten million dollars on the cotton crop alone, to say nothing of corn, wheat, oats, etc., by trying to grow varieties not suited to their conditions. It is not unusual to hear a farmer say: "I bought a new kind of cotton seed last spring and failed to get more than half as much per acre as I got from the old kind I have planted for years." I hear them say the same of corn, wheat and oats. In our variety tests on the farms you will note that some cottons yield as much as $25 an acre more than others growing alongside them and receiving identical treatment. Similar differences are found in the case of corn and wheat.

We stated that the best variety to plant for a given locality is the one that has been developed under the soil and climatic conditions of that locality. This being true, the only way to know positively that we are growing the best varieties is to ascertain the details of their development in their original environment, and since few or none of the many existing varieties of crops are at present grown under soil and climatic conditions similar to those in which they were developed, but have been scattered far and wide over the country and grown under all sorts of soil and climatic conditions till they have lost all inheritance but their name, it is plain that any definite knowledge of the probable performance of any of the varieties of crops offered for sale in the general market will be difficult to obtain.

In view, then, of the difficulties in the way of securing from abroad the varieties of crops best suited to our conditions, the Department is carrying on extensive plant-breeding work, looking to the development on the different soil types of the State of varieties of plants that shall be perfectly adapted to their environment. When these varieties have been bred up to where a profitable yield is secured it is the intention of the Department to distribute samples of these well-bred seeds to the farmers of the State who farm on land similar to that on which the varieties have been developed. This will be done in the hope that in each county where these seeds are placed one or more good farmers will take them and multiply them into commercial quantities for his own fields and those of his neighbors.

In the meantime the highest bred seed will be kept on the farms and, by persistent efforts, will have its productive power pushed higher and higher, and, from time to time, those who are growing the seed for sale will be furnished a new strain of the same variety to take the place of the strain previously grown. The Department hopes in this way not only to protect the farmers of the State against fraudulent seed distribution, but to provide means whereby they may get good seed of the best variety for their individual soil and climatic conditions, thus enabling them to sow in the spring with a greater assurance of reaping a profitable harvest in the fall.

SOIL PRESERVATION.

By E. E. MILLER, MANAGING EDITOR PROGRESSIVE FARMER.

Quite likely you have all heard the old story of the two men who were traveling through one of those sections where the land, the crops, the buildings, the stock, the people all look as if the blight of insufficiency had fallen upon them. Sitting in front of a dilapidated cabin in a particularly unpromising field was an old man who looked as listless and despondent as the scrubby crops about him or the old, sad-eyed mule tied up by the pine-pole stable. "Poor fellow!" said one of the travelers; "poor, hopeless, poverty-ridden man." The old chap overheard him and shifted his quid to the other side. "Lookee heah, stranger," he drawled, "I ain't as hopeless and poverty-ridden as youall think. I don't own none of this land about heah."

That old man may not have been much of a farmer, but he was evidently something of a philosopher, for there are thousands of farmers in this State to-day who own land which is a burden to them rather than a help, which decreases their profits instead of increasing them. Every acre of land that a man cultivates that does not return enough to pay for the labor and expense of making the crop, for the interest on the money invested in it, and for the plant food removed from it by the soil, is an unprofitable acre—one which he had better not have tended. And it is because we cultivate so many such acres as this that there are so many farmers who work hard year after year without getting ahead, whose only fate, it would seem, is to toil on and on, with no reward for their labor except a scanty living and that long-deferred hope which maketh the heart sick.

The average yield of cotton per acre in the State of North Carolina last year was 211 pounds. The average yield of corn has reached 15 bushels per acre only three years in the last ten. Most of you, no doubt, made much larger yields, but this means that other men made much less; means that there have been thousands of acres of cotton making less than 150 pounds, and thousands of acres of corn making less than 10 bushels. Were these acres profitable acres? Did they add to the prosperity of the men who tended them? Do they not tell, instead, of the misapplication of energy; of labor that availed not, and of years of time literally wasted out of the lives of men who should have been adding to the wealth and well-being of the State? Farming will never be the profitable occupation it should be until we *get rid of these unprofitable acres.*

The great question is, "How are we to do this?"

It is a question easier to ask than answer, too, because each acre is a distinct problem, demanding an individual solution. We frequently get letters in our office asking how to make 50 bushels of corn, for example, on land that has been making 20, or what fertilizers to use on a poor farm to make it pay. I always feel sorry for the men who write these letters—sorry for them, in the first place, because they are working land that does not produce crops large enough to pay for the labor and money expended in their making (I have tried that proposition myself, and know there is no fun in it); and sorry for them, in the second place, because their questions tell so plainly that they have no real idea of what they need to do. With such questions I always get a glimpse in my mind of a farmer wearing himself out working land too poor to make profitable crops, and probably leaving the land—as well as himself—poorer at the season's end than at the beginning. We laugh about the pompous old planter whose land was so thin the stranger crawled over it on his hands and knees because he was afraid it would break through if he walked upright; but to the men who have to cultivate these poor soils they mean hard work, poor homes, low standards of living, inefficiency; to the children reared upon them they are likely to mean deprivation, hardship, ignorance—the tragedy of unrealized aspirations and of thwarted development.

My friends, we must get rid of these unprofitable acres.

But how? Well, in the first place, we must change our ideals of farming; we must learn that the prosperity of any farmer is, to a large degree, necessarily dependent on the fertility of the soil he tends, and that any system of farming which does not pay due regard to the maintenance of soil fertility is bound in the end to make poor farms and poor farmers. We must learn what that splendid old poet-farmer, Daniel Grant Mitchell, said nearly fifty years ago, "Successful farming is not that which secures the largest money results this year and the next year and the year after, but it is that which insures to the land a constantly accumulating fertility in connection with remunerative results." We must realize that our soils are not only our chief wealth, but that they are also the heritage of the race; that they belong to generations yet unborn as much as to us; that the man who recklessly wastes soil fertility, who lets his lands wash away or who crops them until they will no longer pay for working, commits a crime against the men who are to come after him and against the God to whom the hills belong, because He made them.

Several years ago I heard a fine old Tennessee farmer, Capt. H. B. Clay, say: "I believe in our final accounting we shall be judged for the gullies and the gulls we have left on these old red hills of ours where we might have left perennial carpetings of grass." The thought stuck with me. I believe he was right. We have no right to make poor land, because poor land means poor people and a poor State. We are all proud of North Carolina, but let me ask you what kind of State it would be if every cultivated acre in it was a profit-producing acre? Would it not be a State of attractive homes, of good schools, of good roads, of flourishing towns, of an educated, prosperous and progressive people?

Now for just a few thoughts on some of the practical methods of going about this work—the greatest work given this generation to do—getting rid of these unprofitable acres. In the first place, we must rotate our crops. There is not any extensive soil area, I feel safe in saying, in North Carolina, that can stand continued cultivation in cotton or corn or tobacco or wheat without being made poorer by it; there are practically no soils in the State that do not need a leguminous crop on them once in every three years, to say the least. Most of the land, indeed, should have a leguminous crop every year for a long time to come; and the land that will not make more than 15 bushels of corn or 150 pounds of cotton to the acre had better be planted in something else. No man is likely to make poor land rich by continuing to crop it in corn or cotton. He is certainly not going to make a profit on the operation. The legumes are our cheapest source of humus and nitrogen, and we must grow more of them. A big cowpea crop is being grown this year, and I am told there is an unprecedented demand for crimson clover. This is as it should be, but there is still great room for improvement. My friends, I really believe that until we have as many acres in cowpeas as in corn and as many acres in crimson clover and other winter-growing legumes as in cotton, we are headed the wrong way.

In the second place, the washing of the soil must be stopped. Whatever will do this—terraces, deeper plowing, more humus, winter cover crops—is well worth while, and all these are needed.

A third thing needed to redeem these unprofitable acres is drainage. Large areas of the best land in the South are practically valueless to-day simply because they need drainage. The man who is afraid his crop will be drowned out every time a wet spell comes is not much happier than the man who expects his land to be washed away with every heavy rain. Judicious drainage would help both cases. Mr. French says he has made 1,000 per cent profit in two or three years on some of his tile-draining investments; and there are other farmers here who could probably do as well. Another thing right here: If I were farming, I shouldn't plant corn or cotton on land where the chances were even that it would get drowned out before maturity. I'd put the land down in redtop, if I didn't want to drain it, and sell the hay to the man whose cotton turned yellow and made about half a crop.

But let me say right here that in my opinion practically all of our lands need cover crops on them during the winter. I may be a crank on this subject; but, frankly, I believe it possible to permanently and economically build up most Southern soils while they are left bare during the winter. The washing and leaching of the winter rains injure our lands more than the summer cropping; and with all the cover crops we have, and our chronic need of feed for our stock, and humus for our land, is it not folly to leave the lands exposed to all the rains of our rainy winters? We must also keep more stock and quit exporting so much of our cotton-seed meal. But all these problems each man must work out for himself on his own farm. I am only trying to call attention to the problem—the greatest problem the Southern farmer has to solve—the getting rid of the unprofitable acres, or rather the changing of them into profitable acres. We cannot afford, my friends, to go on working lands that do not pay wages for the time we spend on them; we certainly cannot afford to go on increasing the area of such lands. We must learn that the soil is not a dead mass of matter with which we can do as we please, but that it is the source of our very life, to be cared for and enriched and loved. When we learn this, and have changed our old methods of soil-robbery and soil-mutilation for the watchful care and the tender protection the good husbandman has always given the acres he has tended, the soil will do its part. We have unprofitable acres because we have been unthinking and unscrupulous in our dealings with the land. Robbing it, we have robbed ourselves.

When you, the farmers of North Carolina, treat your land with the respect due to the handiwork of God, you will quit making average yields of 200 pounds of cotton and less than 15 bushels of corn to the acre; and you will free your State from the blight of unproductive labor, which is, in its turn, largely responsible for the poverty, the illiteracy and the inefficiency of which we are all so ashamed whenever we see the census reports.

We should all be glad to be permitted to share in such a work, each man individually on his own land, and all of us together, in one great educational movement that will make plain to every farmer the folly and the wrong of continued soil depletion!

THE CRIME OF GULLYING.

By C. L. NEWMAN, North Carolina College of Agriculture and Mechanic Arts.

The earth's surface is the abode of man and of all other animate creations. It is the alpha and omega of life. All of man's activities are confined to the common meeting-ground of earth and air. The earth's surface is the Garden of Eden, and man, by divine command, is its keeper. What record have we of his stewardship? The destruction of a once magnificent forest and the chiseling of gullies as monuments to its memory! "The firm and everlasting hills we must regard as neither firm nor everlasting. Whole mountain chains of a geological yesterday have disappeared from view, and, as with the ancient cities of the East, we read their histories only in their ruins. Yet, in all this seemingly destructive force of breaking down, decomposition, and erosion, there is traceable the one underlying principle of transformation from the unstable to that which to-day is more stable." Viewed in the light of planet building or of planet transformation, nothing is lost and nothing stable. Change is the organic law of Nature, and Nature, in an ever fitful unrest, ceaselessly labors at tearing down her own handiwork. She may rear a forest of fungi in a night or a forest of oaks in a hundred centuries; she may cast a mountain system in a day and dally a thousand centuries in the sculpturing of a hillock.

A lack of foresight and a disregard for coming generations is manifest wherever cotton and tobacco reign, and every muddy stream bears down-

ward to the sea an increased load of silt, loam and plant nutriment from lands prostituted through greed and ignorance and from which every rain removes a portion of the finest and richest of the soil—that portion of the surface which has received the care of past generations, upon which all the agencies of soil building have been at work, into which we have lavishly poured fertilizers—leaving behind barren wastes.

"The ravages committed by man," writes Marsh, "subvert the relations and destroy the balance which Nature has established between the organized and the inorganic creations, and she avenges herself upon the intruder by letting loose upon her defaced provinces destructive energies hitherto kept in check by organic forces destined to be his best auxiliaries, but which he has unwisely dispersed and driven from the field of action. When the forest is gone the great reservoir of moisture stored up in its vegetable mould is evaporated and returns only in deluges of rain to wash away the parched dust into which that mould has been converted. The well-wooded and humid hills are turned to ridges of dry rock, which encumbers the lowgrounds and chokes the water courses with its débris, and the whole earth, unless rescued by human art from the physical degradation to which it tends, becomes an assemblage of bald mountains, of barren, turfless hills scarred with gullies. There are parts of Asia Minor, of Northern Africa, of Greece and of Alpine Europe where the operation of causes set in action by man has brought the face of the earth to a desolation almost as complete as that of the moon; and though within that brief space of time which we call "the historical period" they are known to have been covered with luxuriant woods, verdant pastures and fertile meadows, they are now too far deteriorated to be reclaimed by man, nor can they become again fitted for human use, except through great geological changes or other mysterious influences or agencies of which we have no present knowledge or over which we have no present control. The earth is fast becoming an unfit home for its noblest inhabitant, and another era of equal human crime and human improvidence and with like duration with that through which traces of that crime and that improvidence extend, would reduce it to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the deprivation, barbarism and perhaps even the extinction of the species."

As a nation we slowly begin to realize the prodigality with which we have wasted and destroyed our natural resources. Our crime has not been that of burying our talents in the ground, but of destroying the ground itself.

President Roosevelt called a conference of Governors who met at the White House in May, 1908, and issued the following declarations:

"We, the Governors of the States and Territories of the United States of America, in conference assembled, do hereby declare the conviction that the great prosperity of our country rests upon the abundant resources of the land chosen by our forefathers for their homes, and where they laid the foundation of this great Nation.

"We look upon these resources as a heritage to be made use of in establishing and promoting the comfort, prosperity and happiness of the American people, but not to be wasted, deteriorated, or needlessly destroyed.

"We agree that our country's future is involved in this; that the great natural resources supply the material basis upon which our civilization must continue to depend, and upon which the perpetuity of the Nation itself rests.

"We agree, in the light of the facts brought to our knowledge and from information received from sources which we cannot doubt, that this material basis is threatened with exhaustion. Even as each succeeding generation from the birth of the Nation has performed its part in promoting the progress and development of the Republic, so do we in this generation recognize it as a high duty to perform our part; and this duty in large degree lies in the adoption of measures for the conservation of the natural wealth of the country.

"We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance, which should engage unremittingly the attention of the Nation, the States, and the people in earnest co-operation. These natural resources include the land on which we live and which yields our food; the living waters which fertilize the soil, supply power,

and form great avenues of commerce; the forests which yield the materials for our homes, prevent erosion of the soil, and conserve the navigation and other uses of the streams; and the minerals which form the basis of our industrial life, and supply us with heat, light and power.

"We agree that the land should be so used that erosion and soil wash shall cease; and that there should be reclamation of arid and semiarid regions by means of irrigation, and of swamp and overflowed regions by means of drainage; that the waters should be so conserved and used as to promote navigation, to enable the arid regions to be reclaimed by irrigation, and to develop power in the interests of the people; that the forests which regulate our rivers, support our industries, and promote the fertility and productiveness of the soil should be preserved and perpetuated; that the minerals found so abundantly beneath the surface should be so used as to prolong their utility; that the beauty, healthfulness, and habitability of our country should be preserved and increased; that sources of national wealth exist for the benefit of the people and that monopoly thereof should not be tolerated."

"It may at first seem strange that man, who prides himself on being the highest type in the animal kingdom, as well as the only animal endowed with reasoning powers, should prove the most destructive; yet such is the case. Through prodigality, due in part to thoughtlessness, and in part to a willful disregard for any but immediate interests, man has, apparently from the very beginning of his existence, so conducted himself with regard to natural resources as to leave little less than ruin in his path. This is true, not merely with reference to his treatment of the soil, but of the deeper lying rocks and their mineral contents. In the name of development he has squandered; through careless husbandry, he has not merely impoverished the soil, but in many cases allowed it to run waste and be lost beyond recovery."

The Mississippi River gives the Gulf of Mexico each year 7,468,694,400 cubic feet of soil. This would cover a square mile 268 feet deep and represents the removal of 3 inches, mostly of surface, from 1,072 square miles or 685,080 acres, which, if capable of producing one-half bale of cotton, represents the loss of 342,540 bales, or, at $50 a bale, $17,127,000 annually; and it is probable that the gullying now going on in other than the Mississippi's tributaries between the Mississippi and the Potomac is equally as great as that being accomplished by the Mississippi. Further, these figures represent the removal of soil from the land and into the sea and do not take into consideration the thousands greater quantities annually moved, but not carried to the sea.

Moving water gives us one of our greatest natural forces. Its power for work is exceedingly great and, if not controlled, excessively destructive.

A better understanding of this force may lead to a better understanding of the causes of gullying and its checks.

"If the surface of the obstacle is constant, the *force* of running water varies as the velocity is squared. This may be easily proved. Suppose we have an obstacle, like the pier of a bridge, standing in water running with any given velocity. Now, if for any cause the velocity of the current be doubled, since momentum or force is equal to quantity of matter multiplied by velocity, the force of the current will be quadrupled, for there will be double the quantity of water striking the pier in a given time with double the velocity." "The *transporting* power of a current or the weight of the largest fragment it can carry varies as the sixth power of the velocity. This seems so extraordinary a result that, before accepting it, we will try to make it still more clear by an example. Let *a* represent a cubic inch of stone which a current of a certain velocity will just move. Now the proposition is that, if the velocity of the current is doubled it will move the stone *b*, sixty-four times as large. That it will do so is evident from the fact that the opposing surface of *b* is sixteen times as great as that of *a* and the moving force would be increased sixteen times from this cause. But the velocity being doubled, as we have already seen, the force against every square inch of *b* will now be four times that previously against *a*, and therefore the whole force from these two causes would be $16 \times 4 = 64$ times as great. But the weight is also sixty-four times as great; therefore the current will just be able to move it. We may accept

it, therefore, as a law, that the transporting power varies as the sixth power of the velocity. If the velocity, therefore, be increased ten times the transporting power is increased one million times." But "the *transporting* power of water must not be confounded with *erosive* power. The resistance in one case is *weight*, in the other *cohesion;* the latter varies as the square, the former as the sixth power of the velocity." However, cohesion is greatly reduced in the presence of water and weight lessened by its buoyancy. If, as has been shown, the transporting power of water is made sixty-four times greater by doubling the velocity, the converse of the law is also true, and a corresponding reduction in the velocity of a current will correspondingly reduce its force or working power as applied to weight, erosion and transportation. A current capable of moving an obstacle weighing 64 pounds could move an obstacle weighing only 1 pound should its velocity be checked one-half. It may, then, be readily understood that all rain-water induced to enter the soil as it falls is robbed of its gullying power, and if that which must flow off is checked to one-half its velocity, its gullying power is reduced sixty-four times.

The excessive gullying taking place in that area lying between the Ohio River and the Gulf of Mexico and the Mississippi River and the Atlantic Ocean is due in part to natural conditions enumerated as follows:

1. Heavy and irregular rainfall.
2. Irregular, broken and steep topography.
3. Soils which erode and transport easily on account of the character of the soil particles.
4. Soil characters which cause the surface to expand and intersoil spaces to close when wet, thus sealing up the surface and checking the flow of rain-water into the soil.

Added to these natural causes, and far more influential in bringing about this devastation, is the carelessness, improvidence and ignorance of man as is exemplified in his treatment of the soil. Man has aided and abetted in the prostitution of our natural resources:

1. By clearing many thousands of acres which should have always remained in forest.
2. By shallow tillage.
3. By tilling the same areas repeatedly in hoed or clean-culture crops.
4. By high ridging or bedding as practiced for cotton and tobacco.
5. By not maintaining humus in the soil.
6. By failing to practice systematic and judicious rotation.
7. By leaving soil bare of vegetation, particularly in winter and early spring.
8. By giving more attention to the tillage of the crop than to the tillage of the soil.
9. By neglect of the live-stock industry.
10. By depending too much on man power and too little on farm work stock.
11. By neglecting the large pure-bred for the small scrub.
12. By failing to use up-to-date labor-saving farm implements.
13. By dependence upon fertilizers to the neglect of the soil and of farm manures.
14. By failing to apply ordinary business principles to the business of farming.
15. By neglect of mechanical means for the control of surface water.

All of these are in varying degrees responsible for gullying and opposed to good farm practice, and, all, so far as is practicable, must be utilized in bringing about the desirable change. With conditions as they are, the first efforts must be towards the control of surface water. The means to this end are:

1. Deeper and better plowing, with better implements drawn by better animals.
2. Terracing as a means by which the surplus water is allowed to leave the field at as reduced a velocity as possible, and so that as great a proportion as possible may enter the soil.
3. Level culture, that the water may be robbed of its velocity and momentum by being spread uniformly over the surface.

4. Rotation with crops of different habits and characters, and particularly those that serve as summer and winter cover crops.
5. A more extensive use of legumes.
6. The keeping of that number of farm animals which will enable the profitable consumption of these humus-producing crops.

Farming is a composite occupation, and success does not follow attention to isolated units, but does follow the adjustment of these units into a harmonious whole. Conservation of the soil's fertility is the nucleus around which revolve and from which radiate the elements of successful farming. The conditions and practices which favor gullying or soil wash are the most serious problems in North Carolina agriculture and the heaviest tax upon the resources of the State.

DOUBLING THE CORN YIELD.

By C. R. HUDSON, STATE AGENT FARMERS' CO-OPERATIVE DEMONSTRATION WORK FOR NORTH CAROLINA.

Mr. Chairman and Gentlemen of the Convention:

Probably the most important of any one thing in growing a big crop of corn is a well-regulated and abundant supply of moisture. Corn is a plant that requires an enormous amount of water when it is growing rapidly and making the ear. An acre of these plants, with the ordinary distance of planting, requires from 500 to 700 tons, or about 300 pounds of water for every stalk of corn. Every observant farmer knows that either of the two extremes, a wet spell or a dry spell of weather, is detrimental to a good yield. To have a good supply of water without the bad effects of either extreme three things are necessary. They are:

1. A deep soil.
2. A pulverized soil.
3. A humus-filled soil.

In a long series of years of farming the Southern farmer has proven that on the average soil a large yield of corn cannot be grown on land that is broken only three or four inches deep. The records show that for forty or fifty years, previous to 1907, North Carolina grew less than 14 bushels per acre, average; South Carolina and Georgia, about 10 bushels; Alabama, about 12 bushels. The average depth of breaking the soil in these States during that time probably did not exceed four inches. The shallow soil soon becomes filled with water during heavy rains. If the rains continue for some time the corn turns yellow for lack of air, which is kept out of the soil and from the roots by the water. Two things cannot occupy the same place at the same time. If excessive rains fall the surplus either flows off over the soil with more or less detrimental washing, or if the land is flat and level it stands for some time afterwards. Both cases may be remedied by proper methods of farming.

When a rain occurs that fills four inches of plowed soil it will in the deeply plowed soil sink downward and allow the air to follow it. If the soil is broken deeply enough no ordinary rain will more than fill it. If a drought follows this the deep soil may contain two or three times as much moisture as the shallow, and may thus carry a crop right on through a drought, when the corn on the shallow soil would suffer for moisture. This deep breaking, however, should be done in the fall on most soils and should be followed by a cover crop of some kind to be turned under in the spring. At no time should the fresh-broken clay be turned out on top. After being loosened up for a few years and having had the action of the atmosphere on it in weathering and having had the humus worked downward, it may then be turned out, for by that time it is pretty good soil.

Many farmers think that it does not pay to harrow or to roll and pulverize the clods. If the land is too dry, so that it breaks into clods the seed are put in among the clods with the expectation of securing good results, forgetting that plants have about as much use for rocks as for clods. Every clod has a given surface area which holds a given amount of film water. This is not the water that lies between the clods or that which is in the interior of the clod, but it is that which clings around the clod after the surplus water has passed off, or has been used by plants. If the clod is broken into two pieces the two fresh surfaces represent the increased surface area which the clod has for holding film water. If the two parts are again broken its area is further increased. If the clod is crushed into fine particles its surface area and therefore its water-holding capacity is increased many times. Of course, this is what is needed for both wet weather and for dry weather.

HUMUS (CONVERTED VEGETATION).

Much has been said and is still being said about humus in the soil, but its importance has not been overestimated. Aside from its value in supplying plant food, in making the soil work easily and in furnishing a valuable medium upon which bacterial germs live, humus is a very absorptive material. It is a fact that a pound of humus in the soil absorbs three times as much moisture as the same amount of clay, and retains its moisture twice as long. It takes up seven times as much water as sand and holds it five times as long (shown by an experiment). This, again, is what we need, both in times of excessive and of scanty rainfall. Stable manure is a most valuable material for the same purpose, while at the same time adding valuable fertility. In fact, land without vegetable matter is but the skeleton of soil, since soils are forced by the disintegration of rocks. The amount of stable manure produced on the average farm, however, being necessarily limited, the practice of growing large areas of cowpeas and clover should be resorted to.

PRODUCTIVE, HOME-GROWN SEED.

The farmer who is interested in making profitable corn crops either grows and improves his seed corn from his own seed patch or buys from a neighbor who understands and properly follows up good lines of improvement. Seed from a distance or outside of his own locality may or may not be the best for his special conditions. More often they are not. Too often all he knows about the corn is its appearance or its yield under conditions which may be entirely different from his own. Its former large yields may have been due to heavy application of commercial fertilizers, and may have been made at an expense instead of at a goodly profit. It is not always the ear that ranks highest by the score-card or by the eye that makes the largest yields. It should have inherited the capacity to make the most bushels per acre where it is to be grown.

CULTIVATION.

Many corn crops are stunted and the yield considerably reduced by lack of sufficient early cultivation. A stunted calf, pig or colt may afterwards be highly fed and cared for and make a comparatively good animal, but it will never make quite the animal that it would have made otherwise, while the cost of getting it back into a strong, growing condition is considerably increased. The same is true of stunted plants. With a wide-reaching weeder or light harrow the young corn can be gone over often enough so that no weeds or grass will ever be allowed to choke it. In fact, they never should have a chance to show themselves above the surface, being dislodged in the soil and killed while germinating. The soil should at all times be kept loose on top in order to prevent the evaporation of moisture as well as to destroy weeds. It often happens that from one to three late cultivations will add several bushels of corn per acre. It is a critical time with corn when it is completing its stalk growth and making the ear. Good conditions of cultivation, season, etc., may bring the corn along all right up to this period, but if cultivation is discontinued too early, and the season becomes dry, the soil may become compact, dry out, and the yield of the crop shortened.

COST OF PRODUCING CORN.

We want to grow not only large crops of corn, but want to grow them as economically as possible. This means that we must get more corn per acre. No general records kept over the State will show what it costs to grow corn on an individual farm, but if the farmer will keep even approximately correct records he will soon become convinced that he can grow corn much cheaper than he can buy it, provided he grows over 12 to 15 bushels per acre. Hundreds of records kept in the Demonstration Work in North Carolina last season where good methods were in operation show that corn can easily be grown on the average farm for from 20 to 30 cents per bushel. Many of them show a cost of 10 cents per bushel and less, after counting labor at $1 per day both for the man and for the horse, counting all fertilizers at market price, stable manure at $2.50 per ton, and allowing $5 per acre as interest on the money invested or as rent for the land.

On many of the Demonstration farms the doubling of the depth of soil alone doubled the yield of corn. On some of them three or four good diskings without deep breaking increased the yield from 25 to 50 per cent. The fields with plenty of humus, even without deep breaking, yielded from 50 to 100 per cent more than similar soils without humus. On a number of farms good seed made from 10 to 50 per cent more than scrub seed. These things being true, what may we not expect when the intelligent farmers of North Carolina and the South properly combine and practice all these essential things toward growing greater and more profitable corn crops? But they are already awakening to the importance of these things, and we predict that in the next ten to fifteen years we may reasonably expect that the low yields of corn will be doubled, while at the same time the cost per acre will be decreased. Much of the hand labor now practiced will be superseded by machinery. These things would constitute one of the greatest of factors toward building a higher civilization in the South.

BUILDING UP OUR WORN-OUT LANDS BY DIVERSIFIED FARMING, ROTATION OF CROPS AND KEEPING LIVE STOCK.

BY R. W. SCOTT, OF ALAMANCE COUNTY.

Is your land rich enough, and is it producing as much as you wish, and does the land in North Carolina need improving? I want to talk to you a while about this matter and give you some experience that I have had in building up a worn-out farm. Poor land and poor crops are what we see all over the State. This, in my opinion, is the most important subject the farmer has to deal with. Poor lands mean poor crops, poor stock, a poor farmer—and a poor State.

The reason, to-day, that farmers are sending out of the State so much money to buy products that ought and can be produced here is because we haven't our farms in proper condition to produce these things. If we are to stop buying hay, corn, flour, meat, butter, horses, mules, and many other articles, we must improve our lands and get them in a condition to grow these crops. Is it any wonder that our farmers complain of hard times? It is a wonder that our people, under the system of farming that they have followed, have gotten along as well as they have.

The farmer who depends upon one crop to support his family and buy his meat, flour, hay, horses and many other things, sooner or later will come to grief, it matters not what, in reason, the price of that one article is. This one-crop system is what is the matter with our farmers. We need to diversify our crops more.

We need to keep more live stock; to raise our own horses and mules, sheep, cattle, hogs and other live stock; to raise more hay, grain and leguminous

crops. Those sections where the farmers raise their own supplies, and have some to sell to supply the local markets, are the most prosperous.

We need to fence our farms, and must do so, if we keep live stock; and we must keep live stock if we expect to have manure to go on our crops. Without manure I believe it almost impossible to get our farms into a high state of cultivation. By the keeping of live stock on our farms, not only will this live stock manure the farms and get the fields in better condition for growing better crops, but they will pay a profit to the owner. Our waste lands and hills should be fenced, and growing cattle, horses and sheep, instead of being allowed to grow up and, in many cases, wash away.

If one-half the money that goes out of the State for food products could be kept here, what a change would come about in the financial condition of our people in a few years! We need to supply our markets with good butter and milk. We are sending to Iowa and other States to buy our butter. They are sending here and getting our cotton-seed meal, making butter and sending it back to us. By such a system they are making their farms rich at our expense. This should not be. I have found feeding milk cows to be profitable, and the best way to get good manure that I have tried.

Why not raise more sheep? I have found that sheep are as easy to raise as any stock, and almost indispensable in building up my farm. They will improve any land they graze upon; will kill the briers, keep down weeds, kill sassafras and bushes, will distribute their droppings evenly over the fields, and put the land in fine condition for any crop. If there was no other profit I would consider that they pay me in preparing my land for crops. But they will pay in mutton. A gentleman said, in Danville you could not buy spring lamb for less than 25 cents per pound. Another gentleman said in another place two sheep brought him $16 in mutton; and we can consume more of it on the farms. How about the wool? We have woolen mills in the State ready to convert your wool into blankets, flannel, rugs, shawls, buggy-robes and cloth—and I don't find any for sale as good as I have made out of my wool. These mills are sending North for wool, and our money is going to enrich the farmer who keeps sheep. Why not keep some sheep, and let them help you to improve your farm, and at the same time make your family happy by providing good mutton and good woolen goods? If you do this you can keep more money in our State and more in your pocket.

Each one of us must do our part in the great work of reclaiming our State.

We need to keep good brood-mares to raise our own horses. We cannot afford to be paying from $400 to $600 per pair for horses and mules; every time you buy a pair out of the State you are making some other farm rich and putting money into some other man's pocket, and proportionately making your farm poor and taking money out of your own pocket.

We ought to raise more poultry, chicken, turkeys, ducks—yes, and geese, too. You can't now get a good feather bed, and yet geese are grazers and are easily raised and give little trouble. Yet we are sleeping on straw ticks or sending North to buy mattresses.

We should raise more meat. Keep more hogs on the farm; meat is too high to buy.

There is scarcely a county that does not have these products shipped into it from other States; and too often the farmer himself is the purchaser, when he should not only supply himself, but should supply the local market. To do this means you will have to raise more feed for this stock, such as your land is best adapted to—pea-vines, red and crimson clover, hay, etc.; oats and wheat when the land is adapted to it. If you do this your farm will show the result, your land will get better and better each year, raising larger crops, thus enabling you to keep more stock and put more money in your pocket. To do this will require time and patience, unless you have a big lot of money to do it at once; but it is the true system of farming.

This kind of farming will build up any country, and make the farmer independent of any trust or monopoly. I know the difficulties in the way, but I know by experience that what I am saying is true. If you are going to get the gullies, brier thickets, and galls out of your place, you must have stock to

help you. They will work cheap, 15 hours a day, and pay for the privilege of doing it. What cheap labor! Yet it is true. Why not avail yourself of it? The ideal condition is where you see fields growing the various crops such as the land is adapted to, with nicely kept fields, with stock of different kinds feeding upon the land. This means safe farming, plenty of corn, meat and grain. It also means a contented, satisfied farmer.

None of us can carry out just what we would like to, but we will never advance until we try, and the sooner we make a beginning the better. The farmer who doesn't try to improve his land, and get it into better shape to produce crops, and improve the looks of his fields cannot love his work. I have one field of 47 acres on my farm that I bought twenty-five years ago for $287.50. The land was considered worthless; no crops growing on it, except gullies, sassafras, wild onions, briers, cedars, etc. I sold the wheat that grew upon it this year direct from the gin for $1,040. Once before I made 1,400 bushels oats on it, and several times made 800 or more bushels of wheat. This land now is carrying 40 sheep, several horses and colts, 20 young cattle and some hogs on grass that came up after the wheat was taken off. There is not a stump, gully or wash on this piece of ground. I have gotten it up by the use of live stock—especially sheep and dairy cows. The sheep have cleaned the land of wild growth, while the manure has gone direct from the cow stables to manure the poor places, and getting the gullies and galls out; peas and clover and a rotation of crops, deep plowing and a little fertilizer did the rest. I have just now got this land ready to improve. When I bought it, my neighbors said it was too poor and thirsty; that if it rained every other day it might make something. It was a long way below the average land in the Piedmont section. How am I going to treat it for the next few years? I will tell you. I threshed my wheat in five different places in the field, selecting the thinnest places. It is now being improved by the stock running on it. This winter on pleasant days I will turn my milk cows in this field, and with other cattle they will eat a great deal of this straw, and what they do not eat will in the spring be scattered over the poorest places in the field, and, with the droppings of the cows over the field, will leave the land in good condition for the next crop. In May I will plow the field with a disc plow, and will use, about the first of June, a two-horse planter, with about 200 pounds acid phosphate; plant this field in peas and soja beans and will cultivate them with a double cultivator. I am undecided whether or not at last working to sow this land in crimson clover. In the fall I will put hogs in the field to feed on the peas, and the next year will put it in corn. Sowing crimson clover would be the thing to do, but I am afraid I could not get the sod of clover turned under at the proper time to get in a corn crop. I am undecided what to do, but any way this crop of peas with hogs running in the field would in itself be an ideal preparation for a corn crop. You see by this method I am improving this land without a great outlay of labor—live stock doing the work. What I am doing to this field, I am trying to do, the best I can, for my whole farm. What I have done and am doing to this field every farmer, whether small or large, can and should do.

What we want to do is not to cultivate our land so often in clean crops that it will wash away, but to cultivate so we will add humus and decayed matter to keep it from washing. I know of no other way in which I could have made a living on my farm and improved it. I know of thousands of farms in the State that could be improved in this way that are getting poorer every year. I can't tell you just how each man should manage his farm. You must study your conditions, and know your farm, and your surroundings. But I want to get you to thinking about it, and tell you how easy it is. If I have done this, I will feel my talk has not been in vain.

ROTATION OF CROPS.

BY N. A. LAYTON, OF BLADEN COUNTY.

We will take a field on your farm on which corn is now growing, with field peas sown in the middles. After you have gathered the corn, cut the stalks, break the land thoroughly so as to turn all the vegetable matter under; then sow it to oats, putting two bushels of Red Rust or Appler oats to the acre. Put them in with a drill or harrow them in with a disc harrow by going over the ground both ways. If the surface is not in good tilth and smooth, go over it again with a smoothing harrow or drag. You can sow vetch with your oats and greatly increase the amount of hay. If wanted for hay, cut the oats when they are in the dough state and the vetch in bloom. Vetch, being a legume, will take nitrogen from the air and deposit it in the soil and in that way improve the land.

If you use any fertilizer at time of planting, use nothing but muriate of potash and acid phosphate, 14 per cent or 16 per cent. Mix as follows: 200 pounds of acid phosphate and 25 pounds of muriate of potash for one acre. If your land is sandy, use more potash; if heavy clay, use less. Sow it broadcast when you sow the oats. For the southeastern part of the State sow your oats from the first of October to the first of December.

About the last of March or first of April sow from 75 to 100 pounds of nitrate of soda broadcast on your oats; do this when the oats are not wet with dew or rain. As soon as you harvest your oats sow the land to field peas to be cut for hay. When you have harvested the hay and broken the land thoroughly about eight inches deep, sow to rye.

About the first of March prepare this land for cotton by laying off the rows four feet apart; put 400 to 600 pounds of high-grade fertilizer (not lower than 8-3-3) to the acre and bed it out; let stand until about the first of April, then rebed or list by throwing two furrows back, and plant on that list or ridge. As soon as planted, break out the balk between the rows with a cotton plow or sweep. After the first rain go over the cotton with a weeder crosswise or run round it with a side harrow. Put to stand as soon as danger from insect pests and disease to young plants is past, then cultivate shallow and often.

After the first or second picking of cotton sow crimson clover or winter vetch in middles of cotton rows, and run through middles with a light harrow to cover seed; sow from 12 to 15 pounds of crimson clover to the acre and from 18 to 20 pounds of vetch. Sow when there is a good season in the land to insure a good stand. I would advise you to get soil from where crimson clover has been grown successfully and sow in your cotton middles to insure a good growth of clover, and get soil from where vetch has been grown to inoculate the soil for your vetch.

You will follow cotton with corn, which will complete the three-year rotation.

Following is a summary of the foregoing plan of rotation:

1. You get more humus in your soil.
2. You get larger crops.
3. You can combat insect pests of corn and cotton more effectually.
4. You will grow more home supplies—the only way to ever become independent farming.
5. You will keep a cover crop on your land all the year, especially in winter, and keep the land from leaching so badly from winter rains.
6. You will have green pasture for your pigs and cattle in early spring that otherwise you might not have.
7. You will keep your land from washing into gullies and build it up for future generations.
8. Do not forget that this is the plan to restore the humus that has been burned out of your land for years, leaving it and you poorer all the time.

COMMERCIAL FERTILIZERS AND THEIR USES.

BY T. E. BROWNE, OF HERTFORD COUNTY.

The subject of commercial fertilizers has grown in importance during the last few decades; first, because of the need of adding plant food in order to reap the maximum crops from our farm lands; second, because of the increasing interest in agriculture through the country and the more scientific methods used in this industry; third, because of the growing tendency toward *intensive* rather than *extensive* farming.

Originally, the soils were quite rich in all the elements of plant food necessary for plant growth. The original soil, as it was newly turned by the crude plowshare of our forefathers, was well stocked by the Maker of the Universe with all that was necessary to reproduce the plants of the forest and meadow. When our forefathers began the tillage of the soil, they did not realize the necessity of returning something to the land to replace the food taken out by the growing crops, so they soon found the lands growing less productive. As they knew nothing about fertilizers, they thought the soil was "worn-out," so they would abandon the old fields, go into the forest and "clear up" new land. This custom was followed until they found a way of renewing the fertility artificially.

There are in all about thirteen elements of plant food necessary for the growth and maturity of farm crops, but it seems that nature has supplied ten of these in such abundance, and they are so little used by plants, that we do not concern ourselves about them. There are three, however, that are used up quite rapidly, and are so essential for plant growth that the scientific world has bestirred itself to devise a plan of keeping the soil replenished with these, instead of having to abandon the old fields and clear up new.

These three elements about which we are most concerned and which, I may say, are most essential to plant growth, are: *Phosphoric Acid*, *Potash*, and *Ammonia* or *Nitrogen*. When we buy commercial fertilizers we always buy them for these three elements contained therein, the purchase price being based on the amount of these elements of plant food the ton contains.

Each of these elements is derived from one or more definite sources, and are put on the market in various forms. Their agricultural value is largely dependent on the source from which the element is derived and the form in which it is supplied. We know that the plant roots cannot use any element of plant food until it is in a soluble state, and therefore for an element to be of agricultural value it must be soluble in water. Therefore, for us farmers to be able to buy and use fertilizers intelligently it is necessary for us to know something of the source and form of the elements of plant food we are buying.

I want to say right here that we should learn to distinguish between the commercial and agricultural value of a fertilizer. We usually know only of the first. The commercial value of a fertilizer is the added cost of the raw material, cost of digging or dredging in case of mineral elements, cost of treating and handling, and cost of mixing and bagging. The agricultural value of a fertilizer is measured by the increased production per acre by the use thereof. Whenever, fellow farmers, the commercial value exceeds the agricultural value, there should we discontinue the use of that particular brand and seek something better.

I want to name, in this connection, a few of the most common sources from which these elements are derived, in order that we may become familiar with them, and also that we may the better be able to determine, after a careful study of the question, which is better for us to buy, the raw material or the ready-mixed goods.

Phosphoric acid, that element which is used more largely than any other, is derived mainly from the South Carolina, Tennessee and Florida phosphate rocks. In the raw (or natural) state this rock is not in such a condition

to be of use to the plant. It contains three parts lime and one part phosphate. This rock is ground into a fine powder, treated with sulphuric acid, which acts upon it in such a way as to take from it two parts of the lime, leaving one part lime and the remainder water-soluble phosphoric acid. This is what is known as acid phosphate, and is the most common source from which the phosphoric acid used in making commercial fertilizers is derived. It is the water-soluble phosphoric acid we are most concerned about.

Nitrogen (ammonia, as it is known to most farmers) is the most expensive element in all fertilizer, and it is that element we can most easily dispense with buying. The atmosphere above our fields is more than three-fourths nitrogen, and yet we are content to go ahead and buy it in the form of fertilizer at 18 and 20 cents per pound, when by growing leguminous plants in a proper rotation we could secure free of cost enough to furnish our plants. Nitrogen as a commercial product is derived from various sources. Ammonia is known as water-soluble or organic ammonia, which has reference to whether it is readily soluble in water or whether it is first necessary to be decomposed and decay before it gives off its nitrogen. The common forms of nitrogen readily available or soluble in water are nitrate of soda and sulphate of ammonia. These sources give off the gas quite readily after being applied to the soil; especially is this true if the soil is moist and warm. For the above reason it is not best to use the nitrogen from these sources till the roots are in the soil ready to use it as it becomes soluble, otherwise a large per cent of the gas will leak out into the ditches, streams, or lower strata of soil, or will go off into the atmosphere. Nitrogen from these sources is better for quick-growing crops, such as truck crops, or to use as a top or side dressing when crops need extra stimulating.

The organic sources of ammonia are cotton-seed meal, dried blood, tankage, fish scrap and various others, barnyard and stable manure being a common source. Cotton-seed meal is one of the best forms of organic ammonia, and is most easily secured by us farmers of North Carolina on account of the oil mills in our midst. It contains about 7 per cent ammonia and is finely ground so as to feed the plant along through the growing season, the finer particles dissolving and giving off the nitrogen first and the coarser particles feeding the plant as it nears maturity. Fish scrap and dried blood are also good sources for organic ammonia. As stated above, ammonia derived from these sources is far better for the crops, such as cotton, corn, etc., that grow through a long season, than that from nitrate of soda and sulphate of ammonia.

The value of organic ammonia as plant food is in proportion to its content of nitrogen and the rapidity with which it decays and gives off the gas. Burnt leather is rich in ammonia, and yet it takes several years for it to be available for the plant. Thanks to our Legislature, factories are forbidden to use burnt leather as a source of ammonia in this State.

Potash, which is another essential element in plant growth, was derived chiefly from hardwood ashes and decayed vegetable and animal matter till about 1860, when the potash-salt mines of Stassfort, Germany, were discovered. Since that time there has been little change in the price of potash or little anxiety as to the supply. The potash we use is obtained from German kainit, muriate of potash and sulphate of potash. The form of potash has little to do with its value as a plant food, the same number of pounds derived from kainit being worth just as much as if derived from muriate, the only difference being the large amount of chlorine and other impurities in the kainit. Kainit usually contains about 12½ per cent potash and muriate from 48 to 50 per cent. In nearly all cases I would advise the use of muriate on account of the saving in handling the extra bulk, one ton of muriate being worth as much as four of kainit. For cotton, however, the kainit is better, as the common salt contained in it has a tendency to prevent rust.

Each of these elements has its special function in the development of the plant, just as different food for cattle produces different results. Phosphoric acid, for instance, is the seed-producing element; potash produces the woody fiber in the plant, aids in the maturing of the fruit, makes the tuber in case

of potatoes and other tuber crops, and gives to the peach and other fruits their rich, rosy color. Nitrogen or ammonia is the leaf and stem producing element.

As no two crops demand these elements in precisely the same proportion, it is necessary for the farmer who uses fertilizers intelligently to study the demands of the various crops he is growing and feed to the plants the elements in proportion that will meet the demands of the plant and afford a profitable return for the money invested. The majority of us use fertilizers not as a permanent improvement, but for immediate results; therefore, it is the more necessary to study this question. If, for instance, we are growing a grain crop, the seed being the important part of the plant, we should feed it well with the seed-producing element (phosphoric acid), and only give it enough of the other elements to produce stalks sufficient to bear the fruit. The hay and grass crops should be fed that element (ammonia) which makes leaf and stem. The tuber and fruit crops should be fertilized with potash.

Equally true as the above statement is the fact that different soils require the elements in different proportions. Some soils may be quite rich in one element and deficient in others. For instance, the red lands of the Piedmont section of our State are rich in potash, and frequently do not respond at all to the use of this element. Each farmer must determine for himself what elements are needed in his soil. It is not safe to depend on chemical analysis for this information. Of course, in this way we can determine what elements are present in our soils, but we are more vitally interested in the elements that are present in an available or water-soluble condition, and not in the mere fact of their presence. The only practical way to find out this is to test it on our own farm by a series of experiments. Each farmer can take a small area and try the various elements under the different crops and easily determine which will give profitable returns. The farmers of our State are spending annually thousands of dollars for plant food that is absolutely worthless to our plants, while with only a little trouble and thought we could purchase intelligently only that which our soils and plants require.

After we have decided the above questions as to the fertilizers best suited to our soils and plants, can we control these conditions by the use of ready-mixed or manipulated fertilizers? Most assuredly not. The only economical and intelligent thing to do is to buy the raw material, such as acid phosphate, cotton-seed meal and muriate of potash, and mix our own fertilizers at home. Having these materials at hand with a fixed per cent of the elements of plant food, any farmer with a little intelligence can make a fertilizer to meet the demands of his various soils and crops.

I say it is the only economical thing to do, because we can buy the above-named materials, which have a fixed market value, and mix up a ton of fertilizer at from $3 to $5 per ton less than we can buy the same analysis ready mixed.

We know that the price of the elements of plant food in raw materials for the spring of 1909 was as follows:

Phosphoric acid in acid phosphate	4c. per lb.
Nitrogen	18c. per lb.
Potash	5c. per lb.

If we take, for example, a ton of the ordinary 8-2-2 fertilizer, which I find is used more than any other analysis in North Carolina, we find the following condition:

160 lbs. of phosphoric acid at 4c. per lb.	$ 6.40
40 lbs. of ammonia or 33 lbs. nitrogen at 18c.	5.94
40 lbs. of potash at 5c. per lb.	2.00
Total value of plant foods	$14.34

We know that 8-2-2 costs the average farmer from $18 to $22 per ton. Of course, the above prices are based on the value in raw or unmixed material,

but we can buy these materials and mix them at home for a great deal less than the difference between the actual value of the plant food and the selling price of the ready-mixed goods.

Another disadvantage in using the low-grade, ready-mixed fertilizer is the expensive handling of a quantity of sand or filler in each ton. The manufacturer cannot make this low-grade goods and give us full weight without putting in some sand. We do not expect them to use the low-grade materials, as the cost of handling is the same per ton. For instance, it costs the same to handle a ton of kainit as a ton of muriate, and the muriate is four times as much potash. We will mix a ton of 8-2-2 as an example:

1,000	lbs. of 16% acid gives 160 lbs. or 8% of 2,000 lbs.
533⅓	lbs. of 7½% cotton-seed meal gives 40 lbs. ammonia or 2%.
80	lbs. of 50% muriate gives 40 lbs. potash, or 2%.
1,613⅓	

It will be readily seen that the requirements of the law are met as the number of pounds to fulfill the formula have been added, and yet, instead of a ton there are only 1,613⅓ pounds of material. The manufacturer knows the trade will not be satisfied with this amount, and he also knows he cannot afford to add any more material of value, so he sends and gets a carload of sand, that costs practically nothing, and piles it in one corner of the mixing shed and calls it filler or make-weight, being the material used to make up the deficiency in weight.

How much better would it be for us farmers if we would buy the raw material and for a ton of 8-2-2 mix up the 1,613 pounds and use it on the same land we would have used the ton of 8-2-2. We would thus eliminate the cost of handling, mixing, bagging and freight on this amount of sand, all of this cost being charged up to the farmer in the end.

We pay from $3 to $5 a ton for mixing fertilizer, when we can do it with our farm labor for not more than 50 cents per ton. We can mix the material just as well as the people at the factory, and could do it usually at times when we would be doing nothing—rainy days, before breakfast, etc.

The farmers of the country are waking up to the folly of buying low-grade, ready-mixed fertilizer, and each year more farmers are mixing their fertilizers at home. One of the most satisfactory evidences of the economy and practicality of home mixing is, whenever a farmer gives it a thorough trial he never goes back to the use of manipulated goods.

If any man is determined to use ready-mixed fertilizer and cannot be induced to mix his own fertilizer, I want to urge him to buy a higher grade goods than 8-2-2. The elements of plant food are always more expensive in the low-grade goods, and, furthermore, there is less danger of getting sand or make-weight in the better grades.

We, farmers of North Carolina, are wasting annually over a million dollars by the unintelligent use of fertilizer, and it is to be hoped that we shall soon wake up to the necessity of thinking for ourselves, especially along this line of commercial fertilizers and their uses.

THE HEAD OF THE HERD.

By WM. G. CHRISMAN, State Veterinarian.

The selecting of the head of a herd is a question which deserves much more thought and consideration than the average farmer thinks when the subject first presents itself; and yet it is one of the most important questions with which the breeder has to deal. Why?

Because the sire is the source or fountainhead of the herd, or the foundation upon which it is built; just as no good structure can be erected without a firm foundation, neither can a good herd be established without a good sire at its head. Just as the grain grower selects the best seed for planting, realizing that the best crops are made when the best available seed is sown, so should the breeder select the best available sire for his herd.

We all are quite familiar with the fact that the weak, bad points of both plants and animals seem to be more easily established in the young than the strong characteristics. There seems to be a natural tendency to retrogression, or a cropping-out of the bad points in animals; and these are the things which we desire to guard against. "Like begets like" is a law of nature. We expect the offspring to be like the parent. This being the case, a poor, lean, long, lank, ill-shaped animal, possessing a mean, snarly disposition, will impart these same characteristics to his offspring.

In the same ratio that this is true of the poor animal, which does not adhere to any particular type, so is it true of the good, well-bred animal, adhering closely to a fixed type and possessing the characteristics of this breed. How often you hear your neighbor say, "Johnny Jones should be a big, strong, fine-looking fellow, for his father before him was one of the best-looking men in the town." The same is true of animals.

Since this is a fact, let us think for a moment as to the sire we select for our foundation. What sort of sire did this animal have? How long has his family been known? How many brothers and sisters has he, and what kind of animals are they? Was his dam a good individual—was she a good mother? If of a class of animals that bring forth young in twos or in litter, has he a twin brother, or litter brothers? If so, how many? What percentage are good individuals, and what records have they?

Now, these may seem at first to be of little value, but without them upon what can you base your estimates of future success as a breeder?

If you wish to build a barn, surely you would use some material of known durability in order to estimate the value and strength as well as the beauty of your building. Who would think of constructing a barn of salmon brick and covering it with ordinary building paper? And why not? Because these materials have bad records. They do not possess the characteristics which are found in good building materials.

Certainly you cannot afford to take the time, say nothing of the necessary cost, to prove his ability by breeding the animal yourself; and it is entirely unnecessary, when other breeders have determined this for you, and you simply avail yourself of the results of their investigations.

So, in selecting a head for your herd, the record must be closely examined, not only of this animal, but also the record of his sire and dam for generations. If he is an animal of good type, possessing the characteristics peculiar to this breed, and has well-established blood lines, you can feel pretty well assured that he will transmit these characteristics to his offspring.

Knowing, as we do, that we cannot expect the young to be better individuals than the sire, it becomes absolutely necessary to consider very carefully the selection of the head of your herd. If we wish the young animal to be well developed, strong, healthy and true to the breed, we must select with impunity the male that is to sire them. Why so particularly the male? Because he represents exactly one-half of the foundation of the herd.

From an economical or business standpoint, it is much cheaper to purchase and maintain one good animal that represents so much blood of the herd and has such a marked power or influence upon such a large number of animals.

In raising animals of any kind our object should be to produce as many as possible of the same general well-fixed characteristics; uniformity of size, style, conformation, general qualities and color markings. The nearer a lot of animals conform to the same ideal the higher price they will command. All of us have seen, at some time or another, cattle sold to a dealer who paid a quarter of a cent more for one lot of steers that ran even in size, style, general appearance and color, than was paid for another lot of steers that were equally as good individuals, yet not so uniform in size and style and

bad or mixed colors. Another familiar example with the cattle dealers of to-day is the objection raised immediately upon finding one or two horned steers in the bunch. A few years ago the reverse was true; no dealer would give you as much for a muley steer, as he was then called, and did not like to take him at all.

Just to give you an example of a poor selection of sire, I will cite a case I observed in one of the counties of your good Old North State. It was a herd of swine numbering over two hundred and owned by one of the leading cotton growers of the State.

There were ten brood sows—no two alike in any respect, color not excepted, as black, blue, red, white and black spotted, as well as some red and white spotted. Let us look at the sire. He was of the nondescript class—neither a bacon nor a lard hog, but a genuine razor-back with the characteristic long nose, long legs, rainbow back and elephant ears, and if slaughtered when fat, I do not believe his sides (middlings) would be as thick as good sole-leather. Now, what do you think the pigs from such an animal as that would be worth on a good market? What would you be willing to pay for such pigs, and if you bought them what would you expect to do with them? How much corn do you suppose would be necessary to fatten one of these pigs? Well, I can give you the sizes, as I saw several six-months-old pigs weighed by a butcher who had purchased them.

Think of only 53 pounds! One weighed 61 pounds. It was not the lack of feed, for they were well fed twice a day.

This shows the influence the sire has on the herd. Had this gentleman kept a good sire, having a good top line, a good belly line, a good deep body, with plenty of length, and short legs, you would have seen an entirely different lot of pigs and some in which a profit could be anticipated over and above the expense of raising.

Show me the head of a breeder's herd and I can tell you what kind of a herd he keeps.

IMPROVED FARM IMPLEMENTS.

By THOMAS B. WILDER, of FRANKLIN COUNTY.

As the science of farming advances the necessity for improved farm machinery becomes more and more imperative. The fact is that the success of the modern farm is largely indicated by the number of the farm implements used on it. It has been relatively but a few years since one old Buckeye mower was the only mowing machine used in the country, whereas now there are hundreds of mowers. And yet the mere possession of farm machinery is not the only thing needed; but first get the machinery, then make an intelligent study of its mechanical construction and then you are in a position to get efficient service from it.

Generally speaking, all farm machinery is shipped "knocked down" in order to save freight charges, and is set up either at the station where received or on the farm. Unless you are going to do the setting up it is a good plan to see the machine put together. By this means you get a more comprehensive idea of its construction than by any other plan. Of course, some people have more of a knack with machinery than others; but if you do not have this knack remember these few suggestions: Be sure that all bolts are kept tight, that all broken, missing or weakened parts are replaced, and that plenty of oil is used. Another thing, when the machine is working properly do not tinker with it. Many a bolt is stripped of its threads and the machine damaged simply on account of the desire of some one to be eternally using a monkey-wrench when the bolt is already tight.

Perhaps a few words on the use and care of a mowing machine—used more

generally now, perhaps, than any other one piece of improved machinery—will be of service and will give an idea as to how to study out any piece of machinery.

The mower, on account of its general use, the heavy work to which it is subject, and the various kinds of ground upon which it is used, has had perhaps as much mechanical skill expended upon its make and improvement as any other piece of farm machinery, and the more attention you give to its construction the more will this idea be impressed upon you. The important part of the mower is, of course, the cutting bar, and this is where the wear is, and there is necessarily a good deal of wear. For this reason, in buying one be sure to get one for which new parts can always be had.

Notice, first, each end of the pitman and see that the nuts here especially are kept tight. I have known the straps on the lower end of a pitman to be rendered entirely useless by less than a day's work on account of a loose bolt at the lower end, and I have known others on which the same pair of straps were used for several seasons—all due to keeping the ratchet nut tight. At the upper end of the pitman there is a double cone bearing, and the nut holding these together should also be kept tight.

Look under the shoe at either end of the cutting bar and you will find a flat piece of steel (some mowers have a wheel at outer end in place of this sole); be sure that these are kept renewed, as they take the wear off of underside of the bar. They are adjustable as to height, and I usually run my machines with the bar well lifted from the ground.

Then notice the flat pieces of steel on the front upper part of the cutting bar. These are called wearing plates and are intended to keep the bar from wear. In most machines that have been used you will find these worn out and needing to be replaced, which can be done at very little cost.

Then be sure that the blades are kept sharp. Some people put in a blade and use it as long as it will cut or "chew" stuff off, and then replace it with another. It is a great saving both to your machine and to your team to keep the blades sharp. This can be done with a file or a grindstone, but the best plan is to use a grinder made for that special purpose.

Sometimes when the blade is well sharpened it does not cut well; this is caused by the fact that the small plates on upper side of the guards are either broken out or dull. These can be easily replaced by punching out the rivet (from the top) and putting in a new plate. Sometimes the clips which are intended to hold the blade down need replacing or bending down.

The sharpening of the blade and then leaving the guard plates either out or dull is like sharpening one blade of a pair of scissors and leaving the other dull.

When a section of the blade needs replacing some people use a cold chisel and punch. This is slow and unsatisfactory. Simply put the rib of the blade in the edge of an anvil or some heavy iron (the back of an axe the edge of which is stuck in a log is a splendid substitute) and strike the back of the section a sharp blow with a hammer. The hard steel of the section will cut the soft rivet cleanly and easily.

Finally, after the season is over, give the machine a coat of varnish or paint (the color is immaterial), oil the bearings thoroughly and put it away under shelter. A good machine kept thus ought to give satisfactory service for twelve or fifteen years.

SOIL IMPROVEMENT.

BY DR. W. J. McLENDON, OF ANSON COUNTY.

I wish to discuss with you to-day soil improvement, a subject that should interest every farmer from our seacoast to the mountains.

The fact that the average crops grown on our lands are so low and profits so small makes it a duty that we owe ourselves to use every means possible

to increase the yield of our cultivated acres. (Two hundred and fifteen pounds of lint cotton per acre, fifteen bushels of corn, six bushels of wheat, and other crops in proportion is the average for our State.)

To produce larger crops we must increase the fertility of our soils. We cannot depend upon commercial fertilizers. How can we do this in an economical way—one in reach of all classes of our farmers? The answer to this question I will try to give.

In the first place, diversity of crops is an absolute necessity. The growing of any one crop continuously upon the same land tends only to poverty of said lands, and for convenience and best results a proper rotation of crops suitable to each farm should be established and religiously adhered to. For the majority of the farms of our State a three-year rotation is the most practical and gives the best results. One year in small grain, one in cotton, one in corn. Having established our rotation, the next thing that claims our attention is the working out of the details on each section.

Take section one, that is for grain. Prepare the land well by plowing and harrowing, sowing such grains as can be grown to the best advantage; follow grain with cowpeas or a mixture of cowpeas and soy beans. Fertilize each crop. For peas I prefer ash element; use 400 pounds per acre. Phosphate and potash make a good fertilizer for peas. When the first pods of peas begin to ripen is the proper time to cut peas.

After the peas are taken from the land begin plowing as soon as possible. Now we come to one of the most important steps in soil improvement. No man can improve his soil by plowing three or four inches deep; he must go deeper or failure will be the result.

This is the proper time for deep plowing; the subsoil is now dry and everything is favorable. Use such plows as will do the best work. I prefer the Reversible Disc to any plow I ever used. After using them for five years the good results become more and more perceptible. They pulverize the land better, mix the subsoil with the soil and mix the vegetable matter all through the land in a way that no other plow will do. Plow the land at this time at least two inches deeper than it was plowed before. This section will go in cotton next year, so the plowing should be well done. After the land is plowed sow one bushel of rye per acre and put in with harrow. The rye growing during winter will prevent leaching of soluble plant food from the land, besides furnishing a good quantity of vegetable matter that will help the cotton crop next summer. Next fall, during the month of September, sow among the cotton crimson clover, hairy vetch, or a mixture of the two. This can be done behind the cotton pickers by using a small cultivator or harrow without any injury to the cotton.

The clover and vetch are winter crops and make the best fertilizer for corn that we know of. In our rotation corn will follow the cotton. During last plowing of corn sow peas. This takes us three years, and during this time there has been grown, in addition to the general crops, one crop of rye, two crops of peas and one of clover and vetch—three crops of legumes and one winter cover crop. The reason for using rye is that the deep plowing is finished so late in fall or early winter that clover and vetch cannot be used.

With a rotation like this, cotton is on the land only one year in three; same with corn and grain. These plants feed differently, their root systems are unlike; therefore, giving the best results in crops grown, and also using the land to the best advantage.

With cowpeas and soy beans for summer, crimson clover and the vetches for winter, there is no longer any excuse for cultivating an impoverished soil. Under existing conditions lands that will not produce three-fourths to one bale of cotton and twenty-five to fifty bushels of corn per acre are not profitable, and should be put in those crops that build them up.

The legumes require a special bacteria for each variety, to make them grow and enable them to take from the air nitrogen and store on their roots in the form of nodules. These plants will place in the soil about $10 worth of nitrogen per acre, on an average. On lands that have never grown clover

and vetch, very little will have the bacteria in the soil, hence we have to inoculate the soil with the special bacteria suitable for the plant we wish to grow.

The quickest way to do this is to get some soil—say, five bushels—from land on which they have grown and sow broadcast over one acre; this will inoculate the soil sufficient to grow a good crop. From this acre we can get all we want for future use. Again by sowing the same land for three years in succession the soil will become inoculated sufficient to produce good crops. I do not think anything of inoculated seed; have seen them fail so often that, as a rule, you lose the money invested.

The best season to sow crimson clover and vetch is from the first week in September until the 15th day of October. On pea stubble sow immediately after cutting vines and put in with a spike-tooth harrow.

Among cotton, following the pickers, sow seeds and put in with cultivator, run shallow. You will not injure the cotton and secure a good stand at this time of the year. I do not like sowing these seeds when plowing the crop the last time, because the sun is so hot, and if there should follow a drought practically all the plants will be killed.

In conclusion, I wish to urge you to use all the legumes mentioned above over all the farm possible, plow deep, working into the soil all vegetable matter possible, and by all means use the best rotation for your lands with the crops grown. If you will do this, all food products used by man and beast will be produced on the farm, your soil in a few years doubled in fertility, mortgages and crop liens unnecessary, and you will enter upon an era of prosperity.

CARE AND FEEDING OF WORK STOCK.

(Including preliminary remarks on need for more Live Stock and selection of same.)

BY G. A. ROBERTS, NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

NEED FOR MORE LIVE STOCK.

Seeing the need for more live stock on most of our farms, I cannot refrain from adding a word of emphasis to what others have said along the same line.

As I see it, there are five grave reasons for keeping more live stock of some good kinds on our farms:

(*a*) For the production of manure in the improvement of the soil;

(*b*) For providing a home market for our farm products and maintaining a large portion of their fertilizer value on the farm;

(*c*) For supplying ourselves with the necessary animal products, such as meat, milk, and butter;

(*d*) For furnishing at least a large portion of animals required by others in our State not able to raise their own;

(*e*) For increasing the working efficiency of our farms in using more and heavier animals with improved machinery, when conditions permit of it.

SELECTION OF LIVE STOCK.

Not that we would advise any one without considerable experience to buy animals by the car-load lots, for too many of us would lose what we already have in "biting off too much." Nor would we advise any, except those few having had some experience, to purchase more than a very few, if any, pure-bred females at fancy prices. We would, however, advise and strongly urge the use of none other than pure-bred sires, selecting a breed suitable for the purposes desired, and continue to grade up our stock with that breed.

There are on many farms places for some of the smaller work animals, but as farm improvements take place, and because of the different kinds of work on most farms, there is also a demand for some larger animals to do the heavier work. While the sizes of the animals needed may vary, the type of the general-purpose animal will not vary to a great extent. Both for its keeping qualities on a moderate amount of feed and of the least tendency towards disease, the type should conform to one more or less rectangular or blocky. Perhaps there are some specimens too chunky, but far too frequently are they long-legged, long-bodied, rawboned and rangy.

SOUNDNESS OF WORK STOCK.

Some consideration should also be given as regards soundness, both as to defects interfering with usefulness and as to blemishes reducing the sale value. Such faults as vicious habits, bad eyes, heaves, and lameness should be looked upon as undesirable. The most serviceable age at which to purchase is shortly after maturity, near six years of age. At this time most of the colt ills will have been over and one would expect the animal to be hardened for service.

CARE OF ANIMALS.

After having purchased a desirable animal it should be worth some care and attention to preserve its health and usefulness. Its quarters should be kept clean and sweet, provided with abundance of sunlight and pure air, but so arranged that the amount of both may be regulated. In hot weather, when the animal is in the barn, it should of course be protected from the direct rays of the sun, and in cool weather it should not stand in too great a draught. Similar care should be taken of the animal out-of-doors when in a heated condition, not allowing it to cool too quickly in rainy or cool weather. It should either be sheltered, blanketed, rubbed dry, or exercised slowly until cooled out.

The use of the currycomb and brush will add considerably to the comfort of the horse as well as to the cleansing of the skin, so that it may more perfectly perform its duty of throwing off waste products from the body.

Nail pricks of horses' feet are very common causes for lameness as well as the principal mode of entrance for the tetanus or lockjaw germ; hence we should be more careful in allowing nails to lie around, particularly in the barn lot. A daily cleaning out of the foot is not a bad practice, at the same time looking for foreign objects, a thrushy condition of the frog or the beginning of a sand-crack. Some hoofs are more brittle than others, and require an occasional soaking or application of a hoof ointment to prevent their cracking. Too little attention is often given to the proper trimming of the hoof, allowing the toe to grow excessively long, throwing too much weight on the heel and unduly stretching the back tendons, subjecting them to strains—a not infrequent cause for lameness. These same tendons are many times strained by careless driving, by slipping and by being overloaded.

OBJECTS OF FEEDING.

If we were to ask why we eat, many would reply, "To live and enjoy ourselves, at least while eating."

In feeding the young our purpose is to have it grow and develop.

In feeding a mature beef animal our purpose is not to make a giant of it by additional growth, but to have it lay on fat uniformly distributed, producing the highly flavored, tender meat.

In feeding the mature work animal, our purpose should be to have it do a reasonable amount of work and at the same time maintaining its body weight. This should hold true for the dairy cow producing milk, as well as for the horse or mule at the plow or wagon.

The needs of the mature work animal to accomplish the desired purpose, then, are substances in the feed which will furnish energy, like fuel for the engine, and material from which the body can repair its constantly wearing and wasting tissues. The more severe the labor the greater will be the wear and tear of the tissues.

CLASSES OF FEEDS.

In the composition of all feeds we find that there are three principal nutrients (that which nourishes), varying in proportion. They are: first, protein, characterized by the presence of nitrogen (expensive as in fertilizers) in it and furnishing the material from which the body may grow or repair its tissues; second, carbohydrates (starches and sugars), and third, fats, these latter furnishing the fuel material, but no material for growth or repair.

In that the amount of protein is variable in the different feeds we divide them into two groups:

First. Those relatively rich in protein, such as oats, wheat bran, middlings, cotton-seed meal, and clover, cowpeas and vetch hays (alfalfa when available).

Second. Those relatively poor in protein, such as corn as a grain, stover, dry or as silage, and the grass hays.

The feeding question, then, is to give these feeds containing "flesh formers" and "fuel materials" in the proportion in which the body uses them, taking into consideration also the palatability and economy of feeds selected.

CHOOSING A RATION.

On at least 9 per cent and in some sections perhaps 99 per cent of our farms the ration for the work animal consists of corn and corn fodder, both low in the amount of protein content. The result of such feeding is, even if the horse should maintain his weight, that he has had to eat an excess of the fuel portion to obtain sufficient of the flesh-forming portion. Hence, we have not fed economically and have taxed the digestive organs in caring for the portion of feed not used. More often the animal, when put to hard work, does not maintain its weight, and we have either made an unwise choice in selecting the animal, "a hard keeper," we have required too much of him, or have not fed properly, excepting, of course, the condition when suffering from some ailment.

As has been said before, the essential points to observe in selecting a ration for a work animal are economy, palatability and one containing a sufficient proportion of protein—more than is in the corn plant.

It would be impossible for us to indicate a ration suitable for all, because of the fluctuating prices of feeds and the individual differences in animals, but we will attempt something a little more definite.

Remembering that even for the idle horse the proportion of protein in corn alone is a little too low, and much so if the animal has not reached full development, then the more severe the labor the greater proportion of this element will be required.

The quantity of feed is also variable, and the feeder must use his eye to feed judiciously, but in round numbers the ration of the average working horse for one day should be about a pound of grain for every 100 pounds of live weight, and as much or more, up to a pound and a half, of long feed for every 100 pounds of live weight.

Due consideration must be taken of the "easy keeper" and the "hard keeper," as well as the amount of work done.

If one has nothing but corn as a grain to feed, then fully one-half or more of the forage should consist of clover, cowpea or vetch hay. Or if the legume hays are scarce and some cotton-seed meal with a little bran or oats to make the meal more palatable, can be had, we can balance the ration by substituting two to three pounds per day of the corn with one to one and one-half pounds of cotton-seed meal, using a little bran or oats and deducting a similar quantity or little more of the corn.

SOME DISEASES RESULTING FROM IMPROPER FEEDING.

The stomach and other digestive organs, requiring a liberal supply of blood to them while digesting a meal, cannot perform their duties as thoroughly when the animal is at work (a large share of blood then being attracted to the limbs) as when at rest. Feed not readily digested by the animal is likely to

undergo fermentation, and the horse being unable to eructate gases from the stomach is likely to suffer from a case of colic as the result of it. Bearing this in mind, when an unusual hard day's labor is anticipated, allow ample time for digestion to get well under way or give a reduction of the usual meal before starting, and make up for it by giving a little extra for several meals, rather than a large excess at one time.

Sudden changes in quantity or kinds should not, as a rule, be made, especially with certain classes of feed, such as from dry to green feed, newly-harvested corn, oats or hay. On the other hand, the horse being less able than the cow to make the best use of hays cut too ripe (having become woody and indigestible) should be fed sparingly of such. It is often an accessory cause of heaves as well as direct cause of indigestion or impaction.

One folly of feeding overripe hays is often seen when feeding on crimson clover cut too late and fed as an exclusive roughage, the result being the formation of the so-called clover balls in the bowels. And when the bowels are obstructed death usually follows. Cut sufficiently early and fed with other roughage, this legume is perfectly safe and is an excellent feed.

TIME AND FREQUENCY OF WATERING.

With reference to watering work stock, it should always precede the meal. Then what will be taken after feeding will not likely be great enough to be injurious, and by many is considered good practice, especially in warm weather.

Nothing is more refreshing to a tired, hot, thirsty animal on a very warm day than fresh, cool water, and if only a few swallows are allowed at a time, will do no harm, but on the other hand will be very beneficial. Hence, in warm weather working animals should be watered once or twice between meals, or, when very hot, oftener.

ADVANTAGES OF NORTH CAROLINA FOR DAIRYING.

BY J. A. CONOVER, DAIRY DEMONSTRATOR, U. S. DEPARTMENT OF AGRICULTURE.

In order to sell an article of any kind there must be a demand for that article; if there is no demand, then the demand must be created. In the case of dairy products we do not need to create a demand, for there is already a larger call for good products than is supplied within our own State. It is, therefore, necessary to import large quantities of dairy products from the North. In an investigation made by the United States Department of Agriculture and reported in Farmers' Bulletin 349, five cities in this State import the following number of pounds of dairy products:

	Creamery Butter.	Renovated Butter.	Oleomargarine.	Cheese.
Asheville	2,000	----------	14,000	120,000
Charlotte	14,600	----------	1,350	543,000
Greensboro	18,390	----------	10,700	167,600
Raleigh	26,676	2,000	19,750	203,760
Wilmington	421,700	59,000	8,400	547,000
Total	501,366	61,000	54,200	1,681,360

Besides the above, there are a number of smaller towns which use considerable of imported products. The total amount of creamery butter or substi-

tutes for the same will amount to at least one million pounds a year. Taking a conservative price of 30 cents per pound, this would mean $300,000 for butter. Cheese is now costing the grocer 17 cents per pound. Taking a minimum of 15 cents per pound, and we have $252,204 that the cheese is costing. These two items—butter and cheese—are costing the people of North Carolina $552,204 annually. Besides these, there is a large quantity of condensed milk shipped into the State, figures for which are not at hand.

When we consider that by the last census this State has only about six dairy cows to the square mile, while the population is about thirty to the square mile, we can easily see the need of shipping in such large quantities of butter, cheese and milk. The people of this State, like those in many other States, have long depended upon one or two crops as the principal source of income; have failed to see that there is money in other things; have robbed their soil of plant food and thus, often, have failed to appreciate or lost sight of the foundation of all our agriculture—soil fertility. We must, therefore, keep more live stock, as it is absolutely necessary to a good system of agriculture. We must raise more rough feed and convert this into beef, pork or butter. Of the different kinds of live stock there is none so profitable, if rightly managed, as the dairy cow. But there is the rub! So few herds are rightly managed, and so few men are giving the subject the attention that it deserves. There are three main reasons why the dairy business is not more of a paying industry, viz., poor cows, the lack of home-grown feeds, and poor products.

POOR COWS.

The cows in the State only produce about one-half as much milk and butter as they should. Unless a cow will give 5,000 pounds of milk and make 200 pounds of butter in a year she will not pay her board bill. How are better cows to be secured? They must be raised. In the first place, it is necessary to keep a record of every cow in the herd, weigh and test the milk from each cow at least once a month. Throw out all cows that do not make at least 250 pounds of butter in a year. It is necessary to have a good bull at the head of the herd, and he should be from a cow who has made a large yearly milk and butter record. I should prefer a bull from a cow making not less than 500 pounds of butter a year. By the use of such a bull, by discarding the poor cows and saving the heifer calves from the best cows, a good paying herd can be secured in four years, and at a much less cost than they could have been bought.

The accompanying cuts show two cows: one making 9,531.5 pounds of milk and 522.53 pounds of butter fat at a cost for feed of $68.60. The other made 1,752 pounds of milk and 102.8 pounds of butter fat at a cost for feed of $38.04. Not only does the record work show what each cow is producing, but more interest will be taken in the dairy work by every one employed on the farm, and especially those doing the milking.

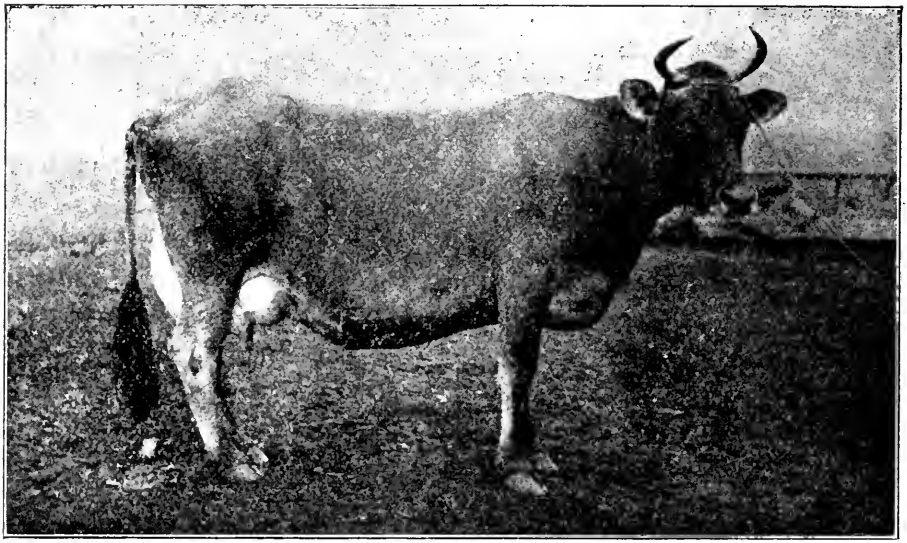
HOME-GROWN FEED.

Too many of our dairymen are depending upon the town merchant to furnish the feeds for the cows; they are depending on cotton-seed hulls for the cow feed. No man will succeed as a dairyman who follows this practice. All the rough feed should be grown on the farm; buy the cotton-seed meal and perhaps some of the other grain feed if necessary.

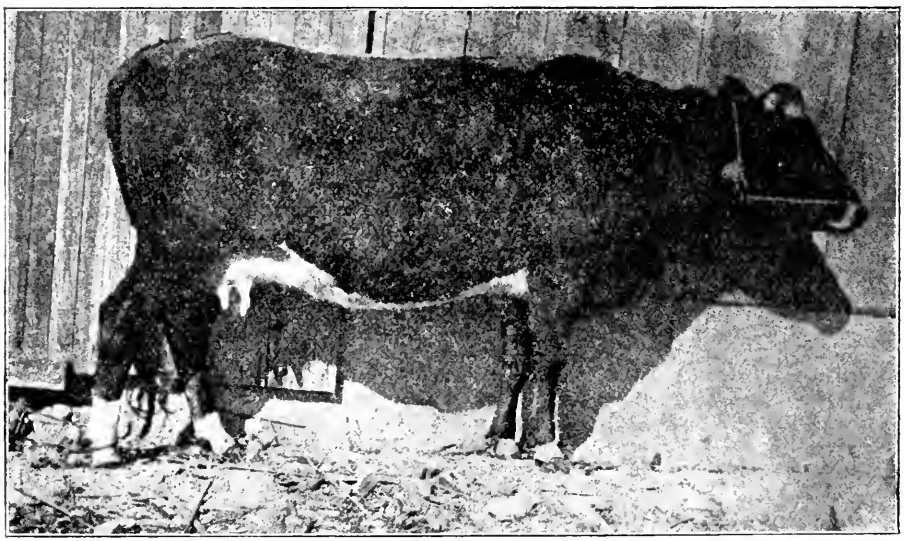
A silo should be a part of the equipment of every cattle farm, and especially the dairy farm. Pea-vine hay, sorghum, shredded stover and the clovers should be grown extensively.

BUTTER PRODUCTS.

After the cows and the feed, there yet remains the product, and this must be good, and good all the time, in order to secure and hold a high price. It is not a hard matter to get 30 cents per pound for butter, but it must be of a high quality. One example will suffice. Last winter the writer went to see a party making butter and selling it at 15 cents per pound, a drug on the market.



YEARLY RECORD.—Milk, 9,531.5 pounds; butter fat, 522.53 pounds; feed cost, $68.60.



YEARLY RECORD.—Milk, 1,752 pounds; butter fat, 102.8; feed, $38.04.

The cream was allowed to become too old before churning, butter was churned too long and gathered into large lumps, making it impossible to wash thoroughly. The butter was worked with the hands instead of paddles. The following changes were made: cream was churned oftener, churn was stopped when the butter granules were the size of a kernel of wheat, butter was thoroughly washed in two or three waters, salted when in the granular state, and worked on a home-made worker. This butter has steadily improved; to-day it brings 30 cents per pound, the herd has been increased and still the demand cannot be supplied.

I might mention other cases, but it is not necessary. There is a lot of poor butter made in this and all other States that by a little study and change of methods could easily be changed into good butter bringing a good price.

STARTING AND BUILDING UP A DAIRY HERD.

BY JOHN MICHELS, NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

GRADE COWS AND PURE-BRED SIRES.

With the average farmer the cheapest and most satisfactory way of starting a dairy herd is to select as foundation stock good-grade cows and a pure-bred bull of one of the strictly dairy breeds. The grading up will be most rapid when the predominant blood in the grades corresponds with the blood of the sire.

A foundation of this kind, of course, does not produce stock that can be registered, but by continuing the use of good, pure-bred bulls of the same blood, stock is soon obtained which, so far as milk and butter production is concerned, very closely approaches in value that of pure breeding.

PURE-BRED COWS AND SIRES.

To start with a pure-bred herd is practically beyond the means of the majority of farmers. Furthermore, there is an objection to placing well-cared-for, pure-bred cows under average conditions as to feed, care and management, because under any such change the attainment of satisfactory results would be practically impossible. Where there is a gradual infusion of pure blood, as in the case of grading up a herd with pure-bred sires, the new blood is gradually accustomed to the change of environment and the herdsman is given the necessary time to change his methods to meet the requirements of pure-bred cattle.

Where the dairyman understands the management of pure-bred stock and has the means with which to purchase the right kind, a pure-bred herd may be started to good advantage.

One of the chief dangers in starting with a pure-bred herd is the lack of funds to procure the right sort of animals. Instead of purchasing a pure-bred bull and a number of pure-bred cows of common merit, it is better policy to buy relatively cheap grade cows, and to add the money thus saved to that originally set aside for the bull. This extra money is likely to be the means of securing a bull of outstanding merit.

IMPORTANCE OF SIRE.

Whether the cows be grades or pure-breds, it is of the highest importance in building up a dairy herd to secure a pure-bred bull of outstanding dairy merit. Unless the bull is descended from good milkers it is folly to expect him to produce good milkers, no matter how fine or ideal he may be as an individual.

It is, furthermore, of importance to remember that a herd cannot be successfully built up unless the bulls that are successively used belong to the same breed. If the grading up is begun with a Jersey bull the process must be continued uninterruptedly by the use of Jersey blood.

The importance of the dairy sire is recognized in the expression, "The bull is half the herd." Usually, however, the bull is more than half the herd, either for good or bad. In the case of common or grade cows, for example, the pure-bred bull may count for three-quarters or more of the herd, by reason of his greater prepotency. To so great an extent does the bull determine the improvement or deterioration of the herd as to call for the utmost caution in his selection.

In the case of a dairy bull, especially a young bull, his chief value is determined by the performance of his ancestry. The points of greatest importance to consider in his pedigree are the following: (1) the merit of his mother and his sire's mother; (2) the merit of the daughters of his sire and grandsire; (3) the value of the daughters of his dam and his granddam; (4) the value of his sisters, if he has any; and (5) the value of his own progeny, if he has any.

The further back consecutively good records can be traced the more valuable the animal. It should always be remembered, however, that near ancestors count for a great deal more than those more remotely related.

SELECTING THE BEST CALVES.

With a first-class bull at the head of the herd, rapid improvement is effected by selecting and retaining calves from only the best milkers, at the same time culling out those cows whose records have not been satisfactory. This work cannot be done to best advantage unless records are kept of the quantity and quality of milk from each cow for a whole lactation period.

BUYING COWS.

Where all of the cows in the foundation stock are grades, none of the calves, of course, can be registered. It is desirable, therefore, to add to the herd from time to time, as means permit, some good pure-bred cows of the same blood as the bulls that have been used. This has the advantage of enabling the owner to dispose of his calves to better advantage.

The purchase of cows, however, is always attended with the danger of introducing contagious diseases into the herd, especially tuberculosis and contagious abortion. For this reason the purchasing of cows should be carried on in a limited way only. It is, of course, always in order to buy cows when the object is to add to the herd pure-bred individuals of exceptional dairy merit. But the practice of buying cows should never be carried to the point of making it the principal means of replenishing the herd, especially since the latter can be accomplished much more satisfactorily by raising the calves from the best cows.

CORN CULTURE.

BY R. W. SCOTT, OF ALAMANCE COUNTY.

Corn being one of the most important crops the farmer raises, both for his family and his animals, and being a crop that is grown in every section of the State, I wish to try to get you more interested in its cultivation.

Do we need to give more attention to the corn crop? I think so. Why? Because corn is selling from 90 cents to $1.25 per bushel, and we are annually sending thousands of dollars out of the State for corn that should be produced at home. There are few counties that produce corn sufficient for their

own use. Also because our average yield for the State is only about 15 bushels, when many farmers in the different counties testify that, when they have given it the proper attention, they have raised from 50 to 100 bushels per acre, showing conclusively that many farmers produce much less than 15 bushels per acre, and that if we can produce from 50 to 100 bushels on a few acres, we can produce it on many more. How are we to go about increasing our yield of corn?

I want to talk to you, first, about the preparation; second, the cultivation; and third, the harvesting of the corn crop.

In discussing this subject, I do so with a view to increasing the yield first, and then with the purpose of handling the corn crop more economically than we are accustomed to do.

I want to urge the farmers to quit patching. You need to get your fields for corn as large as conditions will permit; get the gullies, the brier-thickets, and clumps of bushes out. Good-size fields are necessary for economical cultivation. The great majority of the cornfields we see are suffering for something. See the many little patches of sickly-yellow corn that will not pay for its cultivation. What is the matter? It is simply starved for the want of proper food. Corn must have proper food and water to give good results, just as animals. Deep plowing is absolutely necessary. A deep-plowed soil is the storeroom of food for the corn plant, as much so as the granary is the storeroom for food for the animals. A deep-plowed soil not only holds the moisture, but it acts also as a drainage, permitting the water to soak into the land, and not stand on the surface around the roots of the corn. But deep plowing alone will be a failure. You must practice such a system of rotation as to be continually putting plant food in the soil, by growing leguminous crops—such as peas, red and crimson clover; by keeping live stock, by sowing grasses, and running live stock on your land—any system that will add humus or decayed vegetable matter. If you want the very best results use stable manure. These leguminous crops not only draw nitrogen from the air and store it in the soil, but their decaying in the soil acts as an absorbent, and holds the water and keeps the soil moist and waters the corn plant as it needs it. Deep plowing, stable manure and leguminous crops, then, are absolutely necessary. A farmer who plants a field of corn should give the land such treatment that he would have the right to expect a larger yield of corn on account of that treatment. Unless a person so treats his land he is not worthy of the name of a farmer. Unless he complies with some of these conditions he will fail on his corn crop, no matter what implements he uses, or how he cultivates his corn, or what kind of seed he uses.

SEED SELECTION.

The farmer should give more attention to improving his seed. The best way is to go over your field before you cut or pull your corn and select the stalk that has two good ears, and from a stalk that comes nearest coming up to your ideal of what a cornstalk ought to be. By following this simple method you will improve your field of corn. Of course, after shucking this corn you should select only the best type of ear. An excellent plan is to take a few of these best ears and plant to themselves, where you can look after it more closely than if in a large field. Any farmer can follow this plan. Selecting from the crib may give you a good ear, but you can't tell the parent of that ear, whether the stalk had one ear or two, or was a large, overgrown plant, out of proportion to the ear. It is a mistake to get seed from a distance, that is grown in a different climate and under different conditions from ours. A corn planter should be used, because it saves labor and plants the corn at a uniform distance and depth, and corn will come up better after a planter than it will dropped by hand. It is easy to get corn too thick, and much labor can be saved by having the planter drop the corn at the right distance and putting the right number of grains in a hill. I think one is sufficient, ordinarily. If you have complied with the first condition of having a good seedbed, all that is necessary in the cultivation is to stir the soil so as to keep down the grass, kill young weeds and preserve the moisture. The first working (which should be early after the corn is planted, and certainly as

soon as it is up—before the grass gets a start) can be done with a weeder or light harrow or by a cultivator run next to the corn as soon as it is up good and has two or three blades on it. It should be the aim to do away with hoe work entirely, or as little as possible. It is too expensive, and the labor can be more profitably spent otherwise. The farmer who lets the grass and weeds get such a start so as to make it necessary to use a hoe has lost out on the corn crop. Ordinarily level and shallow cultivation give the best results. Farmers use the one-horse plow too much. The plowing should be done before the corn is planted. One and two horse cultivation should be used. Get your fields in such a shape that you can use a two-horse cultivator, and work a row at a time. If you do this you can always keep ahead of the grass. Corn should be stirred frequently—at least once a week—and if you do not cultivate deep enough to disturb the roots, you can cultivate with profit until corn is in the roasting-ear stage.

I have seen much corn ruined (that might have made fairly good corn) by waiting too long and then going into it to lay it by with a one-horse plow, and tearing up the roots, and if it should be dry a short time the corn is ruined. I do not believe it pays to replant corn. It does not pay me. Do away with the hoe entirely, do not replant, and make it necessary to thin corn as little as possible, and you have cut down the cost of the corn crop certainly one-third.

What I want to do is to get you more interested in your corn growing. You must be the best judge of your farm and the conditions. You will work out the details of what kind of implements to use, if I can get you to thinking, and get you to make up your mind that you can and ought to grow more corn per acre than you are doing.

HARVESTING THE CORN CROP.

As a rule, we are harvesting the corn crop just as we did a hundred years ago. Contrast the way we save the corn crop with the improved methods now in use to handle the wheat crop. Some of the older farmers remember when we used to thresh wheat by having horses walk over it and tramp it out. Now the improved threshing-machines will clean from 300 to 1,000 bushels per day. Then they had the old sickle to cut, the farmer getting down on his knees and grasping the grain in one hand and cutting with the other. Then the common grain cradle and now the binder that cuts, ties the bundles and drops them in a pile to be shocked. Where is the wheat farmer that would go back to the old way? Yet machinery is made to handle the corn crop just as well and just as economically as for the wheat crop. Corn should be cut at the ground and shocked, either cut with a corn knife or a hoe with a short handle, and light enough to use with one hand. Where the land is not too rolling and rough and where the fields are not in patches, a corn harvester that cuts and ties the corn into bundles can be used to great advantage.

The mistake some farmers make is cutting their corn too green. It should be a little riper than when you pull fodder. The shuck on the ear should be brown. Farmers should unite and buy a shredder. Set your shredder in barn lot, with blowpipe in barn, with an empty wagon under the elevator to catch the corn; start two or three wagons to hauling the corn shocks from the field, and you will be surprised how quickly you can shuck a field of corn. When you are done your field is cleared of stalks, your corn is in the crib, and you have a most valuable feed for stock already cut up and in the barn.

I have for fifteen years cut my crop, but I have some good farmers on my place who work for a part of the crop, who would not stay if they were denied the privilege of pulling their fodder. It is sickening to pass by a field that is stripped of its blades, and see about half of the corn green, knowing that that corn is damaged more than the fodder is worth. Experiments have proven this to be true. Farmers, go into your garden, when your corn is silking, and pull the blades off, and what is the result? The silk and cob shrivel up. Why? Because you have taken off the leaves that feed the plant, and the nearer this time and up to the fodder-pulling stage you take off these blades your corn will suffer in proportion, and you will have a light, shriveled grain.

Cut the corn and shock it, and it will be a firmer grain and heavier than if it had been left to ripen in the field with all the fodder on it, because by cutting and placing the green stalks together, and putting them out of the sun and wind, the sap in the stalk is preserved longer, and the corn has a longer time to mature, and draw from the stalk, and hence a firmer and better grain. You cannot afford to waste this good feed when your stock need it, and your farms need the manure. After fifteen years' experience I know of no way of getting a greater amount and a better feed for so little cost and labor as cutting the corn. Pulling fodder, cutting tops, pulling corn, throwing it on the ground, picking it up again, hauling to the lot, and throwing it out again, then shucking and throwing the corn on the ground, then putting in a wagon, and putting in a crib, picking up the shucks, taking to barn and throwing out again is too slow and costly and out of date for this progressive age. We must get out of the old ruts, and improve our methods if we expect to grow the corn crop with any profit.

Farmers, I hope you can get some ideas out of what I have had to say that will be of some help to you in growing your corn. Let us all determine that we will increase our corn yield, and that we will feed our lands and treat them in such a way that we will get better yields. If every farmer will make up his mind to this effect we will see our average go up gradually from 15 bushels an acre to 30.

SOIL IMPROVEMENT.

BY C. L. NEWMAN.

There is no subject confronting the North Carolina farmer which is of equal importance to the subject of soil improvement. The profit resulting from plant production is controlled by soil conditions. The profit resulting from animal production is controlled by plant production. The farmers' efforts in the care of crops are directed almost solely to the present needs of the present crop rather than to the needs of the soil; and the interpretation of these plant needs too often lead the farmer to practices disastrous to the good of the soil and ruinous to its future usefulness.

The thousands of acres of land in the State that are exhausted of fertility and many more thousands of acres so reduced in fertility that they are now cultivated at a loss rather than a profit, have been brought to their present condition by the ignorance, carelessness and self-robbery on the part of the owners of these acres. Every idle field, every broomsedge field, every gullied area and every pine thicket are wounds upon the breast of the State and vandals robbing a people of nourishment. The soil which furnishes all the food and all the clothing to all the inhabitants of the world was not given to be used in ignorance and then thrown aside in a greater ignorance. It was given for all time to come, and he who is a careless keeper of the soil intrusted to him is neglectful of his own interests, untrue to his fellow-beings, robs posterity and is recreant to a divine trust. If a man burns his own house he is convicted of arson; if he abuses his horse he is convicted of cruelty to animals and suffers penalties; if he destroys the usefulness of a thousand acres of the earth's surface no penalty is inflicted. In the pretense of progress we have destroyed our forests. Shall we under the false pretense of science continue to destroy the usefulness of the earth's surface?

The discovery of America is one of the greatest events in the history of the world. What was the condition of our part of this great American Continent when Columbus made it known to the world? Within the present boundary lines of the Old North State there flourished a forest which, if now in existence, would attract and merit the admiration of the world! What has become of it? What have we in its place on thousands of acres? It is true that a great civilization has sprung from the ashes of our great forests, but it was not

necessary that the forests be destroyed that the civilization might develop. A wise preservation or conservation of the forests would have made the development more rapid and greater in both the past and the future. Under forest conditions, such as existed when European races settled America, the surface of our State was protected from soil wash and the streams were clear, unburdened with tons of soil, overflowed but slightly, and droughts were probably unknown. The forests were everywhere and mature. In their mature condition an equilibrium between growth and decay was established. There was annually given back to the soil an amount of plant food in the form of leaf, bark, fruit and twig equal to the plant food needed in the forests' annual growth. A balance was established between supply and demand. This immense quantity of vegetation, each year deposited upon the surface of the soil and slowly decaying into the best forms of plant nutrients, also caught and held the rains that fell, enabling the rain water to enter the earth, from thence it was pumped by the vegetation as needed. The earth's surface was shielded from the intense rays of the sun in summer and blanketed against too great cold in winter by an ever-present covering of vegetation.

Man and his methods changed this natural order of things. The conversion of forest into cultivated field stopped the annual deposit of humus-making material and destroyed that which had accumulated; and Nature, dissipated, let loose her excess of flood and drought, heat and cold.

The tillage methods practiced in growing the three principal crops of the State have forced soil depletion and destruction rather than its improvement. Crop production, or yield per acre, is controlled by soil condition and soil composition. The plow, the greatest implement of production and the foundation of our civilization, has been so used as to check both production and civilization, since its improper use has aided in the destruction of the soil. Production depends upon the soil and civilization upon production. How has this been done? This greatest of civilizing influences, the plow, has been used in a primitive form when better forms were available and in a primitive way when better ways were known. In the preparation for crops the plow has been dragged by the same light mule to the same shallow depth for several generations. The sliding of the plow upon the same subsurface plane year after year has compressed this subsurface and made it to a great extent impervious to the penetration of the roots of growing crops and to the percolation of rain water. Too often has the preparation with the plow been delayed until spring, where the haste to get the soil ready for the spring crops was so great as to impair the quality of the plowing and to induce the use of the plow when this subsurface was wet. There is formed a hard-pan, increasing in hardness each year, largely restricting the roots of the crop to the depth of soil stirred by the plow. The crops are thus forced to depend largely upon this shallow depth of stirred soil for both food and drink, and quickly exhaust both. The costly fertilizers are resorted to, that this impoverished shallow surface may be stimulated to give up more of its plant food. Stable manure, leguminous and other plants are plowed into this shallow surface to restore the lost soil conditions and compositions. The growing crops year after year are confined to this shallow depth, and exhaust it.

Unless the North Carolina farmer has suddenly changed his methods, the average depth of his plowing does not exceed three inches, the State over. He uses only the surface three inches of his land, while he is entitled to three or four times that depth. He restricts the crops feeding to this three inches of surface which has been fed from year after year. The crop, according to its requirement and nature, is entitled to eight or twelve or more inches. The rain that falls so spasmodically should soak into the ground, the ground being the natural reservoir for growing plants. This all but impervious stratum which has been formed three inches beneath the surface prevents the descent of rain. The surface three inches of "prepared" soil soon becomes filled with water when our frequent heavy rains visit us. The three inches become saturated. The surplus water is prevented by the hard stratum from penetrating to greater depth. The soil particles are made lighter in the presence of water. Water exists in every space between the particles of soil, acting as a lubricant.

Practically all of our soil surface has too much fall, and as soon as the surface fails to take up more water the surplus flows off, carrying with it the three inches of soil which we have for years turned over and over in our efforts to fit it for crop production, carrying with it the manures and fertilizers we have lavishly poured into it. The soil condition and the soil composition favorable to crop production are not alone removed, but the soil itself is removed. This is no pen picture invented to tickle the fancy, but a recital of historic events written upon the faces of the farms of North Carolina in the rhetoric of broomsedge, brier and pine and the oratory of galled fields and gullied hillsides. This broad page of history was written by the plow, the real emblem of America's liberty, progress and power!

The fall or steepness of our cultivated fields, together with the shallow plowing so common, are the great checks to soil improvement and aids to the loss of fertility. They are the more important of several aids to soil wash or gullying, and the destruction of farm values. For the sake of convenience, several of the more important means to soil improvement will be taken up separately.

1. *Deep and Thorough Plowing.*—If plowing is done for the purpose of making the soil more congenial to the growth of crops it is well to consider the character of plowing being done, that it may be determined whether or not we are securing the desired results from the operation as it is performed. We must know how to plow and when to plow, what plow to use and how it should be used.

In the preparation of the soil for a crop by the use of the plow and other implements the main objects sought are the (*a*) deepening of the soil and its (*b*) thorough pulverization. The deepening of the soil has been briefly discussed. The quantity of soil available for the exercise of plant-growth functions, together with its physical properties and chemical composition, are the measure of plant growth. The plow is the finest aid to the attainment of these plant-growth controls. It increases the feeding area for the plant, decreases surface washing, increases the water-holding capacity and plant-food content of the soil, lessens the injury from drought and brings to the surface crude materials, where air, sun, temperature and bacteria may act upon it and make it available for the plants' use. There is a variety of soils in the State with variable characters, and each must be given its appropriate treatment. It is not advisable to too rapidly increase the depth of these soils, since in many of them the condition of the subsoil is such as to make it unsuited to the needs of plants. If too much is brought to or near the surface at one time it will dilute the soil proper and may, the first year, actually decrease crop production. If, however, the deepening is done in the fall, when it should be done, and is accompanied by the introduction into the soil of stable manure or vegetable matter plowed down, and an application of lime (if the soil contains much clay), the freezes of winter, with the aid of the lime and organic matter, will in many cases bring about conditions which will be instrumental in doubling the crop yield.

The primitive implements used in the preparation of the soil and the too frequent delay of preparation until freezing weather has passed are responsible for the poor physical condition of the seedbed. The thorough pulverization of the soil before the seed are planted is almost universally neglected, yet its importance cannot be too strongly emphasized. The water-holding capacity of a soil and the amount of available plant food in the soil are proportionate to its pulverization. All the plant food taken by the plant from the soil is in solution—is dissolved in water, and then drawn into the plant through its roots. The plant cannot get its food unless it be dissolved in water. Water and air are the great forces which render available the insoluble plant-food constituents of the soil. Water prepares and carries the food into the plant. The amount of water a soil can hold is controlled by the gross area of surface exposed by the soil particles, and the more thoroughly the soil is pulverized the more water it can hold, the more available plant food the soil will contain and the more readily will it be conveyed to the plant. A simple illustration

will make this plain: Suppose we immerse a cubic inch of stone in water and then remove it. Each of the six sides of the stone will be covered with a thin film of water. There will be six square inches of water adhering to the stone. Now, if the cubic inch of stone be split one hundred times there will be 200 more square inches of surface exposed. If it be split again there will be 200 more square inches of surface, and if again split two hundred times there will be another increased area of 200 square inches, making 600 more than the original cubic inch had, or 606 square inches of surface, each square inch capable of holding its share of water and 606 square inches exposed to water, air, temperature, bacteria, the juices of decomposing organic matter and the direct action of the roots of plants, and by these agencies forced to give up its composition for the use of growing crops. Other things being equal, the difference between a very poor and a very rich soil may be entirely controlled by the fineness of the soil particles or the surface area of soil particles exposed to air and water.

RESOLUTIONS ADOPTED BY FARMERS' CONVENTION.

Resolved, 1. That an executive committee of one man from each county be appointed, the duty of each committeeman being to act as adviser in the general work of the convention.

2. That each county committeeman be expected to bring at least ten members from each county.

3. That in connection with better roads and the extension of rural mail delivery, we should also insist upon the enactment of a parcels post law.

FARMERS' PLATFORM.

Whereas, The Farmers' State Convention of North Carolina holds its 1909 annual session under peculiarly auspicious circumstances. Never before in the history of the State has there been such an awakening to the importance of better agricultural methods, never before such enthusiasm among the farmers themselves, their wives, their sons and daughters. We feel that the farmers of the State are entering upon a new day, an era of marvelous development which we should all be proud to have a part in hastening. The North Carolina Department of Agriculture, Experiment Stations, the farmers' institutes, the demonstration and extension work, farmers' organizations, farm papers, and last, but by no means least, the Agricultural and Mechanical College in which we meet and which is now more efficient than ever before—all these agencies are working together in one great movement for doubling the profits of our North Carolina farmers and for briuging a new dignity to agriculture such as it has never before known. We urge every farmer in North Carolina to put himself in touch with each of these movements, work with them, and make himself a fighting soldier in the great crusade of agricultural progress.

2. In outlining a brief platform of progress we, first of all, call attention to the fundamental importance of preserving and building up the land, the heavy rains of the last twelve months having emphasized afresh the paramount necessity for better care of our soils. We must give special attention to better drainage, the formation of humus to prevent the land from washing so easily, and we must also make it our ideal to have a cover crop upon every acre of our land in winter to prevent the fearful leaching away of fertility, possible only in our warm Southern climate.

3. In general farm methods we wish especially to stress the importance of the great movement for better implements and machinery—more two-horse and three-horse plows, cultivators, and other implements and machinery

instead of the wasteful one-horse method which requires two to three times as much expensive man-labor without increased returns. Better seed selection is another vitally important matter, and every North Carolina farmer who does not buy from reliable and progressive seed-breeders should select seed for next year's corn, cotton and peanut crops from the very best individual plants in his field during the next sixty days. The growing of legumes must be preached until the acreage is doubled again and again. Better cutting and management of our timber is necessary to preserve this great resource and also to save the land itself. We must have more live stock—more hogs, cattle and horses especially—and every farmer should have one or more improved breeding animals on his place; as helping here, the extermination of the cattle tick is a work which we should all encourage, and dairying also offers splendid opportunities for great development. Second in importance to nothing else is the improvement of our homes, and the farmer's wife must get improved household conveniences and comforts, water supply, etc., as rapidly as the farmer himself gets improved farm equipment.

4. We rejoice in the rapid improvement of our public schools, so that it is no longer necessary for our farmers to move to town in order to educate their children. We hail with special delight the coming of Farm-life High Schools, and we urge that the law requiring the teaching of agriculture in our schools be strictly enforced, and that arrangements for instruction in domestic science be brought about as rapidly as possible.

5. Never before has our State been so thoroughly aroused to the importance of better roads. Whether or not expensive macadam roads can be built, we urge our people not to neglect their opportunities for getting the less expensive sand-clay or gravel road, and we especially urge the wider use of the road drag.

6. The agitation for better rural sanitation and health conditions should have the heartiest support of all our farmers. The saving of health and human life is certainly not less important than saving money.

7. For the purpose of enabling our farmers to realize easily upon their capital as other property-holders do, we note with pleasure the growing interest in the Torrens System of registering land titles, and we join the Farmers' Union in urging its importance upon our Legislature.

8. We also join other farmers' organizations in protesting against indiscriminate immigration from Southern Europe. We welcome most heartily men of our own stock, especially wide-awake Western and Northern farmers, men who speak our language and know our institutions, many of whom have made themselves leaders in Southern development; but we do not believe in wholesale immigration of Italians, Poles, Russians, etc.

9. In conclusion, we wish to thank especially the president and faculty of the Agricultural and Mechanical College, the officers of the Experiment Station and the Department of Agriculture, the people of Raleigh, the Catawba County Live-stock Association, and the railroads of the State for courtesies extended in connection with this meeting, and Dr. Knapp, Mr. White, President French and Secretary Parker for their invaluable services.

By the Committee:

CLARENCE H. POE, *Chairman;*
JOHN W. ROBINSON,
B. B. EVERETTE.

LEAF TOBACCO SALES FOR SEPTEMBER, 1909.

Pounds sold for producers, first hand	28,726,637
Pounds sold for dealers	1,146,793
Pounds resold for warehouses	2,675,131
Total	32,548,561

SUPPLEMENT TO OCTOBER BULLETIN, 1909

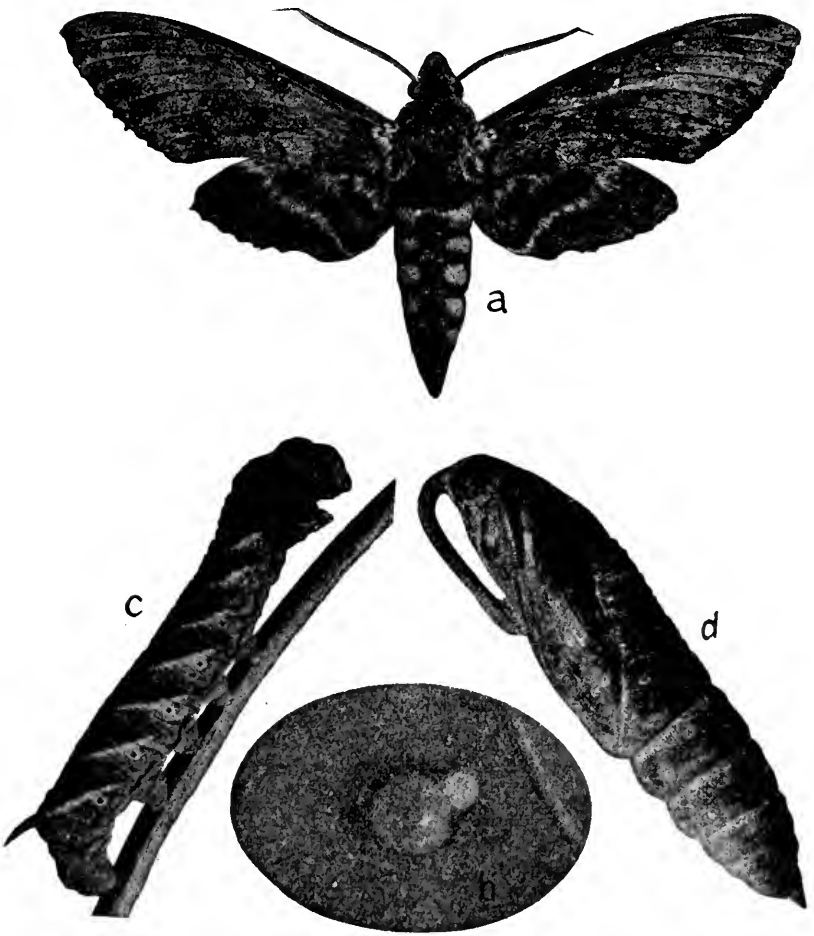
North Carolina Department of Agriculture

SPECIAL BULLETIN

INSECT ENEMIES OF TOBACCO

BY

Z. P. METCALF, Assistant Entomologist



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*Assigned by the Bureau of Soils, United States Department of Agriculture.

LETTER OF TRANSMITTAL.

RALEIGH, N. C., October 1, 1909.

SIR:—I have the honor to transmit herewith manuscript for a Bulletin on *"Insect Enemies of Tobacco,"* together with illustrations for same. This is by Mr. Z. P. Metcalf, Assistant Entomologist, and is designed to answer many of the questions concerning tobacco insects that come to this office every year.

This Bulletin is based not only on the correspondence of the office and a careful study of the literature on the subject, but also includes the results of a number of original observations and experiments by Mr. Metcalf during the past two seasons, most of which were made in Granville County. I recommend that it be issued as a Bulletin of this Department for October, 1909.

Respectfully,

FRANKLIN SHERMAN, JR.,
Entomologist.

To HON. W. A. GRAHAM,
Commissioner of Agriculture.

CONTENTS.

INSECT ENEMIES OF TOBACCO.

By Z. P. METCALF, Assistant Entomologist.

INTRODUCTION.

The United States produces approximately 1,000,000,000 pounds of tobacco every year. Of this amount North Carolina produces about 150,000,000 pounds, ranking as a State second only to Kentucky in number of pounds of tobacco produced. The tobacco-producing area of the State is divided into two pretty well defined sections, the northern tier of counties bordering on Virginia and adjoining counties making one section known as the "Old Tobacco Belt," and an eastern section, with Wilson as a center, known as the "New Tobacco Belt."

The tobacco farmers who grow this enormous crop of tobacco pay each year a large dividend to insect pests, and it is the purpose of this Bulletin to bring together such information concerning their life-histories, natural enemies and remedies as the writer believes will be of interest and value to the tobacco farmer. The number of serious tobacco pests is not large, and most of them are subject to easy methods of control. Yet, regardless of these facts, the damage done to tobacco by insects is growing heavier year by year. True, not all of this loss is preventable, but a large amount of loss may be avoided by proper methods of sowing the seeds, cultivation, rotation and various other indirect as well as direct remedies which are indicated below. The details of the life-histories of these insects are given fully in order that the tobacco farmer may understand why certain remedies are used, why they are applied at a particular time of the year, and why no one remedy will be equally effective against all insects.

For convenience, the tobacco insects are here divided into three classes. Those normally present every year in destructive numbers are discussed under the heading, "Principal Insect Enemies of Tobacco" (page 24). These few pests are responsible, normally, for 95 per cent of the injury to tobacco by insects. It is to this class of insects that the farmer must give attention every year. Any insect discussed under any of the other heads may become very destructive at any time, usually depending upon weather or cultural conditions, but they are usually responsible for only a very small amount of the total loss occasioned by insects. The second class of insects are pests which become destructive usually only under some condition

especially favorable for these insects. For example, long-continued spells of damp, cloudy weather, improper rotation of crops, improper tillage and unfavorable location of seedbed. It will readily be seen that some of these causes which produce destructive insects are under the control of the farmer, while others are not under his control. But such insects as are due to weather conditions are, fortunately, mostly susceptible to direct remedies. Pests belonging to this second class are discussed in detail under the heading, "Insects Occasionally Injurious to Tobacco" (page 46). The third class consists of a variegated assemblage of insects which are normally found in the tobacco field every year, usually, however, not in such numbers as to be really a serious menace to tobacco culture. Fortunately, they, for the most part, succumb to the same treatment that the farmer should use for controlling the more injurious insects. This third class of insects is discussed under the heading, "Lesser Insect Enemies of Tobacco" (page 59). To these three sections is added a fourth, on "Insects Injurious to Stored Tobacco" (page 66).

Acknowledgments.

The writer finds himself under obligations to a vast host of friends and coworkers, to all of whom he wishes to express his thanks. He finds himself under obligation to a large number of successful tobacco farmers who kindly made replies to a circular-letter sent out the past spring. In this way much valuable information was gained concerning insect pests in portions of the State which he would have been unable to visit, and, in addition, much valuable information regarding local practices used in the control of insect pests was secured. The writer takes this occasion to thank each and every one of these gentlemen.

The author finds himself indebted to the writings of Howard, Quaintance, Garman, Sanderson, and others, for many valuable points in regard to the life-history of tobacco insects. In as far as possible all these points have been verified for North Carolina conditions.

We are especially under obligations to Mr. W. J. Webb, of Stem, Granville County, for many valuable observations, for his kindness in placing his entire farm at our disposal for experimental purposes, and for the actual carrying out of many of the experiments themselves.

To Mr. A. C. Morgan, of the Bureau of Entomology, we are especially indebted for many valuable suggestions. To Mr. C. S. Brimley, of Raleigh, for data regarding the life-histories of various insects discussed in this Bulletin, and lastly to Mr. Franklin Sherman for continued aid and advice and for the kindness of placing at our disposal the office records covering a period of eight years.

The present Bulletin is, therefore, compiled from the writer's own experience in the tobacco fields of the State, together with many valuable office records secured through correspondence and inquiry and such information as other writers have given upon this important subject.

INJURY TO TOBACCO BY INSECTS.

Any one walking through a tobacco field, if he is at all observing, cannot fail to have impressed upon his mind the enormous loss occasioned every year by insects. Hardly a leaf can be found which is not injured in some way by insect pests. Either the leaf is punctured by the Flea Bug or large, irregular holes are eaten through the leaf by Horn Worms or the whole top has been shattered by Bud Worms. True, much of the injury is so slight that it has no effect whatsoever upon the price of the leaf tobacco, but much of the tobacco which ought to sell for first-class wrappers sell for a lower grade because of blemishes due to insects. A conservative tobacco farmer estimates that from 30 to 50 per cent of the money value of his crop is annually lost through the destructive work of insects. The larger part of this injury is, however, preventable, if the farmer will only employ the proper methods.

Commencing with the sowing of the seeds in the spring, successive waves of insects pass over the seedbed and over the fields of growing tobacco. The plants that are left for seed have their pods devoured by insects, and the suckers which grow up in the field after the tobacco is harvested are riddled by insects, the work of which is cut short only when the plants are killed by frost.

Insects Injuring Different Parts of the Tobacco Plant.

The Leaves.—Leaves are, of course, the most important part of the tobacco plant, and insects do the most real damage to the leaves. The aim of the tobacco farmer is to grow good, first-class wrappers, as this grade of tobacco brings the best price; but tobacco riddled by Flea Bugs or with large holes chewed into it by Bud Worms or Horn Worms must always be classed with lower and cheaper grades. The number of insects injuring the tobacco leaf is large compared with the numbers that injure other parts of the tobacco plant. The injury caused to leaves by insects is largely due to the fact that these insects are chewing insects and eat holes directly through the leaf. The size of these holes depends upon the size of the insect and the strength of its mouth parts. The holes range in size from the minute holes made by Flea Bugs (page 31) to the almost complete destruction of the leaf by full-grown Horn Worms (page 24). Bud Worms riddle the leaves before they have completely unfolded from the bud (page 36). Grasshoppers (page 59), Crickets (page 56), Tree-

crickets (page 64), and Katydids (page 61) eat larger or smaller holes in the leaf. The Spotted Melon Beetle or Corn Bud Worm (page 65) often eats small, irregular holes in the leaf, and various worms, such as Cutworms (page 41) and Cabbage Loopers (page 62), eat larger or smaller portions of the leaf. So far, no sucking insects which destroy the leaf by puncturing it and sucking out its juices have been discovered in North Carolina, although they have been discovered in other tobacco-growing sections. A chewing insect, the Split Worm (page 53), which works between the two sides of the leaf and leaves large, irregular white blotches, is often destructive.

The Stalk.—The stalks of tobacco are often injured by Bud Worms (page 36), which mine the stalk near the base of the leaves, causing them to wilt. Pith Worms (page 48) dig their tunnels in the center of the stalk near the ground. The Spined Soldier-bug (page 58) sometimes causes the entire plant to wilt by inserting its beak into the stem and sucking out the juices of the plant. Cutworms (page 41) of various kinds cut off the young plants at the surface of the ground, and later Cutworms (page 41) often climb the larger plants and do a slight amount of damage by eating away portions of the stalk. Grasshoppers (page 59) and Katydids (page 61) are often offenders in this respect also.

The Roots.—Wireworms (page 51) are often very injurious to the roots of tobacco, tunneling through the roots in various directions. They often completely cut off the roots of the young plant by making tunnels in various directions through the larger roots, thereby causing the plant to die.

The Seed Pods.—Seed pods are drilled into by both kinds of Bud Worms (page 36), thus preventing the seeds from ripening. Climbing Cutworms (page 41) often cut through the slender stems which support the seed pods, thus causing them to wither and die.

CONTROL OF TOBACCO INSECTS.

Under this heading we will discuss such remedies as are thought to be practicable for the tobacco farmer to employ. During the past year the writer carried on a series of experiments in tobacco fields to determine practical methods of controlling the principal tobacco insects, and while these experiments were greatly interfered with by successive rains, enough evidence was gathered to prove conclusively that certain insects can be controlled at a profit by following the recommendations given herewith. Under the special headings, remedies are to be found, with the discussion of each insect. The remedies discussed under the heading, "Principal Insect Enemies of Tobacco," may be safely and economically followed every year. Those discussed under the heading, "Insects Occasionally Injurious

to Tobacco," are largely preventive and depend to a great extent upon proper cultural methods; and in as far as these cultural methods have to do with the control of insects, they have been indicated below. The author does not claim that these methods are suited to all localities and to all soils. He merely claims that such practices are a decided checking force upon insects of this class. Trial may prove that such methods are unsuited to your soil and conditions, but with present knowledge of the control of certain insects, we have nothing better to offer. The control of pests of this kind is largely a matter for the individual farmer to work out for himself under his known conditions of cultivation, soil, etc. The suggestions indicated below are merely to aid him in determining upon satisfactory methods for controlling insects of this class.

Preparation of the Seedbed.

Usually virgin soil is selected for the seedbed, and such selection has but very little influence upon the crop of insects found in the seedbed. The usual situation is in the woods, and a southeasterly exposure should be selected, if possible. The plants will grow much faster if protected in this way from the cold northern winds, and in this way the plants will, to a certain extent, outgrow the attack of insects in the beds. To this end every care should be taken to see that the bed is well drained, that the soil is full of humus and fertility and that nothing but good, heavy seeds are sown. All these factors tend to produce good, strong plants, which are to a great extent resistant to insects. A good stand of thrifty plants is such an essential thing to the growing of a good tobacco crop that no amount of labor should be spared in the preparation and care of the seedbed. The insects which are destructive in the seedbed are usually easily controlled by spraying. A great deal of spraying may be done on the seedbeds at comparatively small cost, for the area is small and easily accessible, and as most of the insects in the beds follow the plants to the field, there to increase in enormous numbers, it necessarily follows that a reduction of the insects in the bed means a corresponding reduction of the same insects in the field. Then, too, while the plants are young, they may be sprayed in safety with a much stronger solution than could be used in the fields, for a slight burning of the leaves in the beds would in no way injure the salable tobacco. To this end one should spray plantbeds with arsenate of lead with the strength of eight or ten pounds to fifty gallons of water.

Preparation of the Soil.

Needless to say, the ground should be thoroughly prepared for transplanting. Deep plowing and thorough pulverizing of the soil

are such well-known farm practices that they hardly need be mentioned here. In fields that have lain in sod for some time or where there are other good reasons for suspecting the presence of Cutworms, the fields should be plowed deeply two or three weeks before planting, taking care to cover all weeds. Then poisoned baits should be scattered over the field as indicated below, under "Cutworms" (page 45). In the fields as in the beds every reasonable care should be taken to provide the plant with every favorable stimulant to growth. Proper fertilization and proper cultivation are both means to the same end, a better stand of plants in the field with higher insect resisting power. The intelligent farmer cannot afford to neglect these weapons in fighting his insect enemies.

Deep fall plowing has a tendency to disturb many insects and destroy many others which are hibernating in the soil. This method of fighting insect pests will be spoken of frequently in what follows.

Rotation of Crops.

This is another farm practice concerning the advisability of which we need say nothing; its beneficial results are well known. We need concern ourselves here only with its effect upon insects and with the benefits to be derived therefrom. Just what the rotation shall be is for each farmer to decide for himself after carefully considering his soil, market demands, and various other factors. Absolute failure to practice a system of crop rotation is not only ruinous to soil fertility, but is very bad practice from an *entomological* standpoint. Many insects are confined to a single food plant, many others are confined to a very limited group of plants, while a comparatively small number are more or less general feeders. It naturally follows, therefore, that if a field is planted in tobacco this year that was in tobacco last year, it falls heir to a crop of insects which developed in the tobacco the year before. On the other hand, it follows just as naturally that if a tobacco crop is followed by a very dissimilar crop many of the insects will be starved out. It must of necessity be true, also, that the longer the rotation the more unfavorable the prospects for a destructive crop of insects. No one rotation will avoid all insects, and the farmer must study his soil and know, besides, what insects he may reasonably expect in order to determine upon the kind of crops he will have in his rotation in order to avoid as much insect injury as possible.

Destruction of Suckers.

Whatever may be said in its favor, the common practice of leaving the suckers to grow up in the field after the tobacco crop is harvested is, from an *entomological* standpoint, a very bad practice. The last

generation of insects in the fall is in this way enabled to find sufficient food to carry them over until they are ready to go into winter quarters. The writer made this a special point for investigation last fall, and he was greatly surprised at the enormous number of insects which were found feeding upon the suckers. Horn Worms, Flea Bugs, and Cutworms were especially abundant. Besides, there was a vast host of lesser pests. The effect of the destruction of the suckers would be to either starve these insects or force them to find new food plants in other fields. This is largely a matter for communities to take up. One farmer practicing it alone could not expect perfect results. Yet the writer in the course of his investigations saw a striking illustration of the results which might be expected from this practice. A farmer who had been in the habit of keeping the suckers down on his farm sold it to another man who did not do so. It was our good fortune to see the field of tobacco the first year the suckers were allowed to grow, and much to our surprise there were few Horn Worms, fewer Flea Bugs, and scarcely any Cutworms, though the usual bevy of lesser pests were present in about normal numbers. Yet all about this field were other fields of tobacco which were greatly injured by these common tobacco pests. Directly across the road from this field, for instance, was a field which was riddled by insects. Another farmer told us that the year previous he had been prevented from cutting all of his suckers, and that he could tell in his tobacco the next year almost to the exact row where he had finished cutting down the suckers, because the insect injury was so much less in that portion of the field where the suckers had been kept down. It would be good general practice to plow under all stubble and remnants as soon as the crop is harvested and put the land in some crop which will keep the ground covered during the winter.

Destruction of Weeds.

Weeds are such a well-known pest to cultivated crops that we need not urge their destruction on that account. It is necessary, however, to call attention to a special group of weeds, that is, the weeds which are closely related to the tobacco plant. Nearly all the insects of tobacco noted on the following pages were formerly (that is, before the cultivation of tobacco became extensive) enemies of the weeds which are closely related to tobacco. Most of these insects still feed upon these same weeds in localities where tobacco is not grown, and in localities where tobacco is grown these same weeds act as harboring and breeding places for some of the worst insect enemies of tobacco. The farmer who permits these weeds to grow in or near his tobacco field is inviting destruction to his tobacco crop. Most of these weeds are perfectly familiar to all farmers and

need only be mentioned by name. Perhaps the most famous weed of this group is the jimson weed, commonly called "thorn apple." The larvæ of the Horn Worm not only feed upon the leaves of this plant, but is one of the plants commonly visited by the Tobacco Fly, which seeks the honey which is secreted by its long, tubular flowers. The jimson weed is also one of the native food plants of the Tobacco Flea Beetle, or Flea Bug, as it is commonly called. Another notorious weed of this same group is the horse or bull nettle. This weed harbors such well-known insect pests of tobacco as the Horn Worm, Flea Bug, and Bud Worm. Still other weeds of this same group are the common ground cherry, the black night shade, matrimony vine, and hens-bane.

Plants which we consider cultivated plants are just as much weeds as wild plants when they are growing out of their proper place. The same group of plants which furnishes us tobacco also furnishes us several well-known cultivated plants. Chief among these might be mentioned Irish potatoes, tomatoes, and eggplant. The cultivation of these plants near the tobacco field should always be avoided unless they are used in the nature of trap crops or are carefully watched to see that insects do not become abundant upon them. The same insects which attack tobacco are frequently pests of these crops.

In advising the destruction of weeds in and about the tobacco field it must be taken into consideration that many of the insect pests of tobacco prefer these weeds as food plants to tobacco. The tobacco farmer can take advantage of this fact by using these weeds as trap crops. The weeds that are to be used as trap crops are allowed to grow, but are kept heavily sprayed with either of the poisons containing arsenic. The insects visiting these crops are, of course, poisoned by securing a portion of the arsenic, and are killed.

Spraying.

In what follows much will be said about spraying, and we firmly believe that spraying should properly become a regular farm practice with tobacco farmers. We believe that it can be done in such a manner as to return to the tobacco farmer as large profits as the orchardist secures from spraying, and with much greater certainty of results. Once the tobacco farmer is thoroughly convinced that spraying is as much a necessary practice as fertilization, seed-sowing, and cultivation, just that soon will he realize the profits to be secured in this way. The cost of the material is comparatively nothing and the cost of application is not excessive—certainly it does not exceed the cost of the old laborious process of "worming." The insecticides can usually be applied most successfully in liquid form, though some farmers are quite successful in applying Paris green dry. For

the former purpose the farmer will need some sort of spray pump, for the latter some sort of bellows duster, known commonly as "blow gun."

There are many types of spray pumps, but only two or three need concern us here. The first is known as a bucket pump, and, as its name implies, it is a spray pump adapted to be used in a bucket. This type of pump is well shown by Fig. 1. It should be fitted with eight or ten feet of hose and is quite successful for spraying tobacco in the beds. Pumps of this type, however, are too cumbersome to be used in the fields. There are many kinds of bucket pumps for sale, and they may either be secured through a local hardware firm or from the following manufacturers:

FIG. 1.—Bucket Pump, with 3 or 4 feet of hose. (Courtesy of Goulds Mfg. Co.)

Sydnor Pump and Well Company, Richmond, Va.
Gould Manufacturing Company, Seneca Falls, N. Y.
The Deming Company, Salem, Ohio.

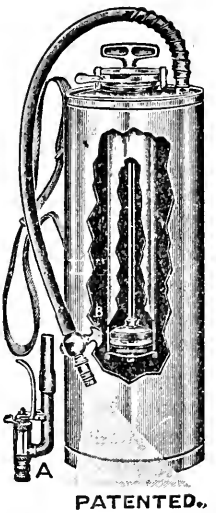

FIG. 2.—Compressed-air Sprayer. (Courtesy of the E. C. Brown Co.)

For spraying plants in the fields we know of no better type of pump than the compressed-air sprayer, such as is manufactured by the E. C. Brown Company, of Rochester, N. Y. (Fig. 2). Some growers, however, may prefer the knapsack type of sprayer (Fig. 3). Figures 2 and 3 show the essential differences between these two types of sprayers.

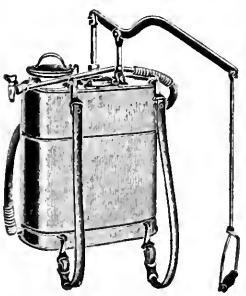

FIG. 3.—Knapsack Sprayer. (Courtesy of the Deming Co.)

FIG. 4.—Extension Pipe. (Courtesy of the E. C. Brown Co.)

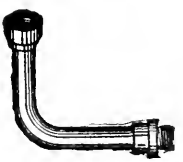

FIG. 5.—Curved Elbow. (Courtesy of the E. C. Brown Co.)

The compressed-air sprayer is simply pumped full of air, which forces the spray mixture through the nozzle. The knapsack sprayer, on the other hand, must be operated continually to force the mixture

through the nozzle. Whatever style of pump is used, it should be fitted with three or four feet of hose and three or four feet of extension pipe (Fig. 4), curved elbow (Fig. 5) and vermorel nozzle (Fig. 6). The extension pipe and curved elbow enables one to

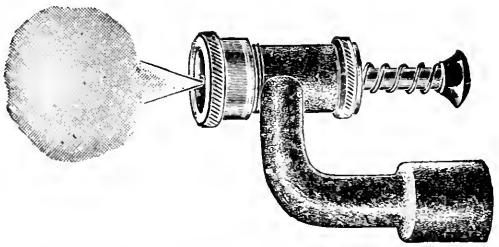

FIG. 6.—Vermorel Nozzle. (Courtesy of the Deming Co.)

reach all parts of the plant easily, and especially the underside of the leaves. With an outfit of this kind one man could easily spray two acres of full-grown tobacco per day, provided his solutions had been prepared the evening before. No attempt need be made in spraying tobacco in the field to cover every leaf on both sides. The plant should simply be covered in a general way.

Spraying Materials.

Spray mixtures may be divided into two classes: First, those that kill by coming in direct contact with the insect, and which corrode and eat away its body walls or stop its breathing pores. Insecticides of this class are known as "contact insecticides." These mixtures cannot be applied in advance of the insect with the hope that when it comes along it will devour enough to kill. Contact insecticides must be applied directly to the insects themselves, and they kill only those insects with which they come in direct contact. The second class of insecticides are known as "stomach poisons." They are used against insects that chew their food, and they kill because they are real poisons, and should be handled accordingly. But there is really no occasion to avoid the use of these substances on tobacco for this reason. This subject is dealt with more in detail below under the heading, "Danger from the Use of Arsenates on Tobacco" (page 19). These insecticides may be placed upon the plants ahead of the appearance of any insect in anticipation of their attacks. The insect appearing later secures a small portion of the poison and dies. These poisons are usually well retained by the tobacco leaf owing to the presence of minute hairs which secrete a sticky substance.

Arsenate of Lead.—Arsenate of lead should be the chief spraying material used by tobacco farmers. It has but a single objection,

and that is, being a comparatively new spraying material, it is not as easy to obtain as Paris green. However, it sticks to the foliage longer than Paris green and does not have the same characteristic burning effect that is sometimes noticeable after Paris green has been used. For this reason arsenate of lead may be used at much greater strength than Paris green. Arsenate of lead costs from 15 to 25 cents per pound and may be secured from the larger druggists in the State. Arsenate of lead comes in a thick paste-like form and goes into solution readily when mixed with water. Recently a dry powdered form of arsenate of lead has been placed upon the market. At the present time it is not nearly so available, however, as the paste form and has scarcely any advantages over the paste form when used in a liquid spray except its lesser bulk. In spraying plant-beds for Flea Bugs it may be used at the rate of 8 or 10 pounds to 50 gallons of water. In the field under all conditions it is not safe to use this stronger than 4 pounds to 50 gallons of water. In early spring, before hot weather commences, it may be used safely as strong as 6 pounds to 50 gallons of water; but later, when the days are hot, slight burning may be noticed if it is applied as strong as 5 pounds to 50 gallons of water. It is perhaps advisable to use the stronger solutions in the early spring, for in that way the earlier generations of Flea Bugs and the first Horn Worms will be cut off before they have a chance to do much damage. The number of sprayings necessary will depend largely upon the condition of the weather. If dry, a fewer number of sprayings will be necessary than if there are long-continued or frequent rains. In our experiments decided advantages in favor of the sprayed plats as against the unsprayed plats could be noticed where but a single spraying was given, even when this spraying was followed by a heavy rain the same day the application was made, although it would be better practice to spray oftener than this. Our experiments in which arsenate of lead was used go to show that it would require 20 to 50 gallons of mixture per acre, depending upon the size of the plants.

Paris Green.—This poison has the advantage of being easier to obtain than arsenate of lead, but, as mentioned above, it does not stick to the foliage as well, and there is often danger of burning the leaves. Paris green has another advantage over arsenate of lead, and that is, that it may be applied in the dry form. While this is convenient, because the apparatus for applying the dry mixture is so much lighter and easier to handle than a spray pump, poison in the dry form cannot be applied nearly as uniformly as in a liquid, hence there is usually much greater danger of burning by applying dry Paris green than there is from applying Paris green in the form of a spray. Paris

green in liquid form should always be accompanied by unslacked lime, as this counteracts the burning effect of Paris green for tobacco spraying. The following formula is recommended:

1-1½ pounds stone lime.
4-6 ounces Paris green.
50 gallons water.

In preparing this mixture the lime should be slacked in a small amount of hot water, using just enough to keep the lime from burning dry. As soon as the lime is slacked, it should be stirred into the whole amount of water, and the Paris green (which has been previously mixed with just enough water to make a thin paste) is then stirred in. Twenty to 50 gallons of this mixture is usually sufficient to spray an acre of tobacco.

In using Paris green in dry form, it should be mixed with cheap flour, dry air-slacked lime, or other dry, finely powdered substance. These substances do not add anything to the value of the poison, but simply act as carriers to make it possible to apply the mixture more uniformly. The usual formula is

20 to 30 pounds flour or lime.
1 pound of Paris green.

In preparing the dry Paris green mixture, care should be taken to see that the Paris green is thoroughly mixed with the other substance used. The whole mass when thoroughly mixed will be of a uniform light-green color without any streaks or lumps of darker green. From one-half to one pound of pure Paris green will cover an acre of tobacco when used in this way. Paris green in the dry form is applied preferably while the dew is on the plants or just after a rain, as it will stick much better when used in this way.

Kerosene Emulsion.—The use of this spray mixture for Flea Bugs in tobacco seedbeds was not attempted until too late to give it a very thorough test. A heavy drenching spray of this mixture was applied to the remnants of tobacco plants left in the seedbeds and a noticeable reduction in the number of Flea Bugs was noticed. Even with this heavy drenching spray only a very slight burning effect was noticed on the tobacco—so slight, indeed, as to be absolutely disregarded in practice. This spray promised excellent things when used against the Flea Bugs, but inasmuch as our experiments have not been carried far enough to be conclusive, it should be used only in an experimental way, if used at all, and if it proves successful under your conditions, it may be used more extensively the following year.

Kerosene emulsion is usually prepared according to the following formula:

½ pound laundry or soft soap.
1 gallon water.
2 gallons kerosene.

The soap is shaved into a kettle containing the water, which is boiled until the soap dissolves, then remove from the fire and add the kerosene. The mixture is then pumped through the spray pump and nozzle back into itself until it has the appearance of thick milk and no globules of free kerosene can be noticed. This stock solution will keep indefinitely. For use, take 1 gallon of stock and add 6 gallons water.

DANGER FROM THE USE OF ARSENATES ON TOBACCO.

There exists in the minds of many people a strong prejudice against the use of poisons (arsenates) on any plant that is used for a food. Needless to say this same prejudice has to be met when one advises the use of arsenates for tobacco spraying. Of course, caution should be used in this matter. We would not apply any poison to tobacco directly before it is harvested, and some time should always intervene from the time of the last spraying until the tobacco is harvested. Certainly two weeks should be allowed, and three or four would be much better. Then by the time the tobacco is harvested the wind and rains have had a chance to remove all but the last traces of poison. To show clearly that the amount of arsenate used on tobacco is not at all dangerous, it is necessary only to call attention to the following facts: (1) At the rate arsenates are used, not enough could be secured by any one person at any one time to prove injurious. (2) Not all of the spray mixture used reaches the plant. (3) Of the amount that does reach the plant only a very small percentage can remain until the end of the season.

The amount of arsenate used originally is not sufficient to cause alarm. Our experiments show that 4 pounds of arsenate of lead would spray an acre of tobacco. The average sample of arsenate of lead contains from 10 to 20 per cent of arsenous oxide (arsenic), which is the real poison in the arsenate of lead. One and one-half grains of arsenic are said to constitute a fatal dose for an adult. In 4 pounds of arsenate of lead there would be from 2,800 to 5,600 grains of arsenic, depending upon the strength of the arsenate of lead used. Assuming, then, that all of the arsenate used reaches the plant, and that all of it remained upon the leaf until harvest time, there would be left on each acre of tobacco for every spraying made, from 1,860 to 3,730 injurious doses. Assuming that three sprayings are made during the season, there would be at the end of the year 8,400 to 16,800 grains of arsenic on an acre of tobacco, provided *all* of the spray mixtures used reached the plant and that *none* of it was washed off or blown away during the season. In other words, there would be approximately 3 grains for each plant. However, as stated below, at least 25 per cent of the original mixture used is wasted, and certainly it seems safe to say that 95 per cent of the amount that

actually reaches the plant would be removed by natural causes in the course of the year. This would leave, then, approximately 700 grains to each acre of tobacco sprayed—about one-seventh of a grain to a plant. Assuming that 4 plants will yield approximately a pound of tobacco, this would mean that there would be approximately one-third of a fatal dose to every pound of tobacco harvested. Since only a very small amount of tobacco is swallowed, in whatever form it is used, it seems safe to say that no one person would at any one time consume enough tobacco, sprayed with arsenates as indicated above, to be injurious.

It seems almost needless to say that not all of the spray mixture used reaches the tobacco plant. This is very evident indeed to any one who has ever done any spraying. It seems safe to say that on still days, under the most favorable conditions, that at least 25 per cent of the spray mixture used is necessarily wasted in this way.

Of the amount of poison that reaches the plant, the greater percentage must be washed away by rain or blown away by the wind. Experiments carried on by Professor Garman, of the Kentucky Experiment Station, prove conclusively by chemical analysis that of the amount of poison that reached the plant originally from 96 to 98 per cent was removed in this way in a month after the plants were sprayed.

These arguments hold true for Paris green as well as arsenate of lead. Assuming that one pound of Paris green is used to an acre of tobacco, and that three sprayings are given throughout the season, we would have 12,600 grains of arsenic used per acre, assuming that Paris green contains 60 per cent of arsenic, which is above the average sample, and discarding the usual 25 per cent for spray mixture wasted in making the application, and 95 per cent of the arsenic which actually reaches the plant, we will have left 3-40 of a grain of arsenic per plant—in other words, a fatal dose for every five pounds of tobacco harvested.

INSECTS IN GENERAL.

In order that the farmer may successfully combat the different insects which injure tobacco, it is necessary to know something regarding insects in general, their life-histories, habits, enemies, and the remedies that may be used against them successfully.

Life-histories.—Briefly, insects may be divided into two classes. One develops from the *egg* to the *adult* without any resting stage. Insects belonging to this class are said to have an *incomplete* change of form. The other class has a resting stage in its life-history, and insects belonging to this class are said to have a *complete* change of form. In *incomplete* change of form there are three stages in the

life cycle of the insects. First, the egg, which is laid by the adult and from which an active, usually rapid growing *"nymph"* is hatched. This "nymph" is wingless, and from it, without any intermediate resting stage, the winged *adults* develop. Grasshoppers may be taken as an illustration of insects of this class. The wingless young are familiar objects to every one. It is this stage of insects with *incomplete* change of form that are known as *"nymphs."* (Fig. 7.)

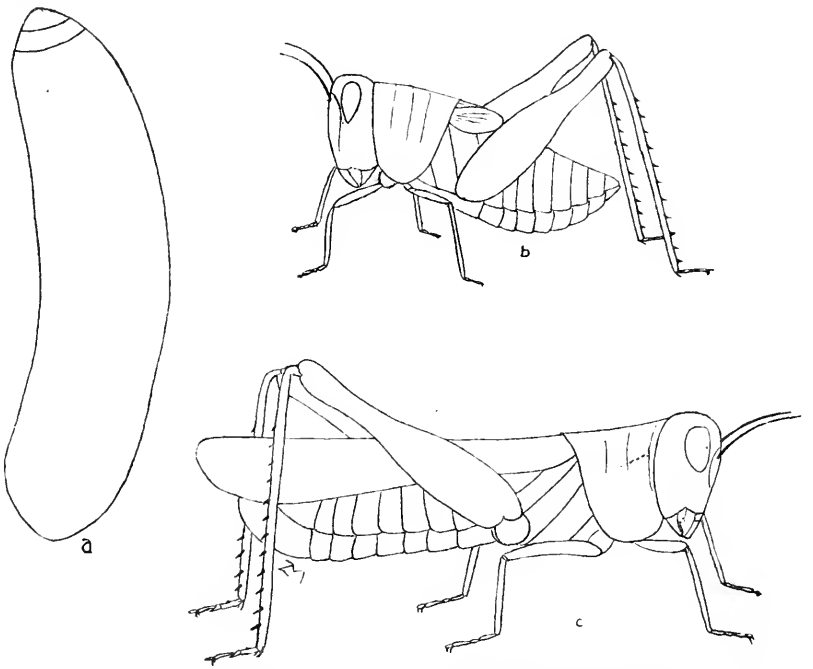

FIG. 7.—Life-history of the Grasshopper (all figures enlarged). (*a*) Egg (*redrawn from Riley*); (*b*) nymph (*original illustration*); (*c*) adult (*original illustration*).

Insects belonging to the second class have four stages in their life-history. *Eggs* laid by the adults develop into *larvæ,* or worms, as they are commonly known. Horn Worms may be taken as an example of this stage in the development of insects of this class. The larvæ is the active growing period, and is followed by a resting period which is known, technically, as the *"pupa"* or *"chrysalis."* From this *pupa,* after a length of time, the *adults* emerge. (Fig. 8.)

It is necessary for the farmer to know the details, the life-history, of the insect he is trying to conquer in order that he may fight it intelligently. Many insects are practically uncontrollable except for a very brief period or a short stage in their life-history. These various details of the life-histories of the tobacco pests will be considered under their proper headings.

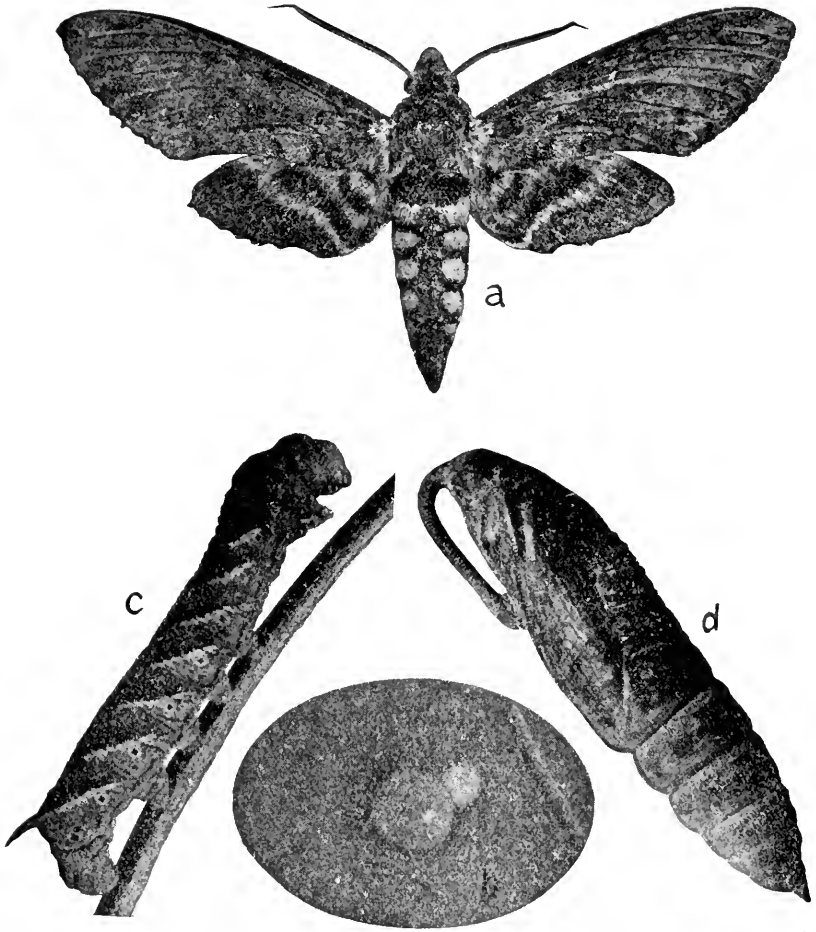

FIG. 8.—Life-history of Southern Horn Worm. (*Same as Frontispiece.*) (*a*) Adult (natural size); (*b*) egg (enlarged); (*c*) larva (natural size); (*d*) pupa (slightly enlarged).
(*From photographs by the author.*)

Groups of Insects.—All insects are divided into groups according to their structure. The structure of the mouth parts is of vital importance in arranging insects under their proper groups. The structure of the mouth parts is also of vital importance to the farmer who is attempting to control the insect pests of tobacco. Fundamentally, insects are divided into two classes, one of which is provided with biting mouth parts and chews its food. Insects of this class usually make their presence known by eating large, irregular holes in the leaves, by eating away portions of the roots or by hollowing out the stem. The insects of the second class are provided with piercing mouth parts. Insects of this class secure their food by inserting

a slender beak beneath the bark of the host plant and securing their food by sucking. It is of fundamental importance to know to which class the insect the farmer is trying to combat belongs, in order that he may select the proper spray mixture to be used against it. For this reason the following brief outline of the insects which concern the tobacco farmer is herewith presented. The technical names used in this outline will be used in the discussion of the insects later, and by merely referring to this table the farmer may determine at a glance the class of insects with which he has to deal. We sincerely trust that this outline will be of use to the farmer in not only helping him to get acquainted with the various groups of insects, but also in aiding him to fight them intelligently.

Orthoptera.—*Katydids, Grasshoppers, Crickets, Tree Crickets,* etc. All the insects of this group are chewing insects and make their presence known by eating holes in the leaves or by chewing through the stem. Although normally present every year in tobacco fields, in greater or less numbers, the insects of this group are not, as a rule, a serious menace to tobacco culture. Grasshoppers and Katydids usually become abundant only in the fall of the year after the tobacco crop has been harvested. At this season of the year they often swarm over the tobacco fields and cut the suckers severely. The Grouse Locust (page 46) sometimes injures the young plants in the seedbeds. The Little Brown Burrowing Cricket (page 56) and other Orthoptera, frequently do a certain amount of injury to the young plants just after they are transplanted.

Hemiptera.—The *true bugs,* such as the *Terrapin Bug, Chinch Bug, Squash Bug,* etc. The members of this group are sucking insects. The only one that is found at all commonly in the tobacco fields of North Carolina is the Spined Soldier Bug (page 58). This insect sometimes injures tobacco plants by sucking the juices from the stem, thus causing the plant to wilt.

Lepidoptera.—*Butterflies* and *Moths.* The larvæ of insects of this group are known commonly as "worms." All the insects of this class have larvæ with biting mouth parts, and it is the larva that is the destructive stage of the insects of this group. The adults are known variously as "moths," "candle-flies," "millers," and "butterflies." The adults, if they feed at all, feed upon the nectar (honey) of flowers. The only damage they do is to lay the eggs which develop into the destructive larvæ.

Diptera.—The *true flies,* such as the *House Fly, Horse Fly, Mosquitoes,* etc. There are no insect enemies of tobacco in this group. One or two are friends of the tobacco farmer, because they are parasites of tobacco insects.

Coleoptera.—The *true beetles,* sometimes wrongly called "bugs," the *Potato Beetle, Flea Beetle,* etc. The chief injury done to tobacco

by these pests is done by the adults, which have biting mouth parts and frequently injure the leaves by eating holes through them. The chief offender in this respect is the Tobacco Flea Beetle (page 31).

Hymenoptera.—*Bees, Wasps, Ants, etc.* There are no insect enemies of tobacco in this group, but certain four-winged "flies" are parasites of tobacco insects (page 29).

THE PRINCIPAL INSECT ENEMIES OF TOBACCO.

Tobacco is especially favored among general farm crops by having comparatively few serious insect enemies. Of all the insects discussed on the following pages, only two are normally serious enemies of the growing tobacco crop. These two, the Horn Worms and the Flea Beetle, are usually very serious pests. Two other insects, Bud Worms and Cutworms, are usually nearly as serious as the Horn Worms and Flea Beetles. Thus we have in North Carolina only four insects that deserve first rank as tobacco pests.

Horn Worms.[1, 2]

ALSO CALLED "TOBACCO WORMS," "TOMATO WORMS," "HORNBLOWERS," "TOBACCO-FLIES."

(Order *Lepidoptera.*)

Horn Worms are a very familiar object to all tobacco growers, and in general their life-histories are well known. Most tobacco farmers recognize the large, strong-flying, narrow-winged "candle flies" as the insect which lays the small, light-green spherical eggs on the underside of the leaves, and, as a rule, they know that these eggs hatch into Horn Worms, which change to brown "pitchers" and issue later as "candle flies." (Fig. 8.) Because the life-history of this pest is so well known and because it is a very destructive tobacco insect, we have taken it as a starting point in the consideration of all insects which are injurious to tobacco. It is not necessary for the farmer to know that there are two kinds of Horn Worms, but attention is called to this point throughout the following discussion merely because it is interesting to know that North Carolina has both injurious forms. The one most frequently met with in the tobacco field, and constituting at least 90 per cent of the worms in the field, may be known as the Southern Horn Worm.[1] The other may be known as the Northern Horn Worm,[2] as its range is decidedly more northern than the common kind.

General Description.—A light greenish worm with oblique bands of white on the sides of its body, measuring when full grown three or four inches in length and provided with a short, stout, curved horn at the hind end of its body. Found in the tobacco fields from early

[1] *Phlegethontius sexta*, John.
[2] *Phlegethontius quinquemaculata*, Haw.

June until mid-October. When young, eating the more tender portions of the leaf. When full grown, eating the entire leaf, with the exception of the principal veins and the mid-rib.

The Egg.—The eggs of the Horn Worm (Fig. 9) are placed by the female on the underside of the leaf, as a rule, although occasionally

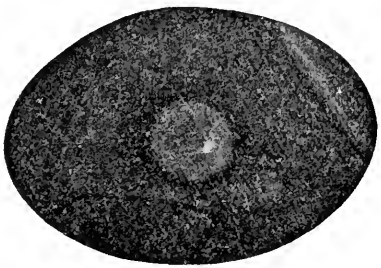

FIG. 9.—Egg of Southern Horn Worm, much more than natural size.
(Photograph by the author.)

they are to be found upon the upper surface. Usually they are placed singly, but occasionally two or more are found side by side. The eggs are light green in color, corresponding closely to the light-colored under surface of the leaf; those found on the upper surface of the leaf being several shades darker. In shape they are almost a perfect sphere or ball. The surface is very smooth and shining and an average egg measures about 1-25 of an inch in diameter; in other words, 25 eggs side by side would equal an inch.

Larva.—The larvæ or "worms" of the two kinds mentioned above differ very decidedly. The larva of the Southern Horn Worm (Fig. 10) is, as a rule, light green in color, with seven straight

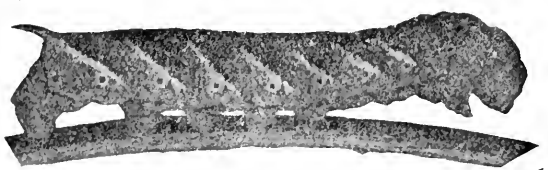

FIG. 10.—Larva of Southern Horn Worm, natural size.
(Photograph by the author.)

oblique whitish lines on the side of the body, extending from just back of the head to the base of the horn. These oblique lines are edged with black on their upper borders. The strongly curved horn is red in color. Frequently dark forms occur in which the black marks on the side of the body are extended and cover almost the entire worm.

The Northern Horn Worm varies (Fig. 11) in general color from green to dark brown. Instead of the seven oblique bands found on the sides of the body of the Southern worm, there is a series of eight whitish v-shaped marks, extending from just back of the

FIG. 11.—Larva of Northern Horn Worm.
(*Photograph by the author.*)

head to beneath the horn. These whitish marks are not edged with blackish as in the Southern form. Horn straight or but slightly curved, black.

Pupa.—The pupæ of Horn Worms are generally called "pitchers" (Fig. 12), because the long tongue case resembles the handle of a

FIG. 12.—Pupa of Southern Horn Worm, natural size.
(*Photograph by the author.*)

pitcher. The pupæ of both kinds of Horn Worms are brownish, cylindrical objects, sharply pointed at one end and with a conspicuous tongue case at the other. To the casual observer the chief difference in the two forms is the length of the tongue case (the sheathlike affair of the pupa which encloses the long, sucking tongue of the adult moth). In the Northern Horn Worm the tongue case is long and slender, reaching almost a third of the length of the body of the pupa. In the Southern Horn Worm it is stouter and shorter, scarcely ever reaching a fourth of the length of the body of the pupa.

Adult.—The adults of both kinds of Horn Worms are dull, grayish hawk moths with stout, narrow wings and a long, slender tongue. Both moths are strong flyers, and feed upon the nectar (honey) of long-tubed flowers, such as four o'clocks and jimson weed. The moths of the Southern Horn Worm (Fig. 13) may be distinguished

FIG. 13.—Adult Moth of Southern Horn Worm, natural size.
(*Photograph by the author.*)

by the presence of a small group of white spots at the base of the fore wings and a small though conspicuous white spot near the middle of the front wings, close to the front margin. The hind wings are crossed near the middle by an obscure blackish band. The abdomen is marked with six bright orange-yellow spots.

The adult of the Northern Horn Worm (Fig. 14) lacks the conspicuous white spots at the base of the fore wings and the single

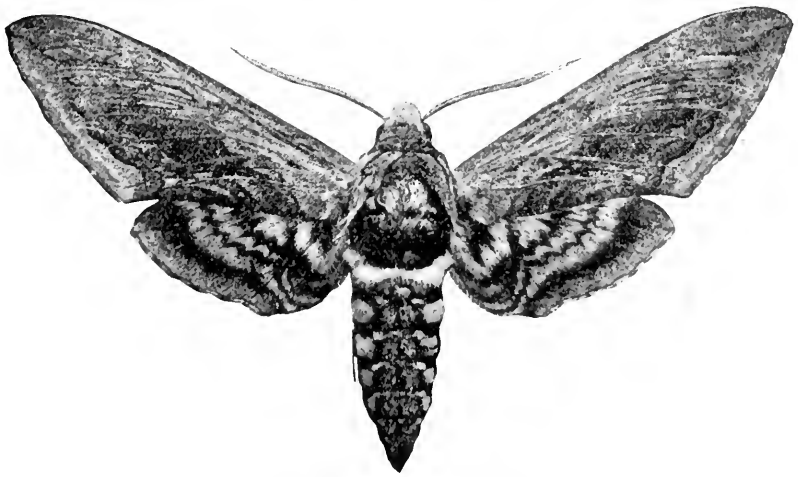

FIG. 14.—Adult of Northern Horn Worm, natural size.
(*Photograph by the author.*)

white spot near the middle of the wings. The hind wings are crossed near the middle by two irregular, sharply-defined black bands. The abdomen is marked with five yellow spots.

Life-histories.—Moths emerge from over-wintering pupæ from the middle of May until early July. These moths pair and soon lay eggs. The eggs hatch normally in three or four days. The larvæ of this summer generation become full grown in from 20 to 25 days, when they enter the ground and pupate three or four inches below the surface. These pupæ remain in the ground for not less than three weeks, when the moths emerge from them. Moths from this generation, as well as some from over-wintering pupæ, issue from mid-July to late August in large numbers, but some issue as late as early October. These moths pair and lay eggs which hatch in about three days. Larvæ are found in the fields from early August to mid-October. Pupæ of this generation are found from late August through the winter, moths from some of them not issuing until late August of the following year. No definite number of generations of Horn Worms can be given for North Carolina. There are two main flights of moths, one commencing about the middle of May and continuing until early July, with the greater number of moths ranging from the 1st to the 15th of June. These moths issue solely from over-wintering pupæ. There is a second flight of moths commencing in mid-July and ending in late August, the greater number of moths ranging from late July to mid-August. This flight of moths issues from pupæ of the summer generation as well as from over-wintering pupæ. Probably moths which are found flying in October represent a partial third brood, but the broods are so confused that it is impossible to give any definite number.

Habits.—Tobacco farmers are well acquainted with the general character of the work of Horn Worms. The irregular oval holes eaten through the leaf between the main veins by the young worms and the complete stripping of the leaf to the mid-rib by the full-grown worms is very characteristic. The young larvæ prefer to work on the under side of the leaf in sheltered situations. As they become larger, however, they are apt to feed more exposed, and in so doing subject themselves to the attack of various enemies.

The adult moths are very strong flyers. They are the common narrow-winged moths which are often noticed at dusk, sipping the nectar from such deep flowers as those of the jimson weed and four o'clock.

Food Plants.—Besides tobacco, Horn Worms frequent various other plants of the potato or tomato family; chief among these are the cultivated tomato, eggplant, pepper, four o'clock, the wild nightshades, horse nettle, matrimony vine, jimson weed or thorn apple and ground cherry. In controlling Horn Worms it is quite essential that

these weeds be kept down in the vicinity of the tobacco field, otherwise they will furnish crop after crop of horn worms for the tobacco field.

Natural Enemies.—Living exposed upon their food plants as they do, Horn Worms are subject to the attacks of a number of natural enemies. Chief among these natural checks is a kind of bacterial disease which causes the worms to turn black, shrivel up and die.

Every tobacco farmer is aquainted with the work of the small four-winged parasitic fly. This parasite lays its eggs upon the Horn Worm and the larvæ live in the interior of the Horn Worm until full grown. When full grown they come to the surface, where they spin white oval cocoons. Horn Worms covered with these cocoons are frequently seen in tobacco fields. (Fig. 15.) Such worms should

FIG. 15.—Larva of Southern Horn Worm with cocoons of a parasite, slightly reduced.
(Photograph by the author.)

not be destroyed, for their days for doing damage are practically over, and the parasites issuing from them would mean the destruction of an increasing number of Horn Worms in the next generation.

Several kinds of two-winged flies have also been reported as enemies of horn worms.

Control.

Preventives.—Fall and winter plowing, if deep, has a tendency to expose the over-wintering pupæ to the action of heat and cold, thus killing a great many. All weeds should be kept down in the tobacco field, especially such weeds as are naturally food plants for the Horn Worm.

Remedies.—Large flocks of turkeys or guineas, if allowed to roam the fields, will materially reduce the annual crop of Horn Worms. Many farmers tell us that they rely upon nothing else to keep their tobacco fields free from Horn Worms except to occasionally kill by hand worms which are noticed when passing through the field.

Hand picking or worming is still the favorite method in most sections, and while it is tedious, it is usually done in connection with cultivation, suckering or topping, and for that reason is not so very expensive. During light worm years, it is certainly the cheapest and most effective method, but during heavy worm years spraying with either of the arsenates would certainly be more economical and less troublesome.

Paris green may be used either in a liquid form or in dry powder. In the liquid form it may be used according to the following formula:

4 ounces Paris green.
8 ounces stone lime.
40 gallons water.

In the dry form it may be used in proportion of one part of the green to from 20 to 30 parts of any dry powdered substance, such as air-slacked lime or cheap flour. If used in the dry form, Paris green should be applied early in the morning just before the dew is off, or directly after a rain.

Arsenate of lead may be used in the liquid form at the rate of 3 pounds to 50 gallons. If used only against horn worms, this strength is entirely effective; but when spraying against Flea Bugs, better results can be had by using 4 pounds to 50 gallons—and this strength is entirely effective against Horn Worms also.

Usually, tobacco will not require more than three sprayings each year, but the number of times one sprays tobacco will depend largely upon the weather and upon the number of worms present. Evidently one would give more sprayings in a season when worms are abundant than when worms are scarce. It is also evident that more sprayings will be required during rainy seasons than seasons which are dry. Perhaps the safest indication of the time to spray is for the farmer to watch his tobacco, noting the appearance of the worms, and to spray immediately thereafter. Farmers should attempt to kill the worms while they are quite small and before they have had a chance to do very much damage.

Tobacco Flea Beetle.[1]

ALSO KNOWN AS "TOBACCO FLEA BUG," "FLEA BUG."

(Order *Coleoptera.*)

General Description.—A small, active beetle, which eats circular holes from about the size of a pinhead to a quarter of an inch in diameter through the leaves of the tobacco plant. The first leaves

FIG. 16.—Lower leaf of Tobacco Plant which has been riddled by Tobacco Flea Beetle, reduced.
(*Photograph by the author.*)

(Fig. 16) suffer more in this respect than the later ones, but in severe cases the beetle spreads throughout the whole plant, injuring every leaf to such an extent that they are unfit for the better grades of tobacco. (Fig. 17.) This is the worst tobacco pest that the farmer has to fight. It is one against which spraying will give the most pronounced results, as we have no other entirely efficient method for keeping it in control.

[1]*Epitrix parvula.*

FIG. 17.—Upper leaf of Tobacco Plant riddled by Tobacco Flea Beetle, reduced.
(*Photograph by the author.*)

Description.

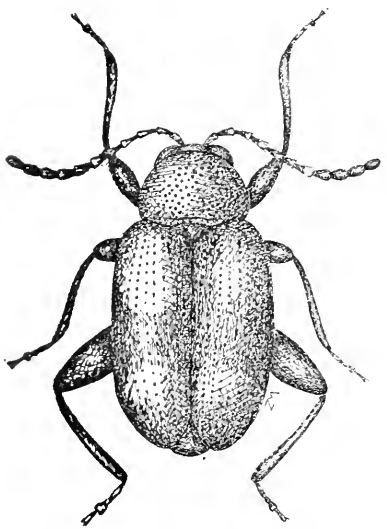

FIG. 18.—Adult Tobacco Flea Beetle, enlarged.
(*Author's illustration.*)

The Adult.—This insect belongs to a group which is known under the general head of flea beetles. The insects of this group are readily distinguished by their small size and their strong hind legs, which give them great power for leaping, hence the name, "flea beetle." The adult Tobacco Flea Beetle (Fig. 18) is a small, yellowish-brown insect with a more or less extensive band of darker brown across the middle of its wing covers. It measures about 1-20 of an inch in length.

The Egg.—The egg, according to Chittenden, is about twice as long as wide, measuring about 1-50 of an inch in length and about 1-100 of an inch in breadth. Grayish in color, with just a faint tinge of yellow.

The Larva.—The larva of the Tobacco Flea Beetle is about 1/8 of an inch long when full grown, very slender and white in color, except the head, which is yellowish. (Fig. 19.)

FIG. 19.—Larva of Tobacco Flea Beetle, side view, enlarged. (*Author's illustration.*)

The Pupa.—According to Chittenden, this stage is also white like the larvæ.

Life-history.—The life-history of this insect has never been entirely worked out. Most of what follows has been adapted from the writings of Dr. Chittenden.

The eggs are evidently laid near the food plant, and they hatch in not less than six days. The larvæ on hatching, bore into the ground, where they feed upon the roots of the food plant. It seems to require a little more than two weeks for the larvæ to become full grown, when they change to pupæ beneath the ground. The pupæ stage lasts about six days, when the adults emerge and commence feeding upon the leaves. Adults evidently over-winter, according to our experience, as they are found in the tobacco seedbeds as early as the first of April. From that time on they are to be found in or about the tobacco field until the middle of November. From the standpoint of the tobacco farmer, there are three important waves of abundance which, perhaps, correspond roughly to generations of this insect. The first of these occurs about the time tobacco is being transplanted, say from the 1st to the 15th of May; the second about the last of June, and the third the early part of August. This would indicate about three generations, with the length of the life cycle as somewhat longer than a month, which is nearly the conclusion reached by Chittenden from indoor experiments.

Habits.—The larvæ feed beneath the ground on the roots of the host plant. Just how much damage they do in this way has never been determined, though the same insect working on potatoes in the Northern States has been recorded as doing a great deal of damage by injuring the tubers. The adult is very active and seems to prefer working in the late evenings and early mornings. During the heat of the day they are usually to be found hidden away beneath lumps of earth, sticks or stones, or in the shade on the underside of the leaf. Long continued, damp, cloudy weather seems to be a decided natural check upon this insect. It is evidently fatal to the larvæ and pupæ which live below the surface and are probably drowned by long con-

tinued damp weather. In a normal hot, dry season, the beetles increase from one wave to the next, and by the time the tobacco is ready to be harvested they are often excessively abundant. At this season of the year the writer has often counted over a hundred adult beetles on a single leaf.

The hibernating beetles on issuing in the spring find the young tobacco in the seedbeds very much to their liking, and often almost entirely destroy the seedbeds. The plants, which are seldom ever completely killed, are usually so severely checked that it is often quite impossible for the tobacco farmer to secure enough plants for transplanting. (Fig. 20.) The Flea Beetles follow the plants from the

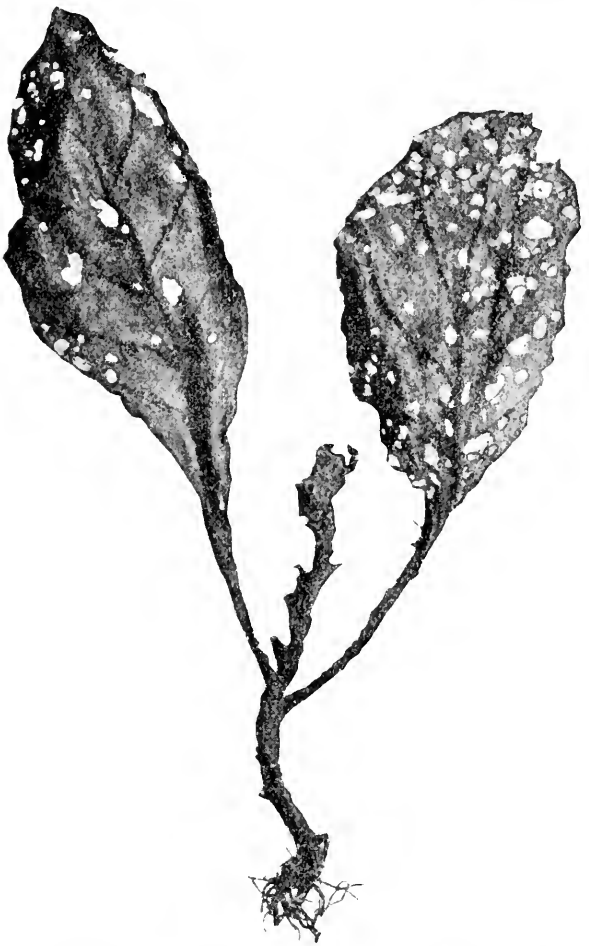

FIG. 20.—Young Tobacco Plant from Seedbed, showing injury by Tobacco Flea Beetle, about natural size.
(*Photograph by the author.*)

seedbed to the field, where they often do a great deal of damage to the plants just after they have been transplanted and in their weakened condition.

Food Plants.—The Tobacco Flea Beetle seems to be able to live and thrive upon any plant of the potato family. It has been recorded by others or observed by the writer upon the following wild plants: ground cherry, nightshade, horse nettle, jimson weed and matrimony vine, and also upon the following cultivated plants: tomato, potato, tobacco, and eggplant, although jimson weed seems to be preferred among the wild plants and tobacco among the cultivated.

Control.

Preventives.—Care should be taken to keep down all weeds of the potato family in and about the tobacco seedbeds and fields. This applies especially to the early weeds of this group.

Remedies.—Arsenate of lead seems to be the best remedy to be used against this pest. In the seedbeds it may be used very strong, 8 to 10 pounds to 50 gallons of water without any apparent injury to the plants. In the fields later it must not be used stronger than 6 pounds to 50 gallons; and still later in the season, especially during hot weather, it should not be used stronger than 4 pounds to 50 gallons, as stronger solutions than this may cause slight injury to the leaves by burning. Weaker solutions than 4 pounds to 50 gallons do not seem to be effective. It is very profitable, however, to use the stronger solutions in the seedbeds, as the plants are at this time confined to a small area and set close together, so that very little of the solution would be wasted. Furthermore, it is evident that the destruction of beetles at this season not only means stronger and healthier plants, but it also means that the succeeding generations of the Tobacco Flea Beetle in the field will be greatly decreased.

If Paris green is used, it should be used somewhat stronger than recommended for horn worms. Growers report favorable results from using 1 pound of Paris green to 125 gallons of water, although there is a slight tendency for this stronger solution to burn the foliage. The addition of a pound and a half of stone lime to this mixture would help to counteract the burning.

Our preliminary experiments in seedbeds showed very favorable results from spraying with kerosene emulsion at a strength of 10 per cent oil. The leaves of the young plants were not injured by this mixture except where the plants were simply drenched, and the reduction in the number of Flea Beetles was more noticeable than where the stronger solutions of arsenate of lead were used. This substance, however, is still in an experimental stage, and if used at all should be very carefully made and applied at first only in an experimental way. If beneficial results are secured from the preliminary spraying, it may then be used more extensively.

Bud Worms.[1]

THE FALSE BUD WORM IS ALSO KNOWN AS "BOLL WORM," "CORN EAR WORM," "TOMATO FRUIT WORM," "SHATTER WORM," ETC.

(Order *Lepidoptera.*)

Two distinctly different insects are confused under the name of Bud Worm. By far the most common of these two is the Cotton Boll Worm or False Bud Worm of Tobacco. This insect is a common pest of corn, cotton, and tomatoes. The other insect which we will call the Tobacco

FIG. 21.—Tobacco Seed Pods injured by Tobacco Bud Worms, reduced. (*Photograph by the author.*)

Bud Worm, while not generally so common as the preceding, is by far the more destructive insect to tobacco in the field.

Both of these insects injure tobacco by working in the bud or unfolded leaf of the tobacco plant or by eating the seed pods of tobacco. (Fig. 21.) When these insects work in the bud of the tobacco they

[1] *Chloridea virescens; Heliothis obsoleta.*

often do a great deal of damage, as small holes eaten into the unfolded leaf mean very large holes when the leaf is fully expanded. (Fig. 22.)

FIG. 22.—Full-grown Tobacco Leaf which has been injured in the Bud by Tobacco Bud Worms, reduced.
(*Photograph by the author.*)

Description.

The Eggs.—The eggs of the True Bud Worm, so far as we are aware, have never been described. The adult undoubtedly lays its eggs on the ground cherry or other weeds of the potato family.

The eggs of the False Bud Worm are white in color, oval in shape and about 1-50 of an inch in diameter. The surface of the eggs is beautifully marked by ridges which radiate from the center. The female seems to lay her eggs by preference on either corn or cotton, but it does deposit its eggs on a very long list of plants.

The Larva.—The larva of the True Bud Worm is greenish in color, with pale longitudinal stripes, and measures when full grown about an inch and a half in length. There are no conspicuous characters which will always separate the larvæ of the two kinds of Bud Worms,

and in practice it is not necessary to do so. As a general rule, however, the larvæ of the True Bud Worm are lighter in color than the larvæ of the False Bud Worm. They are also much less heavily marked and very seldom have conspicuous reddish marks.

The larvæ of the False Bud Worm (Figs. 23, *b* and *c*, and 24) vary greatly in color—from examples that are light green in color and scarcely distinguishable from the True Bud Worm to examples that are

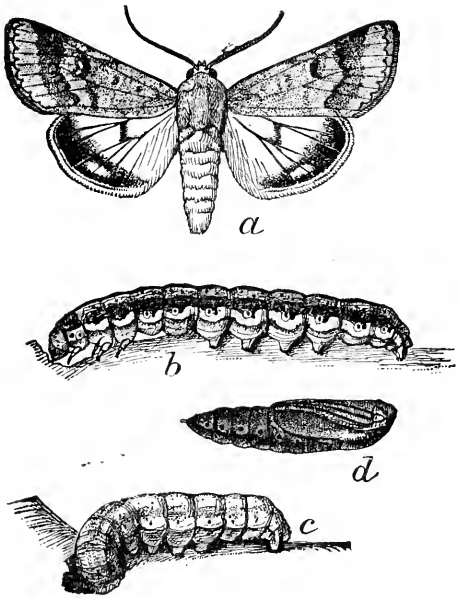

FIG. 23.—False Bud Worm of Tobacco. (*a*) Adult; (*b* and *c*) larva; (*d*) pupa.
(*After Howard, Bureau of Entomology, U. S. Department of Agriculture.*)

brownish or reddish in color. Forms are also found that are scarcely marked at all, whereas others are heavily marked by darker longitudinal lines. The larva of the False Bud Worm measures from an inch and a half to two inches in length.

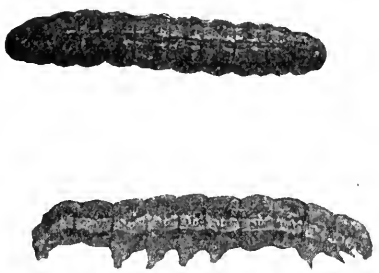

FIG. 24.—Larva of the False Bud Worm of Tobacco, natural size.
(*Photograph by the author.*)

The Pupae.—The pupæ of both Bud Worms are dark mahogany brown in color and resemble in a general way the pupæ of Cutworms. The pupa of the True Tobacco Bud Worm measures about ¾ inch in length. The pupa of the False Bud Worm (Fig. 23*d*) measures about ⅔ of an inch in length.

The Adults.—The adults of both Bud Worms are moths or "candle flies." They differ very remarkably from each other. The adult of the True Bud Worm (Fig. 25) is a beautiful moth with a wing ex-

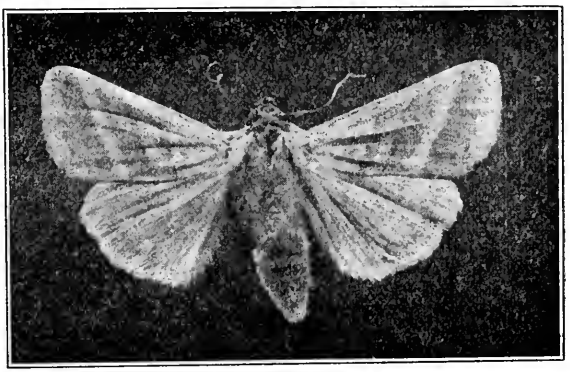

FIG. 25.—Adult of the True Bud Worm of Tobacco, about natural size.
(*Photograph by the author.*)

panse of an inch and a half. The four wings are light green in color, crossed by three bands of lighter color, the lighter bands being bordered on the outer edges with dusky. The hind wings are whitish with darker veins and dusky outer border, which is very heavy in the male, but not so prominent in the female.

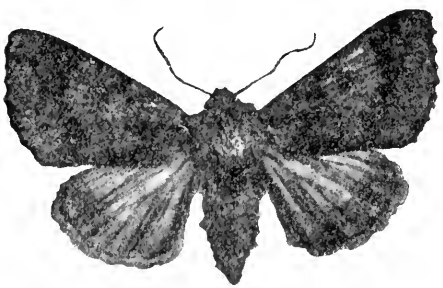

FIG. 26.—Adult of the False Bud Worm of Tobacco, about natural size.
(*Photograph by the author.*)

The adults of the False Bud Worm (Figs. 23*a* and 26) vary in color almost as much as the larvæ. Their color ranges from a reddish brown, which is almost coppery and heavily marked with darker, to a lighter olive-yellow, scarcely marked at all.

Life-history of the True Bud Worm.—Based upon field observations mainly of the presence of the Bud Worms in tobacco, the life-history of the True Bud Worm is about as follows: Moths issue from overwintering pupæ in the spring. Nearly full-grown larvæ are found in the buds of tobacco as early as the middle of June and as late as early July. These pupate in little cells in the ground. Moths from these pupæ evidently emerge all through August. The larvæ of the second generation are found in the tobacco field from late August to late September. The larvæ of the first generation feed on the unfolding buds of tobacco and the larvæ of the second generation feed

upon the seed pods of the tobacco which is left for seed and, later, upon the seed pods of the suckers which spring up in the field after the tobacco is harvested.

Life-history of the False Bud Worm.—The following account of the life-history of the False Bud Worm is adapted mainly from the details given by Quaintance and Brues,[1] supplemented with such observations as we have been able to make in the field. There are evidently several generations of the False Bud Worm each year. The average length of the life cycle from egg to adult is slightly over two months. The eggs are laid more commonly in corn and tobacco, corn evidently being preferred above every other plant. The eggs laid in corn are more commonly laid on the silk. The eggs hatch in from two to eight days. The larvæ become full grown in about a month, when they burrow into the ground to a depth of from an inch to seven inches, where they make a small cell, sparsely lined with silk, in which they pupate. Moths emerge from these pupæ in from two to three weeks.

Food Plants.—The native food plant of the True Bud Worm seems to be the ground cherry, or the horse nettle. Both these weeds are often severely eaten in the field, and the True Bud Worm seems to actually prefer these wild plants to tobacco.

The False Bud Worm is a notorious general feeder, eating almost anything that is green. It is a well-known pest of cotton, feeding on the green bolls, hence it is known to the cotton farmer as the "boll worm." On corn it prefers to feed on the green ears, hence it is known as the "corn ear worm." Frequently, however, it feeds in the growing bud of corn and is generally known as "shatter worm."

Control.

Preventives.—As both the True and False Bud Worms seem to prefer other food plants to tobacco, it is good policy to watch their food plants in and about the tobacco field to see that they do not become excessively abundant on these plants. The plants that should be watched especially are the ground cherry and horse nettle for the True Bud Worm, and corn and cotton for the False Bud Worm.

Remedies.—In our field experiments at Stem, Granville County, the plots sprayed with arsenate of lead at varying strengths from 3 to 6 pounds to 50 gallons of water were entirely protected against these pests. In years when bud worms are not very abundant they may be most easily controlled by hand picking. Quaintance gives the following as a successful remedy used in Florida:

> The pest is much more satisfactorily controlled on tobacco than on most other crops. A very usual practice, and one that has proven to be quite satisfactory, is to sprinkle poisoned corn meal in the bud. This poison mixture

[1] Bulletin 50, Bureau of Entomology, U. S. Department of Agriculture.

should be prepared as follows: To a quart of finely-ground corn meal add half teaspoonful of Paris green and mix thoroughly by stirring. To apply this, a sprinkler should be made by using a baking-powder can in the lid or bottom of which numerous holes have been punched, so that when it is shaken the poisoned corn meal may be peppered over the bud. The poison should be applied frequently and after heavy rains. In the case of large plants it may be necessary to open the buds with the hands and drop in a pinch of the poison.

We see no reason why this mixture should be more successful than the Paris green and lime mixture recommended to be used against Horn Worms. If this mixture is used, it should be applied early in the morning, late in the evening, or just after a rain, as it will stick much better.

Cutworms.[1, 2]

(Order *Lepidoptera.*)

Cutworms are no less partial to tobacco than they are to other early spring crops, especially crops which are transplanted. Cutworms injure tobacco in two ways: Early in the spring, just after the tobacco has been transplanted, they cut off the young plants at the surface of the ground. Cutworms often do a large amount of damage in this way, sometimes necessitating a second and often a third replanting. The species that seem to do most of the damage in this way is known as the Granulated Cutworm.[1] Many other different kinds of Cutworms undoubtedly do damage in this way, but the Granulated Cutworm is the one that is most often found in the tobacco field. Still later in the season, when the plants are larger, Cutworms climb up the stalks and eat holes through the leaves much as Horn Worms do. The species that seem to be responsible for most of this damage to tobacco in North Carolina is the Variegated Cutworm.[2]

Although there are many different kinds of Cutworms, they all resemble each other rather closely. They are all the larvæ of dingy, night-flying moths. The Cutworms themselves are smooth, dirty, grayish-white to blackish colored, stout-bodied worms with various markings. The length averages from an inch to two inches. Cutworms work principally at night or in dull, cloudy weather. In the daytime they are to be found curled up beneath the surface of the ground near the plants on which they have been feeding.

Description.

The Eggs.—The eggs of Cutworms are small, inconspicuous objects. Their usual shape is that of a sphere flattened on one side. The surface is usually marked with ridges and grooves. The eggs are usually laid in groups on the stems of plants or on sticks and stones lying on the ground.

The Larvae.—The larvæ as mentioned above are stout, smooth or almost hairless worms. (Figs. 27, 28, 29.) The different kinds can

[1] *Feltia annexa*; [2] *Peridroma margaritosa*, and related species.

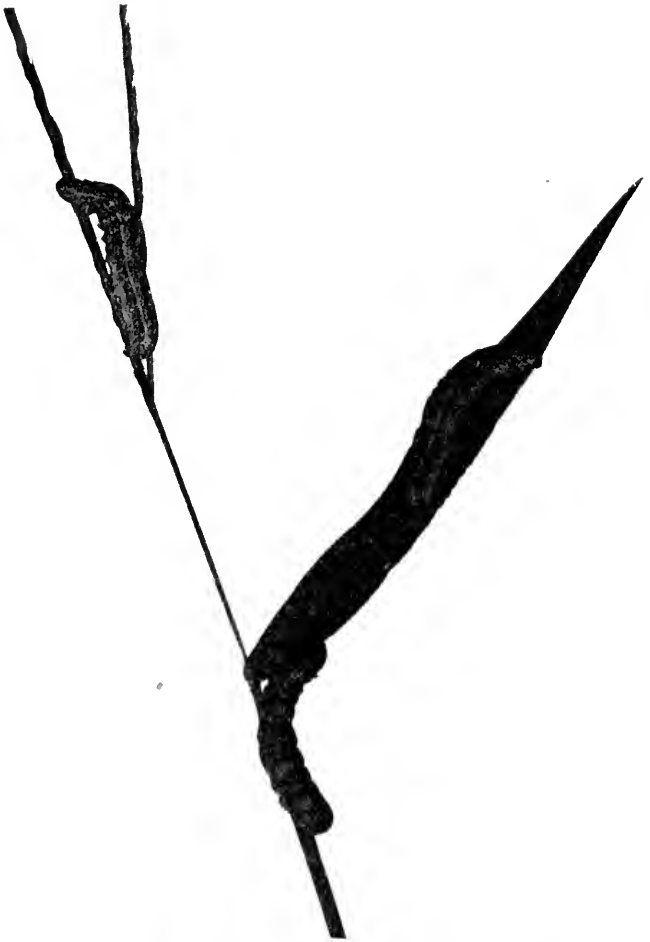

FIG. 27.—Larvæ of Cutworm on Grass, slightly reduced.
(*Negative by Hume.*)

FIG. 28.—Larvæ of the Variegated Cutworm, about natural size.
(*Photograph by the author.*)

usually be distinguished by their color markings, but in general Cutworms vary from dingy, grayish-white to velvety, brownish-black in color. Cutworms of different species are variously marked with

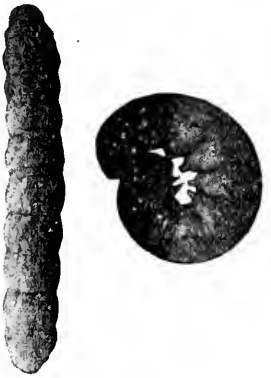

FIG. 29.—Larvæ of the Granulated Cutworm, about natural size.
(*Photograph by the author.*)

triangular dark spots or converging dark lines. When full grown they measure from an inch to two inches in length.

FIG. 30.—Pupa of Granulated Cutworm, about natural size.
(*Author's illustration.*)

The Pupae.—The pupæ of Cutworms (Fig. 30) are uniformly dark mahogany brown in color, and they resemble each other very closely in general characteristics.

FIG. 31.—Adult of the Granulated Cutworm, about natural size.
(*Photograph by the author.*)

The Adults.—The adults of Cutworms (Figs. 31, 32, 33) are all medium-size dingy moths with dark grayish or blackish fore wings marked with spots, streaks, and dashes of lighter gray. The hind wings are grayish-white with black veins and dusky outer margins.

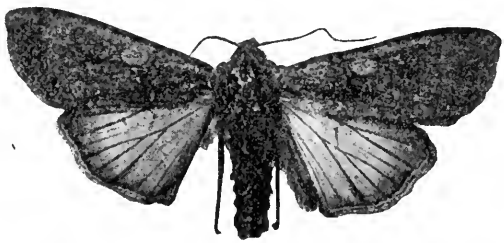

FIG. 32.—Adult of the Variegated Cutworm, about natural size.
(*Photograph by the author.*)

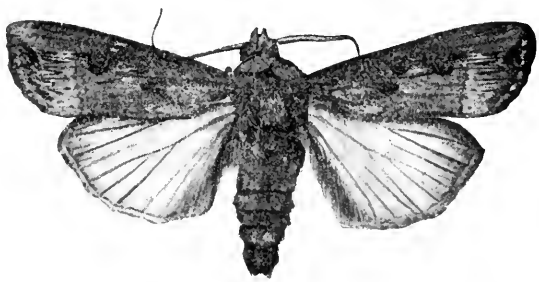

FIG. 33.—Adult of the Greasy Cutworm, somewhat enlarged.
(*Photograph by the author.*)

Life-history and Habits.—The number of generations of Cutworms annually is very difficult to determine, as they overlap in a most confusing manner. There are certainly several each year in North Carolina. Part of the Cutworms evidently pass the winter in the pupæ condition, but most Cutworms pass the winter as partially grown larvæ. It is for this reason that they are so very destructive in the early spring. Hibernating over winter as they do, and being deprived of their food by spring plowing, they are nearly starved when the tobacco is transplanted. They nearly always make up for their long starvation period by eating a large amount of food. Cutworms do not seem to prefer their food in a green state, hence they cut it off and let it wilt before they eat it. Frequently, however, they cut off in this way a great deal more than they are ever able to eat. The larvæ pupate beneath the ground in little earthen cells. The moths mate soon after they issue and the female moths lay their eggs almost anywhere green vegetation is to be found. The eggs are placed on the leaves or stems of plants, on sticks or stones, lying on the ground—in fact, almost anywhere. The last generation of moths

issue in the fall. They lay their eggs, the larvæ hatch and become partially grown before frost, when they burrow into the ground and pass the winter evidently more or less unaffected by heat and cold. By spring they are ready to devour anything green that happens to be in their way. Cutworms are especially troublesome in land that has lain in sod or grown up with weeds. They are often also very troublesome after clover.

Food Plants.—Cutworms are perhaps the most general feeders among insects. They seem to eat anything that is green, whether it be stems, leaves, or fruit. They are perhaps destructive to such plants as are transplanted early in the spring.

Control.

Preventives.—As the moths lay their eggs either in sod land or land that is growing some new crop, it naturally follows that tobacco should not be planted after crops of this kind. If the land that is to be planted in tobacco is plowed early in the fall before the adult moths of the last generation have laid their eggs, vegetation will be kept down and the moths will seek some other field to lay their eggs. Of course, it would be necessary in following this method of preventing Cutworms to see that all vegetation is completely turned under.

Remedies.—In fields that are suspected of having Cutworms, all weeds and trash should be plowed under two or three weeks in advance of transplanting time and the field cleared of Cutworms by using poisoned bait. There are two kinds of poisoned bait that may be used in this way. One may be known as the green clover bait and the other as the bran bait. In preparing the clover bait it is only necessary to spray a small patch of clover with Paris green at the rate of 1 ounce to 6 gallons of water. The clover is then cut and little balls about the size of the fist are scattered through the field. It is usually best to place the bait in rows about six feet apart, placing the balls every four or five feet. By placing the balls in this way the Cutworms will have little trouble in finding them. Each ball of bait should be covered with a shingle or piece of board, otherwise it is apt to wilt too soon. The clover bait may also be made by dipping little balls of clover in Paris green at the strength mentioned above instead of spraying it upon the clover.

Another bait which is frequently recommended to be used against Cutworms is one made of bran, as follows: One pound of sugar is dissolved in about 5 gallons of water and to this is added about 5 pounds of bran (shipstuff) or enough to make a mixture which will just squeeze between the fingers. To the bran mixture is then added

an ounce of Paris green. This mixture is scattered through the fields in rows just as the green clover bait. By some it is said that Cutworms prefer the bran mash to the green clover bait.

INSECTS OCCASIONALLY INJURIOUS TO TOBACCO.

When the insects mentioned on the following pages do become serious they are usually very troublesome, but they are, on the whole, insects whose presence in destructive numbers is usually due to some especially favorable condition. Among these special conditions the following might be mentioned: Unfavorable location of seedbed or tobacco field, thus bringing insects that feed normally upon other plants in close proximity to the tobacco plants; weeds that breed and harbor insects, unfavorable weather conditions for the tobacco plant, thus making it especially susceptible to the attacks of certain insects, and the absence of natural enemies of an insect that allows it to increase in enormous numbers.

The Grouse Locust.[1]

(Order *Orthoptera.*)

A peculiar small grasshopper (Fig. 34) found in the seedbeds eating the leaves, especially the young leaves before they have unfolded from the bud.

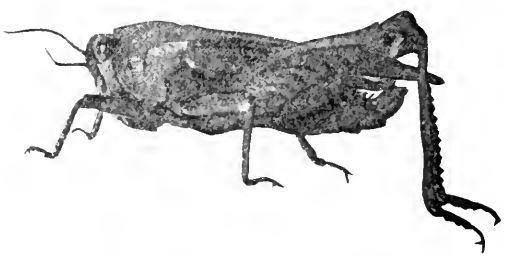

FIG. 34.—Adult of Grouse Locust, enlarged.
(*Photograph by the author.*)

At Stem, this past season, the Grouse Locust was decidedly more destructive to the tobacco seedlings than the Flea Beetle. Many of the plants were suffering from the attacks of both insects, but whereas the Flea Bugs were riddling the fully expanded leaves, they were in no way injuring the buds, and the plants were able to continue in spite of their attack. On the other hand, the Grouse Locust was eating the buds of the plant, almost completely destroying the leaves before they could expand. (Fig. 35.) Thus the plants were so severely checked that they did not recover. Many plants (at least 20 per cent of the entire number) were killed outright, and many more (30 to 40 per cent of the entire number) were so badly injured that they were

[1] *Tettigidea lateralis.*

unfit for transplanting. Just how long this work has been going on is impossible to say, for the tobacco farmers were attributing all the injury to the Flea Bug.

FIG. 35.—Tobacco Plant from Tobacco Seedbed, showing injury by Grouse Locust, about natural size.
(*Photograph by the author.*)

The adult grasshopper (Fig. 34) is about half an inch long, dark yellowish-brown in color. The grasshoppers of this group are readily distinguished from other short-horned grasshoppers by the fact that the back of the grasshopper is extended in a long, narrow, pointed projection which partially covers and extends beyond the end of the

wings. The Grouse Locust passes the winter in adult stage. They become very active early in the spring, and it undoubtedly is the lack of other green food that causes them to turn their attention to tobacco. Normally, this insect seems to confine its attention to low marsh lands, where it undoubtedly feeds on the rank-growing plants found in such situations. This is especially true late in summer when the uplands have become dry. In the winter the adults may be found scattered over a wide range of territory. Evidently they hibernate in any suitable locality. Early in the spring the adults pair and the females lay their eggs in favorable situations. This species is said to prefer to lay its eggs in moss. The young hatch in spring and the young nymphs become adults in the fall. There is undoubtedly only one brood each year, but adults seem to be present the year round, as the over-wintering adults do not die off until the nymphs have become adult in the fall.

Control.

Preventives.—As this insect is especially fond of low, marshy situations, and as the worst infested beds were beds near marshes, it would seem that a good deal of the injury due to this insect might be prevented by avoiding such situations.

Remedies.—It is not easy to control this insect once it has gained entrance to the seedbeds, as the plants are growing very rapidly and it is almost impossible to keep the buds covered with poison all the time. The locusts in the beds are reinforced by locusts from outside continually, and they seem to be able to do much damage to the young plants when sprayed but once per week. Every effort should be made to keep the locusts out of the beds. Perhaps the best preventive is pure kerosene sprayed about the edge of the beds, taking care not to touch any of the tobacco plants with the mixture, as it would kill all plants touched. It would be necessary to spray a strip at least three feet wide all around the seedbed. Kerosene emulsion may be sprayed directly onto the plant or used to spray a strip about the beds, as the Grouse Locust did not cross a strip of tobacco sprayed this way. In one seedbed at Stem they did not injure tobacco next to plants sprayed with kerosene emulsion, although they were bad at the other end of the same bed. Arsenate of lead at the rate of 8 to 10 pounds to 50 gallons of water, if used every three or four days, will keep the Grouse Locust in check, although it will not be completely successful.

Pith Worms.

There seems to be two kinds of insects confused under this one name. Mr. Sherman tells me that he has been hearing of Pith Worms in tobacco almost ever since he has been in the State, but that he has

never had specimens. This past spring replies to circular-letters clearly indicated that there were two pests which were known by tobacco growers as "pith worms." One was described as a "hard, yellowish flat worm working in tobacco just after transplanting." Fortunately, we were able to secure specimens of this insect, which proved to be the larva of a "click beetle," one of the worms known under the general head of "wireworms." (Fig. 36.) The other Pith Worm, specimens of which were not secured, was described as "a small, soft, white-bodied worm working in the center of the stalk just at topping time."

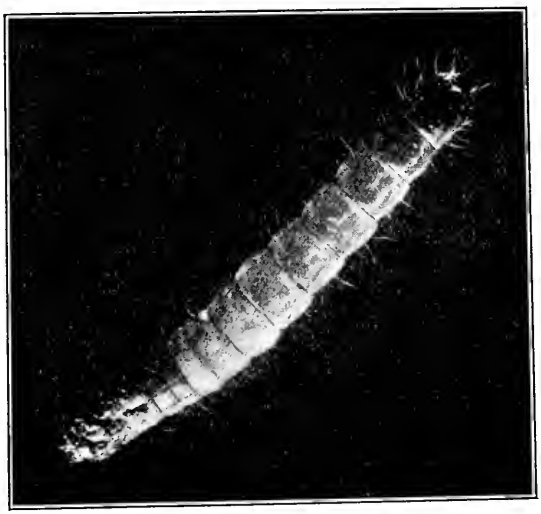

FIG. 36.—Pith Worm, enlarged.
(*Photograph by the author.*)

The injury caused by these pests is said to be considerable at times, especially in land that has not been cultivated for several years, as grown-up sedge grass. The larvæ bore directly into the tobacco plant near the surface of the ground. After entering the stalk they work both above and below the entrance hole, eating out the entire inner portion of the stalk. (Fig. 37.) The young plants which are attacked by the Wireworm soon wilt and never recover. In fields attacked in this way transplanting is often necessary a second and sometimes even a third time. Tobacco farmers tell us that it is often necessary to replant considerable areas for this reason. So far as we have been able to discover, the Pith Worm, which works later in the season, damages the plant in much the same way as the preceding, that is, by hollowing out the stem, and tobacco farmers tell us that

plants injured in this way are either broken off by the wind or wilt down and do not recover. Loss in this way is of course complete, for it is too late to replant.

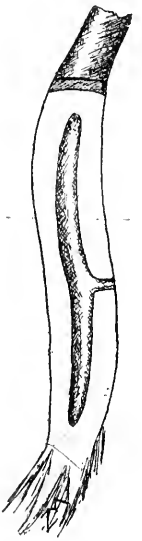

FIG. 37.—Stock of Young Transplanted Tobacco Plant cut open to show the work of a Pith Worm, enlarged.
(*Author's illustration.*)

Wireworms are the larvæ of certain beetles which are known commonly as "click beetles" or "jacksnappers." (Fig. 38.) Every coun-

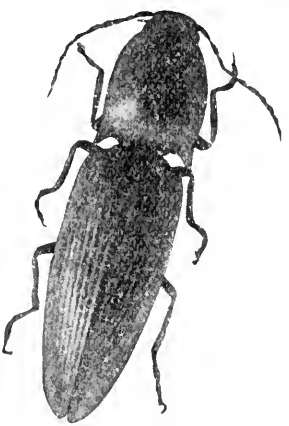

FIG. 38.—A Click Beetle, an adult of Wireworms and Pith Worms, enlarged.
(*Photograph by the author.*)

try boy knows the jacksnapper and his ability to turn "flip-flops" in the air. These beetles are frequently attracted to lights at night, and

when placed on their backs they have the power to spring suddenly into the air and usually land on their feet. These adult beetles pass the winter in all sorts of sheltered places, in deadwood, under the barks of trees, under fences, sticks, leaves, stones, etc. In the summer they pair and lay eggs, usually in lowland fields covered with grasses. The larvæ hatching from these eggs are smooth, tough, yellowish-brown wireworms. They burrow through the ground, feeding upon the roots and seeds of plants which happen to come in their way. It is thought that it requires some of these larvæ two or three years before they become full-grown and change to the pupæ. The pupæ are found in a little cell just below the surface of the ground. After a few weeks the adult beetles emerge from the pupæ; usually, however, most of the beetles do not come to the surface, but remain over winter in their little cell under the ground.

FIG. 39.—Stock of Young Transplanted Tobacco Plant, showing injury by Wireworms, enlarged.
(*Author's illustration.*)

Wireworms are pests of various crops, especially corn, which they injure by feeding upon the seed or upon the young plants. Beside the kind (Pith Worm) which injures tobacco by eating out the center of the stock, Wireworms often injure tobacco by tunneling through the stalk below ground and cutting off the roots. (Fig. 39.) Injury in this way is often very great where tobacco follows sedge grass. Plants in the field which have remained for a long time without making any growth will be found upon examination to have their stalks below ground tunneled through in various directions or their larger roots cut off. Further search in the soil about the plant usually reveals one or more hidden wireworms. Plants which have their stalks in-

jured in this way seldom, if ever, recover. Frequently plants which have their roots destroyed by wireworms recover by sending out additional roots from the stalk above the roots that have been destroyed.

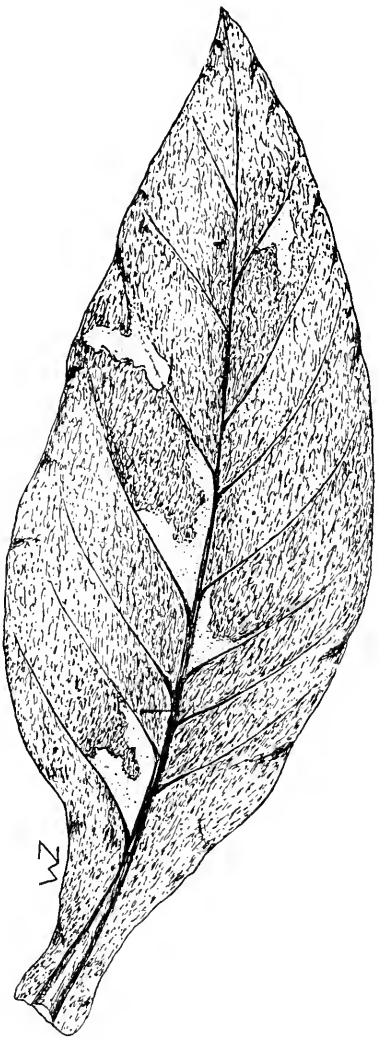

FIG. 40.—Tobacco Leaf Injury by Tobacco Leaf Miner, reduced.
(*Author's illustration.*)

Control.

No entirely satisfactory method of control has ever been devised for preventing the attacks of Wireworms. Some relief can be secured

by not planting tobacco in a field which has lain in sod for some time. Fall plowing will aid somewhat in killing Wireworms which may be in the soil already.

Remedies.—All sorts of methods have been used against Wireworms, but most of these have not been successful. No method of dipping the plants or soaking the seed in any sort of foul-smelling substance seems to prevent the attacks of these pests.

Tobacco Leaf Miner.[1]

ALSO KNOWN AS "SPLIT WORM."

(Order *Lepidoptera.*)

Large irregular blotches appearing on the leaves. These are at first whitish, but later become very dry and parchment-like. Upon examination it will be found that the interior of the leaf has been entirely eaten away, leaving only the upper and lower surfaces. This trouble seems to be confined to areas along the principal veins and along the mid-rib. (Fig. 40.) Leaves injured in this way are unfit for wrapper purposes, as they tear very easily.

Life-histories and Habits.—The adult moth which lays the eggs that develop into the leaf miner is a yellowish-gray insect belonging to the same group and closely resembling the common clothes moth. (Fig. 41.) Its wings measure when fully expanded about half an inch

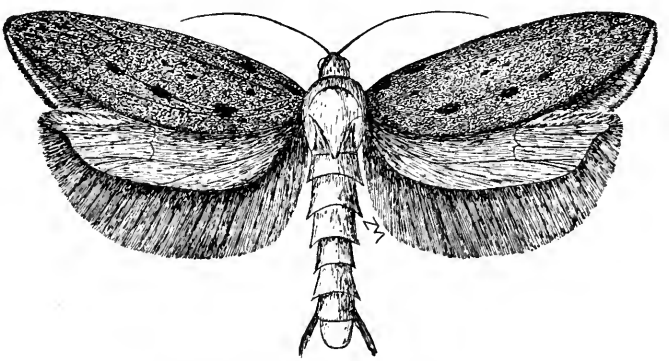

FIG. 41.—Adult of the Tobacco Leaf Miner, enlarged.
(*Redrawn from McCarthy.*)

across. The adult places its eggs upon the leaves of its food plant. The young larvæ (Fig. 42) on hatching eat directly into the leaf. Once on the inside of the leaf, it commences to eat out the tender inner portions between the upper and lower surfaces of the leaf. As pointed out by Quaintance, the larva does not confine its attention to one spot in the leaf, but moves from place to place. In this way one larva will be responsible for several blotches. The larvæ when full-grown

[1] *Phthorimaea operculella.*

drop to the ground, where they pupate in a small silken cocoon underneath clods of earth or in the loose rubbish lying on the ground. There are, perhaps, two generations each year, and the winter is undoubtedly passed in the adult stage, the adults hiding away in the midst of trash found about the tobacco barns.

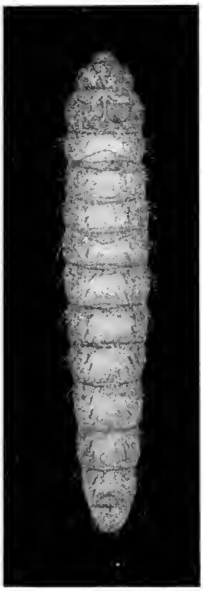

FIG. 42.—Larva of the Tobacco Leaf Miner, enlarged.
(Author's illustration.)

Injury in North Carolina.—Since Professor McCarthy reported this insect as a tobacco pest some twelve years ago, no new records have come to our notice until this past year, when the writer found it in tobacco fields in the old tobacco belt. It was not at this time a serious pest, confining its attention to the lower leaves of the tobacco and was found in only a very limited area.

Control.

Preventives.—The horse or bull nettle seems to be the original food plant of this insect, hence all weeds of this type should be kept out of the tobacco field. Frequent cultivation of the tobacco, stirring the soil up quite close to the plants, according to McCarthy, will bury the pupæ so deeply that the adult moths will be unable to reach the surface.

Remedies.—The larvæ may be destroyed in the leaves by pinching them, and if a close watch is kept they may be destroyed in this way

before they have done much damage. The leaves seem to be able to recover from slight injury, whereas if the larvæ is allowed to continue its work, the leaves never recover. If the leaves are covered with either of the arsenates the larvæ will secure enough poison before they enter the leaf to kill them. After the larvæ have once gained entrance to the leaf they will be apt to come out in order to make a fresh blotch and will be killed by the poison when they are attempting to gain entrance to the leaf. Arsenates for this insect should be used at the strengths recommended for the Flea Beetle (page 35).

The Margined Blister Beetle.[1]

(Order *Coleoptera.*)

This insect was found in the tobacco fields in several instances severely ragging the leaves of the tobacco. In all instances it seemed to have been forced to the tobacco for lack of food after having stripped the leaves from common nightshade, which in this case seemed to be the favorite food plant.

FIG. 43.—Adult of the Margined Blister Beetle, about natural size. (*Photograph by the author.*)

Description.—The adult beetle (Fig. 43) which does the injury in this case is a grayish-black beetle about ⅔ of an inch long, with the edges of its wing covers margined with light gray. It is a chewing insect and strips the leaves bare to the mid-rib.

Life-history and Habits.—The life-history of the blister beetle is very interesting because the larvæ pass through several stages and because they are enemies of grasshoppers. "Their life-history may be summed up in a few words: They deposit from July to October their orange or yellow colored eggs in irregular masses in loose ground, each female producing from four to five hundred eggs. In about ten days these eggs hatch, producing very active, long-legged larvæ with large heads and strong jaws, which run about everywhere, searching for the eggs of locusts. If an egg pod has been found, the larva forces its way into it and commences to devour an egg; if two larvæ have found the same prize, a mortal combat takes place, lasting until a single larva remains as sole owner of this store of food. As soon as one or two eggs have been consumed the larva throws off its skin and reappears in a very different shape, being now white, soft, and possessing only small legs. In the course of another week a second molt takes place, disclosing a larva with

[1] *Epicauta cinerea.*

rudimentary mouth parts and legs and of a very clumsy aspect. Soon another molt takes place, but only slight changes are seen in this form of larvæ. After eating the remaining eggs in the pod, and leaving it, it grows in the soil, where it forms a smooth cavity, within which it rests. Soon it splits its skin again, disclosing now quite rudimentary, tuberculous mouth parts and legs. The semi-pupa thus formed is rigid and of a deep yellow color. It hibernates in this condition. In spring the skin is again torn open and a larva appears looking like that of the second shape, but smaller and whiter; it is quite active, but does not seem to require any food. It changes into a true pupa and eventually into a winged beetle." (Luggar.) The adult beetles are apt to congregate in great numbers, and as they are strong flyers, they often descend on a field and literally strip it in a very short time.

Food Plants.—Potatoes, beans, peas, beets, clematis, nightshades, and horse nettle are all favorite foods of this beetle.

Control.

Preventives.—Evidently clean culture is one of the best means of control. It is doubtful if these insects would ever prove injurious to tobacco save where they are driven to it as a last resort after they have exhausted other available sources of food. As mentioned again and again, weeds closely related to tobacco should be kept out of the tobacco field, as they simply act in the capacity of breeding and harboring places for insects which when their normal food plant gives out are almost sure to turn their attention to tobacco with disastrous results.

Remedies.—Either of the arsenates may be used rather successfully against these pests, especially if they do not occur in great numbers. However, when blister beetles occur in great swarms, arsenates are apt to prove of very little avail. In such cases there is, perhaps, no better remedy than collecting them by hand. For this purpose shallow tin pans should be used. In the bottom of these pans a few rags liberally saturated with kerosene (coal oil) should be placed. A person walking down a row of tobacco, with a pan in one hand and a pine brush in the other, can brush most of the beetles directly into the pan, where they come in contact with the kerosene, which kills them.

The Little Brown Burrowing Cricket.[1]

(Order *Orthoptera.*)

A brownish cricket-like insect (Fig. 44) which lives in deep tunnels in the ground and works in the early spring upon transplanted tobacco, which it cuts off at the surface of the ground much after the manner of

[1] *Anorogryllus muticus.*

Cutworms. The cricket drags the plant after it is cut off into its tunnel. By this means the work of this insect may be readily distinguished from the work of Cutworms.

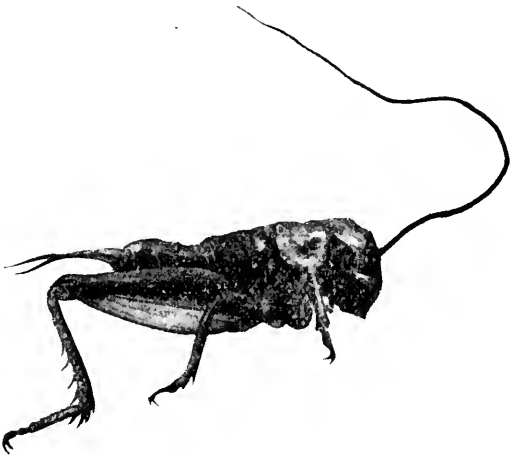

FIG. 44.—Nymph of the Little Brown Burrowing Cricket, enlarged.
(*Photograph by the author.*)

Practically our whole knowledge of this insect as a tobacco pest is contained in a letter by Mr. N. H. Paschall, of Ridgeway, Warren County, N. C., who writes, complaining of this cricket, under date of March 31, 1908, as follows:

"* * * We have a new brown cricket here that lives in the ground and piles up dirt at its hole something like an ant, that promises to give us a lot of trouble with tobacco which has been transplanted. They cut the plant off and then pull it into their tunnels. It is almost impossible to get a stand where these crickets are in the ground. They are more plentiful this year than I have ever seen them."

This species of cricket is southern in its distribution, being an inhabitant of the tropics. It seems to prefer fields that have lain bare over winter. It digs small, round tunnels into the bare ground, often to great depths, sometimes as much as 20 inches or more, piling the dirt removed in a little mound to one side of the hole. The insect seems to have a voracious appetite, cutting off many plants and dragging them to its tunnel. It by no means confines its attention to tobacco, but seems to eat any green food available. It is especially troublesome, according to Mr. Paschall, to plants such as cabbage, collards, tomatoes, and tobacco, which are transplanted early. Dr. Howard reports a case in South Carolina where this species became very injurious to early cotton.

Control.

Preventives.—Fields intended for tobacco should be plowed a week or two before the time to transplant and the ground thoroughly cultivated so that all signs of vegetation will be removed. In this way the cricket will be forced to seek new fields for food. Undoubtedly, too, the cultivation will disturb the crickets in their tunnels, thus causing many of them to leave the field intended for tobacco. If this measure is resorted to it will be absolutely necessary to keep down the growth of all vegetation, otherwise the crickets will secure enough food to keep them alive until tobacco is transplanted, when they will turn their attention to the tobacco, doing, perhaps, all the more damage because they have been starved.

Remedies.—After the fields have been thoroughly cultivated as recommended above, they should be thoroughly covered with poisoned green bait as recommended under Cutworms. (Page 41.) The crickets, being deprived of their normal food, will be forced to eat the poisoned bait, which will kill them.

The Spined Tobacco Bug.[1]

(Order *Hemiptera.*)

Frequently in tobacco fields it will be noticed that the tops of plants, single leaves or whole small plants often wilt down in a single day. The knowing ones say, "tobacco wilt"; but a careful search reveals none of the characteristic marks of the true tobacco

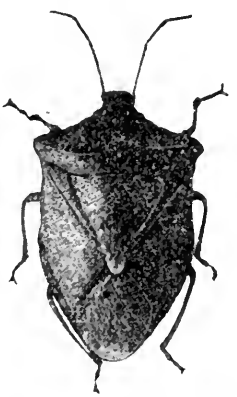

FIG. 45.—Adult of the Spined Tobacco Bug, enlarged.
(*Photograph by the author.*)

wilt, but a drab-colored bug nearly half an inch long. This is a true sucking insect and secures its food by sucking the juices of the plant through a slender beak which it inserts beneath the bark of the plant. Frequently on young plants it works just at the surface of the ground.

[1] *Euchistus servus.*

Often two or three bugs attack a single plant. Such plants rarely recover, and it is at this time that this insect does the greatest amount of damage. On older plants it works usually higher up, in which case only the top of the plant wilts. Such plants, though severely checked, usually recover very rapidly. Still later in the season, when the tobacco is nearly ready to be harvested, these bugs seem to confine themselves to the stems of the leaves. Leaves which have been attacked in this way wilt rapidly and do not seem to mature well in the fields. Tobacco farmers tell me that such leaves are always of an inferior grade and color.

The adult bug which has been described above and which is well illustrated in Fig. 45, is one of the insects which are normally present every year. It is found among all sorts of weeds, but is said to prefer the common thistle and the mullein. Undoubtedly this insect is attracted to the tobacco field because of the rich, succulent growth of tobacco, as the plants at this season of the year are full of juices.

Control.

Preventives.—The tall, rank-growing weeds, such as thistle and mullein, should be kept severely down in the tobacco field and in the fields adjoining. It is doubtful if this insect would ever occur in the tobacco fields if it were not first attracted to them by rank-growing weeds among the tobacco.

Remedies.—There is no remedy that can be used against this pest except hand picking. Wherever the bugs are noticed they should be picked off at once and destroyed.

THE LESSER INSECT ENEMIES OF TOBACCO.

The insects included in this group are usually never serious enemies of tobacco, though normally they are present in the tobacco fields every year and do an appreciable amount of injury. They are only incidental visitors to the tobacco field, as most of them are general feeders. Most of the insects included in this group are abundant, usually occurring wherever there is green vegetation, and not a few of them are serious pests of other crops. Fortunately, however, they are without exception chewing insects, and yield themselves readily to the methods of fighting other more important pests.

Grasshoppers.[1]

(Order *Orthoptera.*)

Every one is familiar with grasshoppers, as they are normally present every year wherever there is any sign of green vegetation. Frequently they do quite an appreciable amount of damage to tobacco by chewing irregular oval holes in first-class wrapper, thereby ruin-

[1] *Melanoplus femur-rubrum and Trimerotropis citrina.*

ing it for that purpose. (Fig. 46.) So far as observed, only two kinds of grasshoppers[1] are injurious to tobacco in North Carolina. The

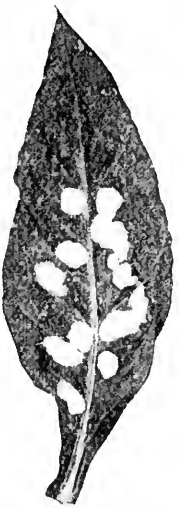

FIG. 46.—Tobacco Leaf injured by Grasshoppers, reduced.
(*Photograph by the author.*)

chief offender in this respect is the red-legged locust. (Fig. 47.) This insect is a small grayish-brown, short-horned locust or grasshopper with no conspicuous markings save a pair of bright-red hind legs. This grasshopper has a single generation each year. Eggs are laid by the female in the fall, and these do not hatch until the follow-

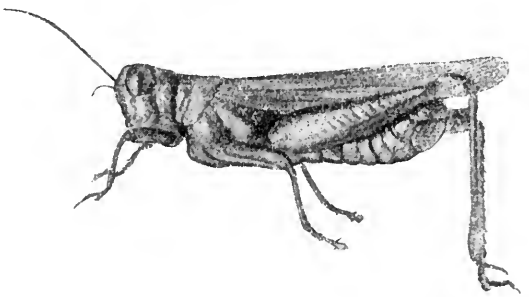

FIG. 47.—The Red-legged Grasshopper, enlarged.
(*Photograph by the author.*)

ing spring. Usually the female selects a hard spot of ground, especially covered with vegetation, and drills a small hole about the diameter of her body and deep enough to hold from two to three dozen eggs. These eggs are laid singly and covered with a water-

[1] *Melanoplus femur-rubrum and Trimerotropis citrina.*

proof, sticky substance which cements them together into bent flask-shaped masses. Each female lays from two to three groups of eggs. These remain over winter in the ground and hatch the following spring.

The nymphs which hatch from these eggs resemble in a general way the full-grown grasshopper. They have large heads in comparison to the rest of the body and the wings are represented by short, thick pads. These nymphs become full-grown about the first of September, when the adults pair and lay eggs for the following year.

Birds of various kinds are serious enemies of grasshoppers, but perhaps the most important enemy is the fungus disease. In the fall especially it is not an uncommon sight to see dead grasshoppers which have been killed by this fungus, clinging to tall weeds or grasses. The larvæ of blister beetles, as mentioned above (page 55), are important enemies of grasshoppers, living as they do on their eggs.

The general habits of grasshoppers are too well known to need discussion. Their range of food plants seems to include all low-growing green vegetation.

Control.

Preventives.—During serious outbreaks Grasshoppers may be controlled to a great extent by fall or winter plowing, as this tends to break up the egg cases and expose them to the weather. If the land is plowed deeply either the eggs are exposed or are buried so deeply that the young nymphs on hatching are unable to reach the surface. Frequently, however, during such outbreaks, the eggs are laid in waste places which cannot be plowed. Under such conditions recourse must be had to some of the following remedies:

Remedies.—Tobacco sprayed by arsenates as recommended for Horn Worms (page 30) is usually sufficiently protected against these pests. However, either poison bran made as directed for Cutworms (page 45) or "Criddle Mixture" made by poisoning horse droppings according to the following formula—one part of Paris green, 60 parts horse droppings and adding two parts of salt dissolved in water (Chittenden)—may be used in very severe cases. The Grasshoppers are attracted by the salt in the mixture and secure enough poison to kill them. Turkeys and guineas, if allowed to range over the fields as recommended under Horn Worms (page 30), will usually keep Grasshoppers in control also.

Katydids.[1]

(Order *Orthoptera.*)

The peculiar rasping call of Katydids is a familiar sound on warm autumn evenings, and Katydids are more familiar to most people by

[1] *Scudderia spp.*

sound than by sight. These light-green, long-horn grasshoppers (Fig. 48) are frequent visitors to the tobacco field, where they do no slight

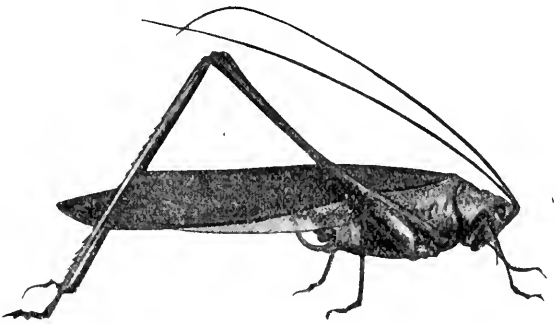

FIG. 48.—"Katydid," about natural size.
(*Photograph by the author.*)

amount of injury by eating large irregular holes through the leaves. Katydids lay their eggs in the fall. The nymphs hatch in the early summer and become full-grown the latter part of August.

Katydids occur in woods, marshes, and weedy fields and only wander to tobacco fields incidentally. The writer has seen tobacco growing next to an old field, overgrown with briars, weeds, and young pines, simply riddled by the nearly full-grown nymphs of Katydids.

Control.

Preventives.—From what has been said above, it may naturally be inferred that the farmer should avoid planting tobacco near fields which seem especially favorable for the development of these pests. Clean cultivation tends also to deter these insects from entering tobacco fields.

Remedies.—The arsenates used against the more important insects are entirely effective in keeping Katydids in check.

Cabbage Looper.[1]

ALSO CALLED "CABBAGE PLUSIA" AND "CABBAGE WORM."

(Order *Lepidoptera.*)

This insect is normally a pest of cabbage. Occasionally, however, it becomes destructive to tobacco.

The eggs of this insect are golden yellow in color and flattened on the side next to the leaf and rounded on the other, the surface being marked with many ridges. The larvæ are light-green in color, with stripes of lighter green on the sides of the body. (Fig. 49.) They have a characteristic, looping gait, whence the name Cabbage Looper. The pupa makes itself a thin, silken cocoon, usually on the underside

[1] *Plusia brassiceae.*

of the leaf of its host plant. (Fig. 50.) The adult is a grayish-brown moth (Fig. 51) with wings marked with white. There is a

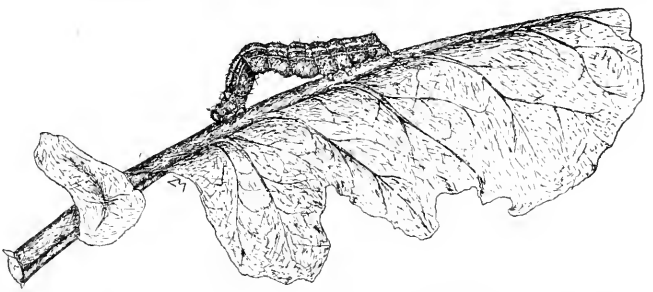

FIG. 49.—Larva of the Cabbage Looper on a Cabbage Leaf, natural size.
(*Author's illustration.*)

characteristic U-shaped white mark near the center of the fore wing. This species has been noted as injurious only when tobacco is grown

FIG. 50.—Pupa of the Cabbage Looper, about natural size.
(*Author's illustration.*)

near cabbage. Tobacco grown in kitchen gardens is often riddled. We noticed, also, a great deal of damage done to the first three or

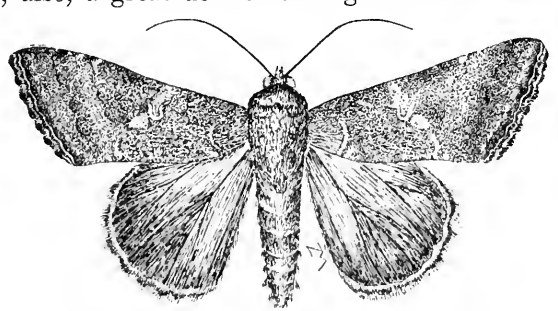

FIG. 51.—Adult Female Cabbage Looper, enlarged.
(*Author's illustration.*)

four rows of tobacco in a field which had a row of cabbage along one side. In this case, however, the cabbage had been neglected and the Cabbage Looper had evidently been driven to the tobacco as a last resort.

Control.

Preventives.—It is quite evident from the statements made above that the tobacco farmer should avoid planting tobacco and cabbage close together. Or if it is necessary to plant the two close together, great care should be taken to see that the Cabbage Looper is kept under control on the cabbage by the use of arsenates.

Remedies.—Either Paris green or arsenate of lead, as recommended for Horn Worms (page 30), may be used successfully against this pest.

Tree Crickets.[1]

(Order *Orthoptera.*)

ALSO KNOWN AS "WHITE FLY."

A light greenish grasshopper-like insect which eats round holes through the tobacco leaves between the main veins.

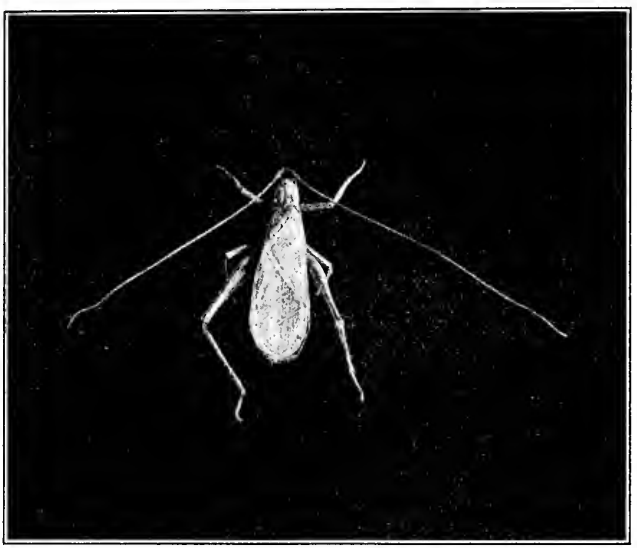

FIG. 52.—Adult Tree Cricket, about natural size.
(*Photograph by the author.*)

The adult Tree Crickets resemble in a general way a small grasshopper. (Fig. 52.) They are light-green in color and the adults and nymphs frequently do considerable damage to tobacco, especially when it is growing near a thicket of brambles. The adult females lay their eggs in the stems of blackberries and raspberries and undoubtedly also in the stems of other plants growing in thickets. The adults themselves normally feed on soft-bodied insects which they find in

[1] *Oecanthus spp.*

such situations. It is for this reason that these insects are worse in fields near such places. The writer has seen tobacco planted in new-grounds which were surrounded on all sides by heavy growths of blackberries quite severely damaged by the nymph and adult Tree Crickets.

Control.

Preventives.—It is evident from what has been said above that Tree Crickets do not ordinarily frequent tobacco fields. It is only when tobacco fields are brought in close proximity to their native habitat that they do any appreciable amount of injury. It necessarily follows that all the method of control needed is to avoid such situations.

Remedies.—Tobacco sprayed as recommended for Horn Worms (page 30) or Flea Bugs (page 35), with either of the arsenates, is entirely protected against these insects.

The Corn Root Worm.[1]

ALSO KNOWN AS "SPOTTED MELON BUG," "BUD WORM" AND "DRILL WORM."

(Order *Coleoptera.*)

This well-known enemy of corn and melons is sometimes found in injurious numbers in the tobacco field. The adult beetle eats small, irregular holes in the tobacco leaves.

This insect passes the winter in the adult stage and comes out the first warm days in spring, being one of the earliest insects noted in the springtime. It feeds upon practically any green vegetation that may come to its notice, being especially injurious at this time of year on melons. The adult beetle (Fig. 53) is about a third of an inch long, yellowish-green in color, with twelve black spots on its wing covers. Just where the eggs are laid it is not known, but it seems quite probable that they are laid in small crevices in the ground near corn, which is the food of the larvæ. As soon as the larvæ hatch, they bore their way into the stalk of corn, often doing a great amount of damage in this way. The larvæ become full-grown in three or four weeks, when they change to pupæ in the soil. The pupæ stay in the ground for about two weeks, when the adult beetles emerge. These beetles soon pair, and the eggs of the second generation are probably laid among coarse grasses and the larvæ probably live in the

FIG. 53.—Adult of the Corn Root Worm, enlarged. (*Photograph by the author.*)

[1] *Diabrotica 12-punctata.*

stalks, as there is no corn available at that season of the year. These larvæ, perhaps, become full-grown in three or four weeks, when they pupate, the adults emerging in the fall and pass the winter hidden in sheltered out-of-the-way places beneath sticks and stones, under the bark of trees, etc.

Control.

Preventives.—From what has been stated above of the life-history of this pest, it would seem natural that this insect would be worse in tobacco which had followed corn or coarse-growing grasses. In case this insect ever becomes serious enough to be a real pest of tobacco, it would seem to be necessary to see that tobacco did not follow corn or any coarse-growing grass.

Remedies.—Paris green or arsenate of lead as used against Horn Worms (page 30) and Flea Bugs (page 35) would be entirely effective against this pest, as the adult beetle is a chewing insect.

INSECT ENEMIES OF STORED TOBACCO.

Having considered the insect enemies of growing tobacco, we pass to those insects which injure the dry tobacco leaves in tobacco warehouses and the manufactured products in stores, etc. So far only two insects have been recorded as injuring stored tobacco in North Carolina. The first and most abundant of these is known as the Cigarette Beetle. The other, which is of much less importance as an insect enemy of stored tobacco, is known as the Drug Store Beetle.

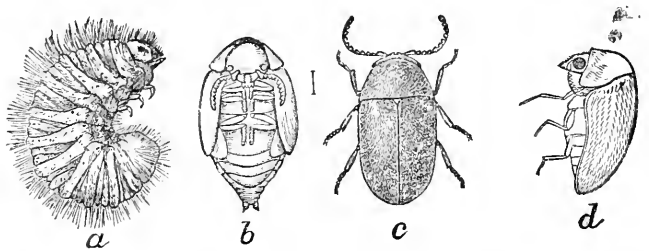

FIG. 54.—Cigarette Beetle. (*a*) Larva; (*b*) pupa; (*c*) adult; (*d*) adult, side view (all enlarged). (*After Chittenden, Bureau of Entomology, U. S. Dept. Agri., Bul. No. 4, n. s.*)

Cigarette Beetle.[1]

(Order *Coleoptera.*)

This insect is so small that it usually escapes all notice until it has done a large amount of damage, when its fine powder-like castings usually betray its presence.

The adult beetle (Fig. 54 *c* and *d*) is about 1/8 of an inch long, uniform brown in color, with its body densely covered with fine hair.

[1] *Lasioderma serricorne.*

In general outline the adult beetle is rather robust and when viewed from the side has a rather peculiar appearance because the head is bent to nearly right angles to the body (Fig. 54*d*).

The larva (Fig. 54*a*) is about 1/8 of an inch long, white in color and densely covered with short hair.

The pupa (Fig. 54*b*) is also white in color, about the same length as the adult, and is encased in a delicate silken cocoon.

FIG. 55.—Work of the Cigarette Beetle on a Bundle of Fancy Wrappers, reduced. (*Photograph by the author.*)

As this insect works in sheltered situations, it undoubtedly breeds throughout the year. Dr. Chittenden has succeeded in rearing a generation in 47 days, which would give us four or five generations annually.

Both the larvæ and adults feed upon a great variety of dried substances. They feed upon all kinds of tobacco, either the dried

leaf or the manufactured plug, fine-cut cigarettes and cigars. Fig. 55 shows the results of the operations of this insect upon a bundle of fancy wrappers which had been stored for several years in the State Museum. This insect is often very troublesome in tobacco warehouses, but usually does most of its damage in cigar stands by drilling small holes in the cigars and cigarettes, thus destroying their commercial value.

As small as this insect is, it is attacked by a four-winged parasite. Although this parasite has never been found in great numbers, it is undoubtedly a slight check upon the increase of this pest.

Control.

Preventives.—This insect is so minute that it is often able to gain entrance to stored products without being noticed. General cleanliness is, however, an excellent preventive. In fact, in mild cases the only remedy required is a thorough cleaning of the infested premises and a free use of gasoline.

Remedies.—In small cigar stands this insect may be easily handled by fumigating with carbon-bisulphide. A tight box should be provided and the stored tobacco placed in this. The carbon-bisulphide should be placed in saucers or shallow pans, the lid of the box replaced and the whole allowed to remain for from 12 to 24 hours. An ounce of the chemical is sufficient to fumigate a box which contains 50 cubic feet. Carbon-bisulphide has a very characteristic odor, but this soon disappears if the tobacco is exposed to the air. It must be borne in mind, however, that carbon-bisulphide is a dangerously inflammable substance, and no light should be brought in contact with it, as an explosion would result.

Gasoline may also be used quite effectively against this insect. It may be sprayed or sprinkled liberally over everything, taking especial care to get it into all cracks and crevices. The room should then be closed tightly and allowed to remain for about 12 hours. The same precautions about lights should be used with gasoline as were mentioned above under carbon-bisulphide.

In large warehouses the control of this insect is a different problem. Some warehousemen secure absolute relief by steaming the infested rooms, and where the building is not tight and steam is accessible there is perhaps no better remedy. In the modern brick warehouses and in other warehouses where steam is not accessible it would perhaps be more economical to fumigate with hydro-cyanic acid gas. This is a dangerously poison gas and should be used accordingly. It is made by placing potassium cyanide in a solution of sulphuric acid. For every 1,000 cubic feet of air space in the warehouse take—

10 ounces potassium cyanide (98% pure).
20 ounces sulphuric acid (pure).
40 ounces water.

The acid and water should be mixed together in an earthenware jar of about 5 gallons capacity. Ordinarily, not more than about 10 ounces of potassium cyanide to be used in one jar. If a larger amount than this is required to fumigate the room, it should be separated into 10-ounce or smaller lots. Potassium cyanide, after being weighed out, should be placed in thin cloth sacks. A skilled person in fumigating a large room can drop these sacks into the jars one after another and escape from the room without injurious results, but as hydrocyanic acid gas is one of the most deadly poisons known, it should be used with great care. A better plan would be to have the sacks suspended over the jars by means of cords working through screw-eyes in such a way that the sacks can be lowered into the jars from the outside. The building should then be left closed about 12 hours and then thoroughly aired before any one attempts to enter the building. The building should be made as near air-tight as possible before fumigation is commenced, otherwise enough of the gas may escape into the outside air to be injurious.

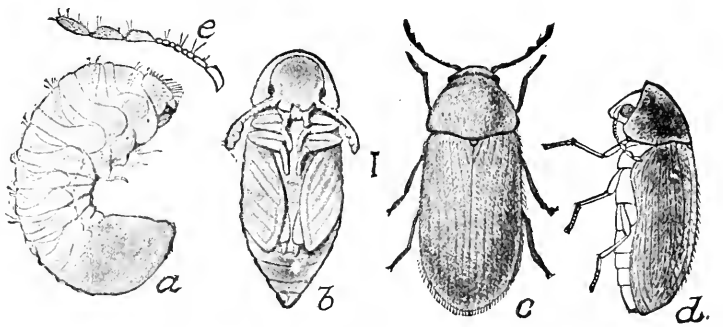

FIG. 56.—Drug Store Beetle, (*a*) Larva; (*b*) pupa; (*c*) adult; (*d*) adult, side view (all enlarged).
(*After Chittenden, Bureau of Entomology, U. S. Dept. Agri., Bul. No. 4, n. s.*)

The Drug Store Beetle.[1]

(Order *Coleoptera.*)

This insect belongs to the same group as the Cigarette Beetle, which it resembles closely. Like the Cigarette Beetle, it is also a very general feeder on all sorts of dried stored products. It does not seem to be especially fond of tobacco, but has been observed by the writer in Raleigh injuring cigars by eating out the filler, though it was a much more serious pest of other stored products in the same store. This insect resembles very closely the Cigarette Beetle. The more important differences can be noticed at a glance by comparing Figs. 54 and 56.

[1] *Sitodrepa panicea.*

The adult beetle (Fig. 56 *c* and *d*) is about the same size as the adult Cigarette Beetle, and while it has the same dull brownish color and fine hairs scattered over the body, it is not nearly so robust as the Cigarette Beetle. In addition, it has the wing covers marked by a series of fine lines.

The larva (Fig. 56*a*) bears a general resemblance to the larva of the Cigarette Beetle, but has only a very few hairs on its body.

The pupa (Fig. 56*b*) is proportionally much more slender than the pupa of the Cigarette Beetle, but, like it, is enclosed in a delicate silken cocoon. Dr. Chittenden states that he has raised this insect from egg to adult in two months, which would give us four or five generations annually.

This insect well deserves the reputation of being able to eat "anything." It is especially fond of dried roots and herbs, hence the name, drug store beetle. As a pest of stored tobacco it is of much less importance than the Cigarette Beetle.

Control.

The same measures recommended against the Cigarette Beetle (page 68) may be used equally successfully against this insect.

NOTICE.

The Division of Entomology is maintained for the purpose of gathering and spreading information concerning insects, their lives, habits, and remedies for those that are injurious. Every person in the State is invited to correspond with us at any time that any matter in this line arouses interest or apprehension. When practicable, specimens should accompany inquiries. They may be sent in tight tin, wooden, or strong pasteboard box, with enough food to last several days. Never send insects in a letter, and never in a bottle, unless preserved in alcohol. Twigs which are suspected of being infested with San José Scale may be sent in package neatly wrapped. Four to six twigs about six inches long, from one and two-year growth, is usually sufficient.

All packages should be neat, and should have the name and address of the sender plainly marked on the outside. Letter should be separate from package.

Additions to our collection of insects are earnestly desired. Special instructions for those who are interested in collecting, mounting and preserving insects will be sent on request. We wish to stimulate an interest in this study among our younger people.

In furtherance of our work, bulletins and circulars are issued from time to time. The regular monthly BULLETINS, of which this is a copy, are sent out to the entire general mailing list of the department, consisting of about 35,000 names. The circulars are sent out to those known to be especially interested in the subjects they discuss and to special lists, but not to the general list. Each circular is devoted to some one subject, and consists of only from six to fifteen pages.

On the following page is a list of our publications, any of which will be sent on request, so far as our supply will allow (those marked * are not available).

ENTOMOLOGICAL CIRCULARS.

*No. 1. The Hessian Fly.
*No. 2. The Cotton Boll-worm.
*No. 3. The Round-headed Apple-borer.
*No. 4. Spraying Apparatus.
*No. 5. (Replaced by No. 13 and No. 26.)
*No. 6. Spraying Apples and Pears.
*No. 7. The Peach-tree Borer.
No. 8. The Harlequin Cabbage Bug.
No. 9. The Potato Beetle.
No. 10. Preparation and Use of Kerosene Emulsion.
No. 11. The San José Scale.
No. 12. The Strawberry Weevil.
*No. 13. (Replaced by No. 26.)
No. 14. The Cotton Boll-weevil.
No. 15. Collecting and Preserving Insects.
No. 16. The Cotton Worm.
No. 17. Bordeaux Mixture and Paris Green.
No. 18. Entomology that the Farmer Should Know.
No. 19. Suggestions to Purchasers of Nursery Stock.
No. 20. The Codling Moth.
No. 21. Erroneous Reports of Cotton Boll-weevil.
No. 22. Regulations Governing Nursery Trade.
*No. 23. Orchard Inspections, 1907.
No. 24. Apple Spraying Demonstration, 1908.
No. 25. The House Fly.
No. 26. Remedies for San José Scale.

MONTHLY BULLETINS.

*June, 1903. Injurious Insects—Spraying.
May, 1905. Insect Enemies of Corn.
May, 1907. San José Scale and Remedies.
June, 1907. San José Scale in North Carolina.
January, 1908. Bee-keeping in North Carolina.
June, 1908. Insect Enemies of Cotton.
June, 1909. Orchard Spraying—Orchard Protection Work, etc.
October, 1909. Insect Enemies of Tobacco.

All correspondence on these subjects, all packages and all requests for these publications should be addressed to

DIVISION OF ENTOMOLOGY,
State Department of Agriculture,
RALEIGH, N. C.

FRANKLIN SHERMAN, JR., *Entomologist.*
Z. P. METCALF, *Assistant Entomologist.*
S. C. CLAPP, *Orchard and Nursery Inspector.*

THE BULLETIN

OF THE

NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. NOVEMBER, 1909. Number 11.

STOCK FEEDS.

PUBLISHED MONTHLY AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MAIL MATTER.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, October 27, 1909.

SIR:—I submit herewith manuscript covering the inspection and analyses of concentrated stock feeds during the past year. I recommend its publication, as heretofore, as the November Bulletin.

Very respectfully,

B. W. KILGORE,
State Chemist.

To WILLIAM A. GRAHAM,
Commissioner of Agriculture.

SEVENTH REPORT ON CONCENTRATED FEEDING STUFFS AND COTTON-SEED MEAL.

B. W. KILGORE, STATE CHEMIST.

BY G. M. MACNIDER, FEED CHEMIST AND MICROSCOPIST,
ASSISTED BY
J. M. PICKEL, L. L. BRINKLEY AND F. P. DRANE, ASSISTANT CHEMISTS.

The following law regulating the registration, sale and inspection of concentrated feeds was passed by the General Assembly of 1909. This law is in accordance with the Uniform Feed Law adopted by the Southern States Association of Commissioners of Agriculture and which this association recommended be adopted by all the States represented in this association.

The object of changing the law from its old form to the present form is to assist in the movement to have feed control laws with uniform requirements throughout the States where the trade conditions are similar. This law affords ample protection to the consumer, and uniformity in the requirements will facilitate the inspection work and be a help to the manufacturer who puts his goods on sale in the States having uniform requirements. Following is the text of the law:

AN ACT TO REGULATE THE REGISTRATION AND SALE OF CONCENTRATED COMMERCIAL FEEDING STUFFS.

The General Assembly of North Carolina do enact:

SECTION 1. That every lot or parcel of concentrated commercial feeding stuff sold, offered or exposed for sale within this State shall have affixed thereto or printed thereon, in a conspicuous place on the outside thereof, a legible and plainly printed statement in the English language clearly and truly certifying the weight of the package (*Provided*, that all concentrated commercial feeding stuffs shall be in standard-weight bags or packages of twenty-five, fifty, seventy-five, one hundred, one hundred and twenty-five, one hundred and fifty, one hundred and seventy-five, and two hundred pounds); the name, brand or trademark under which the article is sold; the name and address of the manufacturer, jobber or importer; the names of each and all ingredients of which the article is composed; a guarantee that the contents are pure and unadulterated, and a statement of the maximum percentage it contains of crude fiber, and the percentage of crude fat, and the percentage of crude protein, and the percentage of carbohydrates, allowing one per cent of nitrogen to equal six and one-fourth per cent of protein, all four constituents to be determined by the methods in use at the time by the Association of Official Agricultural Chemists of the United States.

SEC. 2. The term "concentrated commercial feeding stuffs" shall be held to include all feeds used for live stock and poultry, except hays, straws and corn stover, when the same are not mixed with other materials, nor shall it apply to the whole seeds or grains of cereals when not mixed with other materials.

SEC. 3. Each and every manufacturer, importer, jobber, agent or seller, before selling, offering or exposing for sale in this State any concentrated commercial feeding stuff, shall, for each and every feeding stuff bearing a distinguishing name or trade-mark, file for registration with the Commissioner of Agriculture a copy of the statement required in section one of this act, and accompany said statement, on request, by a sealed glass jar or bottle containing at least one pound of such feeding stuff to be sold, exposed or offered for sale, which sample shall correspond within reasonable limits to the feeding stuff which it represents in the percentages of crude protein, crude fat, crude fiber and carbohydrates which it contains.

SEC. 4. Whenever a manufacturer, importer or jobber of any concentrated commercial feeding stuffs shall have filed a statement, as required by section three of this act, no agent or seller of such manufacturer, importer or jobber shall be required to file such statement.

SEC. 5. The Commissioner of Agriculture shall have the power to refuse the registration of any concentrated commercial feeding stuff under a name which would be misleading as to the materials of which it is composed, or when the names of each and all ingredients of which it is composed are not stated, or where it does not comply with the standards and rulings adopted by the Board of Agriculture. Should any concentrated commercial feeding stuffs be registered and it is afterwards discovered that they are in violation of any of the provisions of this act, the Commissioner of Agriculture shall have the power to cancel such registration.

SEC. 6. Each and every manufacturer, importer, jobber, agent or seller of any concentrated commercial feeding stuff, as defined in section two of this act, shall pay to the Commissioner of Agriculture an inspection tax of twenty cents per ton for each ton of such commercial feeding stuff sold, offered or exposed for sale or distributed in this State, and shall affix to or accompany each car shipped in bulk, and to each bag, barrel or other package of such concentrated commercial feeding stuff, a tag or stamp to be furnished by the Commissioner of Agriculture stating that all charges specified in this section have been paid: *Provided*, whenever any concentrated commercial feeding stuff, as defined in section two, is kept for sale in bulk, stored in bins or otherwise, the manufacturer, dealer, jobber or importer keeping the same for sale shall keep on hand cards of proper size, upon which the statement or statements in section one is or are plainly printed; and if the feeding stuff is sold at retail in bulk, or if it is put up in packages belonging to the purchaser, the manufacturer, dealer, jobber or importer shall furnish the purchaser with one of said cards upon which is or are printed the statement or statements described in this section, together with sufficient tax tags or stamps to cover same: *Provided*, that the inspection tax of twenty cents per ton shall not apply to whole seeds and grains when not mixed with other materials. It is further provided that, upon demand, said inspection tags or stamps shall be redeemed by the department issuing said tags or stamps, upon surrender of same, accompanied by an affidavit that the same have not been used: *Provided*, said tags or stamps shall be returned for redemption within the time fixed by the Board of Agriculture: *Provided further*, that nothing in this act shall be construed to restrict or prohibit the sale of concentrated commercial feeding stuff in bulk to each other by importers, manufacturers or manipulators who mix concentrated commercial feeding stuff for sale. The Commissioner of Agriculture is hereby empowered to prescribe the form of such tax tags or stamps.

SEC. 7. Any manufacturer, importer, jobber, agent or dealer who shall sell, offer or expose for sale or distribution in this State any concentrated commercial feeding stuff, as defined in section two of this act, without complying with the requirements of the preceding sections of this act, or who shall sell or offer or expose for sale or distribution any concentrated commercial feeding stuff which contains substantially a smaller percentage of crude protein or crude fat or carbohydrates or a larger percentage of crude fiber than certified to be contained, or who shall adulterate any feeding stuff with foreign, mineral or other substance or substances, such as rice chaff or hulls, peanut shells, corncobs, oat hulls or similar materials of little or no feeding value, or with

substances injurious to the health of domestic animals, shall be guilty of a violation of this act, and the lot of feeding stuff in question shall be subject to seizure, condemnation and sale by the Commissioner of Agriculture, and the proceeds from said sales shall be covered into the State Treasury for the use of the department executing the provisions of this act. Such seizure and sale shall be made under the direction of the Commissioner of Agriculture, by an officer of the Department of Agriculture. The sale shall be made at the courthouse door in the county in which the seizure is made, after thirty days' advertisement in some newspaper published in such county, or if no newspaper is published in such county, then by a like advertisement in a newspaper published in the nearest county thereto having a newspaper. The advertisement shall state the brand or name of the goods, the quantity and why seized and offered for sale. The Commissioner of Agriculture, however, may in his discretion release the feeding stuff so withdrawn when the requirements of the provisions of this act have been complied with, and upon payment of all costs and expenses incurred by the Department of Agriculture in any proceedings connected with such seizure and withdrawal.

SEC. 8. The Commissioner of Agriculture, together with his deputies, agents and assistants, shall have free access to all places of business, mills, buildings, carriages, cars, vessels and packages of whatsoever kind used in the manufacture, importation or sale of any concentrated commercial feeding stuff, and shall have power and authority to open any package containing or supposed to contain any concentrated commercial feeding stuff, and, upon tender and full payment of the selling price of said samples, to take therefrom, in the manner hereinafter prescribed, samples for analysis; and he shall annually cause to be analyzed at least one sample so taken of every concentrated commercial feeding stuff that is found, sold or offered or exposed for sale in this State under the provisions of this act. Said sample, not less than one pound in weight, shall be taken from not less than ten bags or packages, or if there be less than ten bags or packages, then the sample shall be taken from each bag or package, if it be in bag or package form, or if such feeding stuff be in bulk, then it shall be taken from ten different places of the lot. The sample or samples taken shall be kept a reasonable length of time by the Department of Agriculture, and on demand a portion of such sample or samples shall be furnished to the manufacturer, importer or jobber of his feeds for examination by the chemists or other experts of said manufacturer, importer or jobber. The Department of Agriculture is hereby authorized to publish from time to time in reports or bulletins the results of the analysis of such sample or samples, together with such additional information as circumstances advise: *Provided, however*, that if such sample or samples as analyzed differ from the statement prescribed in section one of this act, then, at least thirty days before publishing the results of such analysis, written notice shall be given of such results to the manufacturer, importer, agent or jobber of such stock, if the name and address of such manufacturer, jobber or importer be known: *Provided further*, that if the analysis of any such sample does not differ within reasonable limits from the statement prescribed in section one of this act appearing upon the goods, the manufacturer shall be considered as having complied with the requirements of this act.

SEC. 9. The Board of Agriculture is empowered to adopt standards for concentrated commercial feeding stuffs and such rules and regulations as may be necessary for the enforcement of this act.

SEC. 10. Any manufacturer, importer, jobber, agent or dealer who shall sell, offer or expose for sale or distribute in this State any concentrated commercial feeding stuff without having attached thereto or furnished therewith such tax stamps, labels or tags as required by the provisions of this act, or who shall use the required tax stamps, labels or tags a second time to avoid the payment of the tonnage tax, or any manufacturer, importer, jobber, agent or dealer who shall counterfeit or use a counterfeit of such tax stamps, labels or tags shall be guilty of a violation of the provisions of this act.

SEC. 11. Any manufacturer, importer, jobber, agent or dealer who refuses to comply with the requirements of the provisions of this act, or any manufacturer, importer, jobber, agent or dealer or person who shall impede, obstruct,

hinder or otherwise prevent or attempt to prevent any chemist, inspector or other authorized agent in the performance of his duty in connection with the provisions of this act, shall be guilty of a violation of the provisions of this act.

SEC. 12. Any manufacturer, importer, jobber, agent or dealer who shall violate any of the provisions of this act, upon conviction thereof, shall be fined not exceeding fifty dollars for the first offense nor more than two hundred dollars for each subsequent offense, and the proceeds from such fines shall be covered into the State Treasury for use of the Department of Agriculture in executing the provisions of this act.

SEC. 13. Whenever the Commissioner of Agriculture becomes cognizant of any violation of the provisions of this act he shall immediately notify in writing the manufacturer, importer or jobber and dealer, if same be known. Any party so notified shall be given an opportunity to be heard, under such rules and regulations as may be prescribed by the Commissioner and the Board of Agriculture, and if it appears that any of the provisions of this act have been violated the Commissioner of Agriculture shall certify the facts to the solicitor in the district in which such sample was obtained, and furnish that officer with a copy of the results of the analysis or other examinations of such article, duly authenticated by the analyst or other officer making such examination, under the oath of such officer. In all prosecutions arising under this act the certificate of the analyst or other officer making the analysis or examination, when duly sworn to by such officer, shall be *prima facie* evidence of the fact or facts therein certified.

SEC. 14. That it shall be the duty of every solicitor to whom the Commissioner of Agriculture shall report any violation of this act to cause proceedings to be commenced and prosecuted without delay for the fines and penalties in such cases prescribed: *Provided*, that the provisions of this act shall not apply to any concentrated commercial feeding stuffs now in the hands or in the stock of any dealer or manufacturer.

SEC. 15. That all laws and clauses of laws in conflict with this act are hereby repealed.

SEC. 16. This act shall be in force from and after its ratification.

Ratified this the 13th day of February, A. D. 1909.

SUMMARY OF REQUIREMENTS OF LAW.

All feeds offered for sale in this State shall be in standard-weight packages of 25, 50, 75, 100, 125, 150, 175 and 200 pounds.

The packages or bags shall bear a plain statement of the name, brand or trade-mark under which the feed is sold; the name and address of the manufacturer, jobber or importer; the names of each and all the ingredients of which the feed is composed, and a statement of the minimum percentage of protein and fat and the maximum percentage of crude fiber and the percentage of carbohydrates.

The term "Concentrated Commercial Feeding Stuff" includes all feeds used for live stock and poultry, except hays, straws, corn stover and whole grains.

Every manufacturer selling goods in this State must register each brand with the Commissioner of Agriculture and file a statement of the requirements as stated in section 1 of the law.

The manufacturer must pay to the Commissioner of Agriculture an inspection tax of twenty cents per ton for every ton of feed offered for sale in the State. Each package must have attached to it a tax stamp, furnished by the Commissioner, showing that these charges have been paid.

Section 7 states the condition under which feeds shall be withdrawn from sale and defines adulterants.

Section 9 gives the Board of Agriculture power to adopt such standards and regulations as may be necessary for the enforcement of the law.

Since the publication of the last Report on Concentrated Feeds 448 samples of feeds and 95 samples of cotton-seed meals have been analyzed, making a total of 543 samples.

The number of samples of each class of feed are as follows:

Wheat Bran and Mixed Brans	64
Middlings or Shorts	65
Bran and Shorts	14
Shipstuff	54
Rye Feeds	8
Corn and Oat Feeds	8
Rice Feeds	3
Beet Pulp	3
Chop Feeds and Meals	9
Cracked Corn	17
Molasses Feeds	21
Alfalfa Feeds	22
Cotton-seed Meal Feeds	22
Peanut Meals	2
Linseed Meals	2
Special Mixed Feeds	14
Poultry Feeds	9
Miscellaneous Mixed Feeds	44
Microscopic Examinations on Feeds not analyzed	67
Cotton-seed Meals	95
Total	543

DUTY OF THE DEPARTMENT OF AGRICULTURE.

It is the duty of the Department of Agriculture to regularly inspect the feeds offered for sale in the State and to see that all feeds bear the tax stamp and are properly labeled. The Department is required to collect and analyze at least one sample of every brand of feed found on sale in the State during the year and to publish the results for the benefit of those interested in this class of goods.

The Department will be glad through correspondence or through the personal service of its inspectors to furnish information regarding the character and value of any class of feed.

RESULTS OF THE ENFORCEMENT OF THE FEED LAW.

The first feed law in North Carolina went into effect in July, 1903. At that time it was found that the markets of the State were flooded with low-grade and adulterated feeds, with no branding on the bag to indicate that they were made of anything but high-grade materials. Such materials as rice chaff, ground corncobs, peanut hulls, oat hulls, etc., with very little feeding value and now classed as adulterants, were used extensively in the composition of feeds.

Since the first law went into effect the Department has made frequent inspections each year in all parts of the State, and wherever adulterated or misbranded feeds have been found they have been withdrawn from sale. The result of this work has been the steady decrease, from year to year, in the number of adulterated feeds on the market and the steady increase in the quality of the feeds of all classes. With the publication of this, the seventh report on feeds, it will be noticed that there are very few cases of adulteration reported. Following each table of analyses will be found a statement of the number of samples which fail to come up to the manufacturer's guarantee. While this number is comparatively large in some classes of feeds, it will be noticed in the majority of cases that the difference between the analysis and the guarantee is comparatively small. This trouble is due largely to the manufacturers not adhering close enough to the chemical analysis of their products in making up the guarantees for them.

The present law, which is the first one to require the statement of the percentage of carbohydrates, was passed in February of this year, and as a large number of the samples were taken early in the year the greater portion of the guarantees in this Bulletin do not show the percentage of carbohydrates.

PURCHASING FEEDS.

At present the price of concentrated feeds is high and in all probability will continue so. The only way for the consumer to get the best feed is to purchase strictly on the basis of the chemical analysis. If the prices of several feeds are compared closely with the percentages of protein, fat and fiber and the one selected which gives the largest amount of protein and fat and the smallest amount of fiber for a given amount of money, the purchaser will in this way get the best returns for his money.

Every feed dealer, to protect himself and his trade, should insist on feeds being shipped him in strict compliance with the law. If he will do this and not buy from those manufacturers who do not comply with the law, he will save considerable trouble and inconvenience by having his feeds seized and confiscated by feed inspectors.

THE CHEMISTRY OF FEEDS.

In the chemical analysis of feeds the following determinations are made: protein, fat, fiber, nitrogen-free extract, moisture and ash. Without going into a detailed description of the chemical properties of these classes of substances, the following general discussion will be found valuable in interpreting the analysis of commercial feeds:

PROTEIN.

The term protein or crude protein as used in feed analysis includes all the nitrogenous compounds contained in the feed. These compounds are divided, chemically, into two classes—the true proteins and the amido compounds. Familiar examples of the true proteins are the white of egg, lean meat and the gluten of flour. In seeds and cereal products the amido compounds are present in very small amount, and hence all the nitrogen is regarded as present in the form of protein. The protein compounds contain, approximately, 16 per cent of nitrogen, so to determine the amount of protein in a feed the total amount of nitrogen is determined, and this, multiplied by the factor 6.25, gives the amount of protein.

The protein compounds are of very great importance in feeds, for it is from them that the animal derives the nitrogenous materials from which its muscular tissues are built.

FATS.

Fats, or more properly termed ether extract, include all the substances soluble in dry ether. These substances include the pure fats, such as cotton-seed oil, linseed oil, etc., and the waxes, resins, chlorophyl, etc. In most feeds the waxes and resins are present in such small amount that the entire ether extract may be regarded as fat. In a few feeds, such as alfalfa products, the ether extracts the chlorophyl or green coloring matter of the plants. This amounts to only a small per cent.

CRUDE FIBER.

The term crude fiber includes the woody parts or the structural materials of plants. It is composed largely of cellulose and is the most indigestible part of the feed. As a rule, a feed with a high percentage of fiber is considered to be a low-grade feed.

MOISTURE.

Water is present to some extent in all classes of feed. Hays and commercial feeds usually contain from 6 to 15 per cent of water.

ASH.

Ash is the inorganic or mineral matter of plants. It is composed principally of soda, potash, lime and magnesia, combined in the form

of phosphates, sulphates, chlorides and carbonates. The constituents of the ash furnish the material for the bony structure of animals and is used to only a small extent in the tissues and organs.

NITROGEN-FREE EXTRACT.

The term nitrogen-free extract includes the non-nitrogenous constituents of feeds. The principal classes of substances included in this term are the sugars, starch, organic acids, pentosans, etc. In the ordinary feed analysis the nitrogen-free extract is determined by difference; the sum of the percentages of protein, fats, fiber, moisture and ash is subtracted from 100, and the remainder considered as nitrogen-free extract.

CARBOHYDRATES.

The term carbohydrates includes the nitrogen-free extract and the crude fiber. In publishing the analyses the nitrogen-free extract and the crude fiber are reported separately. To get the per cent of carbohydrates in a feed it is only necessary to add the percentages of these two constituents.

The percentage of carbohydrates as stated in the manufacturer's guarantee should be, as above stated, the sum of the per cent of nitrogen-free extract and the per cent of crude fiber.

The following classification will give a clearer understanding of the facts presented above:

Protein (N x 6.25)	True proteins.	
	Amido compounds.	
Fats (Ether Extract)	True fats.	
	Waxes, resins, organic acids, chlorophyl, etc.	
Carbohydrates	Nitrogen-free extract.	Sugars, Starch, Pentosans, etc.
	Crude fiber.	

MICROSCOPIC ANALYSIS OF FEEDS.

In addition to the regular chemical analysis, all the feed samples are examined microscopically. This is the final test of their purity.

The chemical analysis shows the percentage amounts of the nutritive constituents of the feed, but it gives no idea of the source from which they are derived, and as the protein and fat are more digestible and hence more valuable in some classes of feeds than in others it is very important to know just what substances go to make up the feed. The microscopic examination is the only way this can be done with any degree of accuracy.

The chief use of the microscope in feed analysis is in the detection of adulterants and in the detection of the use of spoiled or low-grade seeds. Many feeds are now put on the market in finely ground con-

dition, and as this destroys the characteristic appearance of the ingredients it is very easy to adulterate them with finely ground rice chaff, corncobs or peanut hulls. All of these substances have characteristic elements which are readily distinguished under the microscope.

For example, if a mixed feed contains 15 per cent of fiber it would not be considered low grade, provided it is made from good materials; but if the microscopic examination shows that part of this fiber is furnished by rice chaff or corncobs it would be considered a very low-grade feed.

DESCRIPTION AND COMPOSITION OF THE BY-PRODUCTS USED FOR FEED.

The materials used for commercial feeds are usually the by-products of other industries, such as the by-products from flour mills, oil mills, etc. The composition of these materials varies somewhat with the season in which they are grown, the method of milling, etc.; but within reasonable limits the standard grades of these by-products have a very similar composition. The following general descriptions of these products, with the average analyses, compiled from a large number of analyses[1], will show what the compositions of each one of these products should be.

WHEAT PRODUCTS.

Bran.—This consists of the outer portion or covering of the wheat grain. It contains the greater portion of the fibrous material of the grain, but is also rich in protein and fat. Average analysis: Protein, 15.03 per cent; fat, 4.52 per cent; fiber, 8.36 per cent; nitrogen-free extract, 56.15 per cent; water, 9.33 per cent; ash, 6.61 per cent.

Middlings or Shorts.—These terms are used, generally, interchangeably in the trade and are used to describe the various products intermediate between bran and flour, some being composed largely of the starchy matter, while others contain more of the fibrous tissue of the grain.

Average analysis of goods sold under the name middlings or shorts: Protein, 16.53 per cent; fat, 5.04 per cent; fiber, 5.50 per cent; nitrogen-free extract, 59.90 per cent; water, 8.79 per cent; ash, 4.24 per cent.

In addition to the products sold under the general term middlings, the following grades of middlings are made, depending on the process of milling and the parts of the grain of which they are composed:

Standard Middlings.—Average analysis: Protein, 16.54 per cent; fat, 5.63 per cent; fiber, 7.28 per cent; nitrogen-free extract, 56.41 per cent; water, 9.21 per cent; ash, 4.93 per cent.

[1]The analyses used in these descriptions marked (†) are taken from Bulletin No. 11, Office of Experiment Stations, U. S. Department of Agriculture. Those not so marked are compiled from analyses made in this laboratory.

Flour Middlings.—Average analysis: Protein, 17.54 per cent; fat, 6.14 per cent; fiber, 4.10 per cent; nitrogen-free extract, 59.30 per cent; water, 8.82 per cent; ash, 4.10 per cent.

Red Dog Middlings.—Average analysis: Protein, 17.72 per cent; fat, 5.15 per cent; fiber, 2.26 per cent; nitrogen-free extract, 62.52 per cent; water, 9.15 per cent; ash, 3.10 per cent.

It has been found by analysis that the products made from Winter wheat have a slightly different composition from the products made from Spring wheat. The most important difference being that the Spring wheat products contain more crude fiber than the Winter wheat products.

The following analyses are typical of these products:

ANALYSES OF WINTER AND SPRING WHEAT PRODUCTS.

	Protein.	Fat.	Fiber.	Nitrogen-free Extract.	Water.	Ash.
WINTER WHEAT—						
Bran	15.87	4.72	8.45	55.60	8.43	6.93
Standard Middlings	17.25	5.05	6.22	58.33	8.31	4.84
SPRING WHEAT—						
Bran	14.62	5.43	11.15	54.26	8.51	6.03
Standard Middlings	15.87	5.83	8.06	57.73	7.75	4.76

Shipstuff.—The term shipstuff should be applied only to mixtures of wheat products. It is generally applied to mixtures of bran and middlings and reground bran. It is frequently misused and applied to mixtures of wheat products and corn chops or corn bran, and sometimes to a mixture of wheat, corn and oat products. Such products should be branded Feed or Mixed Feed, and not Shipstuff.

The following analysis is the average of forty-three samples of pure wheat shipstuff: Protein, 15.98 per cent; fat, 4.87 per cent; fiber, 5.67 per cent; nitrogen-free extract, 60.03 per cent; water, 8.98 per cent; ash, 4.47 per cent.

RYE PRODUCTS.

The by-products from the milling of rye are very similar to those from wheat.

Bran.—Average analysis: Protein, 14.70 per cent; fat, 2.80 per cent; fiber, 3.50 per cent; nitrogen-free extract, 63.80 per cent; water, 11.60 per cent; ash, 3.60 per cent.

Middlings.—Average analysis: Protein, 15.90 per cent; fat, 4.00 per cent; fiber, 4.36 per cent; nitrogen-free extract, 60.81 per cent; water, 10.69 per cent; ash, 4.24 per cent.

CORN PRODUCTS.

Bran.—This is the outer coating of the corn grain. It has a low feeding value and is used to some extent as an adulterant in wheat products. Its chief use is in mixed feeds and corn chops. Average analysis: Protein, 9.00 per cent; fat, 5.80 per cent; fiber, 12.70 per cent; nitrogen-free extract, 62.20 per cent; water, 9.10 per cent; ash, 1.30 per cent.†

Corn Chops.—This product is quite variable in the ingredients of which it is composed, sometimes being composed of the entire grain and ground rather coarse, while in other cases it is composed of parts of the grain with the addition of reground bran and cob meal. The following analysis is the average of seven samples of corn products: Protein, 8.78 per cent; fat, 5.04 per cent; fiber, 5.22 per cent; nitrogen-free extract, 71.50 per cent; water, 7.68 per cent; ash, 1.78 per cent. Other names used for this class of products are Hominy Feed and Hominy Chops.

Corn and Cob Meal.—Corn, together with the cob which bears it, are frequently ground together to form what is known as corn and cob meal. In such cases the cobs are not considered an adulterant, provided the amount of cobs does not exceed that which would normally be present with the grain, *i. e.*, 14 pounds of cobs to 56 pounds of grain. Average analysis: Protein, 8.50 per cent; fat, 3.50 per cent; fiber, 6.60 per cent; nitrogen-free extract, 64.80 per cent; water, 15.10 per cent; ash, 1.50 per cent.†

Cracked Corn.—This is the whole grain coarsely crushed. On account of the coarseness this product is not very liable to adulteration, the only source of trouble being that it is sometimes made from low-grade or spoiled corn. Average analysis of seventeen samples: Protein, 8.94 per cent; fat, 4.06 per cent; fiber, 1.95 per cent; nitrogen-free extract, 74.04 per cent; water, 9.05 per cent; ash, 1.96 per cent.

Corncobs.—(See adulterants.)

OAT PRODUCTS.

Oats are usually used whole or crushed (rolled) as a feed. The by-products from the milling of oats are principally oat hulls, and are practically worthless as a feed.

Average analysis of whole oats: Protein, 11.80 per cent; fat, 5.00 per cent; fiber, 9.50 per cent; nitrogen-free extract, 59.70 per cent; water, 11.00 per cent; ash, 3.00 per cent.†

RICE PRODUCTS.

The by-products from the milling of rice consist of hulls, bran and polish.

Rice Hulls.—Rice hulls are the outer coating of the rice grain. They are composed principally of fibrous material, with a large

amount of mineral matter, and are worthless as a feed. The hulls are found to some extent in rice meal and bran, and when present in any considerable amount are considered as an adulterant. For analyses, see adulterants.

Rice Bran.—Rice bran is the thin coating of the grain lying next to the hull.

Average analysis: Protein, 12.10 per cent; fat, 8.80 per cent; fiber, 9.50 per cent; nitrogen-free extract, 49.90 per cent; water, 9.70 per cent; ash, 10.00 per cent.†

Rice Polish.—After the hulls and bran have been removed the rice grains are polished before being put on the market. This process removes the thin coating lying next to the rice grain. It is sold for feed under the name of rice polish.

Average analysis: Protein, 11.70 per cent; fat, 7.30 per cent; fiber, 6.30 per cent; nitrogen-free extract, 58.00 per cent; water, 10.00 per cent; ash, 6.70 per cent.†

Rice Meal.—Rice meal usually consists of a mixture of rice bran and polish, frequently with the addition of varying amounts of hulls.

Average analysis: Protein, 11.25 per cent; fat, 9.93 per cent; fiber, 10.29 per cent; nitrogen-free extract, 49.55 per cent; water, 8.83 per cent; ash, 10.15 per cent.†

DRIED BEET PULP.

Dried Beet Pulp is the by-product from the manufacture of sugar from sugar beets. After the sugar has been extracted from the ground beets the pulp remaining is dried and put on the market as a feed.

Average analysis: Protein, 9.50 per cent; fat, 1.03 per cent; fiber, 17.43 per cent; nitrogen-free extract, 59.52 per cent; water, 8.95 per cent; ash, 3.57 per cent.

MOLASSES FEEDS.

Molasses feeds consist principally of mill by-products mixed with molasses. These feeds vary a great deal in the ingredients of which they are composed, many of them being composed of nutritious ingredients and of good quality, while others contain only low-grade materials the identity of which is covered up by molasses. The ingredients found in the feeds examined are as follows: Mill screenings (frequently containing considerable amount of weed seed), wheat middlings, malt sprouts, corn meal, oat hulls, cotton-seed meal, dried brewers' grains, barley, barley hulls, cracked corn, dried distillers' grains, rice hulls, and a few have a small amount of salt added to them.

Molasses is a carbohydrate, and when properly mixed with materials which contain protein and fat makes a very satisfactory feed. The only danger in buying this class of goods is that some manufacturers use the molasses to cover up worthless adulterants in the feeds.

Mill screenings have been found to compose a large part of some of these feeds. This introduces into the feed a large quantity of weed seeds. Experiments at several Stations have shown that in many cases weed seeds when fed to animals are not affected by the digestive process, and hence a large amount viable weed seeds are left in the manure. When feeds contain considerable amounts of weed seeds the purchaser is not only paying for worthless materials, but is introducing weeds on his land. Oat hulls, barley hulls and rice hulls, all of which are practically worthless as feeds, have been found in considerable quantities in some of these feeds. Two contained a small amount of salt. This is not objectionable when it is used in small amount and so stated on the package.

From the tabulated analyses it will be seen that there are several brands of molasses feeds on the market which are of good quality, and it will also be seen that there are several brands in which the molasses is used merely as a cover for low-grade materials and adulterants. As this is the case, the purchaser should buy these feeds strictly on the basis of the analysis and ingredients of which they are composed.

ALFALFA FEEDS.[1]

The rapid growth of the industry of grinding alfalfa hay into meal has recently put on the market a large number of mixed feeds in which alfalfa is the principal ingredient. Various materials are mixed with the meal to increase the percentage of fat and make them more nearly balanced feeds. The materials which have been found in the brands on the markets are as follows: Cracked corn, oats, oat hulls, cotton-seed meal, linseed meal, corn meal, dried brewers' grains, wheat bran and middlings. As will be seen from the analysis, these feeds are composed of nutritious ingredients, and in only a few cases have low-grade materials been introduced into them.

COTTON-SEED MEAL FEEDS.

Cotton-seed meal is mixed with varying amounts of hulls and sold for feeding purposes under a trade name or as cotton-seed meal feed. Low-grade meal, or meal which does not come up to the standard of 6.18 per cent nitrogen, is also sold largely for feed. In such cases it should be branded as a feed and have a feed guarantee in place of nitrogen guarantee.

[1] For a fuller discussion of Alfalfa Feeds, see Circular No. 1 of the Division of Chemistry, by G. M. MacNider.

LINSEED MEAL.

Linseed meal or oil meal is the residue from the extraction of oil from flaxseed. The oil is extracted by two processes, known as the old process and the new process. In the old process the oil is extracted by pressure and in the new process a solvent is used. On account of the extraction being more complete when a solvent is used, the old process meal is richer in fat, while the new process meal is slightly higher in protein.

Average analyses: Old Process Meal—Protein, 32.90 per cent; fat, 7.90 per cent; fiber, 8.90 per cent; nitrogen-free extract, 35.40 per cent; water, 9.20 per cent; ash, 5.70 per cent.†

New Process Meal—Protein, 32.20 per cent; fat, 3.00 per cent; fiber, 9.50 per cent; nitrogen-free extract, 38.40 per cent; water, 10.10 per cent; ash, 5.80 per cent.†

PEANUT MEAL.

Peanut meal is the ground cake resulting from the extraction of oil from peanuts. This makes a very rich feed. Frequently considerable quantities of peanut hulls are ground with cake. This lowers the value of the meal considerably, as the hulls are practically worthless as a feed. Average analysis: Protein, 47.60 per cent; fat, 8.00 per cent; fiber, 5.10 per cent; nitrogen-free extract, 23.70 per cent; water, 10.70 per cent; ash, 4.90 per cent.†

BREWERY AND DISTILLERY BY-PRODUCTS.

Dried Brewers' Grains.—Dried brewers' grains are dried barley grains after they have undergone the process of malting, by which the soluble dextrin and sugar are extracted. Average analysis: Protein, 19.90 per cent; fat, 5.60 per cent; fiber, 11.00 per cent; nitrogen-free extract, 51.70 per cent; water, 8.20 per cent; ash, 3.60 per cent.†

Malt Sprouts.—The small radicles which germinate from the barley in the process of malting are known as malt sprouts. Average analysis: Protein, 23.20 per cent; fat, 1.70 per cent; fiber, 10.70 per cent; nitrogen-free extract, 48.50 per cent; water, 10.20 per cent; ash, 5.70 per cent.†

Dried Distillers' Grains.—Distillers' grains are a by-product from the manufacture of whiskey and alcohol.

In the feeds on sale in the State this year the above three products have been found only as ingredients in mixed feeds.

SPECIAL MIXED FEEDS.

In this class are grouped mixtures of two or more products which are sold under a trade name. These usually consist of wheat and corn products, in a few instances with the addition of cotton-seed meal or linseed meal.

POULTRY FEEDS.

Several brands of poultry and chick feeds were found on the markets. The ingredients of which they are composed are cracked corn, whole oats, barley, sorghum seed, peas, wheat, buckwheat, millet, sunflower seed, and in some brands ground limestone.

The chick feeds are usually composed of the same ingredients, which have been partially ground.

As these feeds are composed entirely of whole and cracked grains, the purchaser should pay especial attention to the ingredients of which they are composed.

MISCELLANEOUS MIXED FEEDS.

In this class are grouped feeds which are sold under the name Mixed Feed, Mill Feed and Feed. These are usually mixtures of wheat products, wheat and corn products and cotton-seed meal.

ADULTERANTS.

The following materials when mixed with feeds without sufficient labeling to indicate their presence are considered adulterants: Corn bran, rice hulls, ground corncobs, peanut hulls, peanut middlings, oat hulls, oat dust, mill sweepings, screenings, cotton-seed hulls, and similar products.

The following table of analyses shows the composition of these materials:

ANALYSES OF FEED ADULTERANTS.

	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Water.	Ash.
Corn Bran	9.00	5.80	12.70	62.20	9.10	†1.30
Rice Hulls	3.60	0.70	35.70	38.60	8.20	†13.20
Corncobs	2.40	0.50	30.10	54.90	10.70	†1.40
Peanut Hulls	4.56	0.81	67.31	----------	----------	2.17
Peanut Middlings	8.75	0.88	40.75	----------	----------	16.75
Oat Hulls	3.30	1.00	29.70	52.10	7.30	†6.70
Oat Dust	13.50	4.80	18.20	50.20	6.50	†6.90
Wheat Screenings	12.50	3.00	4.90	65.10	11.60	†2.90
Cotton-seed Hulls, with lint	3.25	1.12	46.92	40.11	6.05	2.55
Cotton-seed Hulls, delinted	2.40	0.31	36.49	50.22	8.20	2.38

ANALYSES OF SAMPLES OF FEEDS, SEASON 1909.

On the following pages will be found the results of the chemical and microscopic analyses of samples of stock feeds collected by the inspectors of the Department, and those sent in by individuals, dealers and manufacturers. A study of these tabulated results will show which brands are pure and come up to the manufacturer's guarantee.

ANALYSES OF WHEAT

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3151	Bran	Concord Milling Co., Concord, N. C.	H. M. Blackwelder, Concord.	Feb. 9, '09	100
3318	---do	Statesville Flour Mill Co., Statesville, N. C.			
2928	Wheat Bran	White Star Mills, Staunton, Va.	Pate & Co., Goldsboro	Nov. 23, '08	100
2937	Bran	Cumberland Mills, Nashville, Tenn.	D. L. Gore & Co., Wilmington	Nov. 28, '08	100
3315	Bran and Screenings	J. W. Sloan, China Grove, N. C.			
3100	Bran	Wachovia Mills, Winston, N. C.	Sampled at mill	Jan. 16, '09	
3155	---do	Henderson Roller Mill Co., Monroe, N. C.	F. B. Ashcraft, Monroe	Feb. 10, '09	100
3217	---do	Holt-Granite Co., Haw River, N. C.	Crowder & Rand, Raleigh	Mar. 25, '09	80
3096	Mixed Bran	Forsyth Roller Mills, Winston, N. C.	Sampled at mill	Jan. 15, '09	
3093	---do	---do	Farmers' Stock Co., Winston.	Jan. 15, '09	100
3068	Bran	J. H. Walker & Co., Reidsville, N. C.	Sampled at mill	Jan. 21, '09	
3006	---do	Mountain City Mill Co., Chattanooga, Tenn.	Burrus & Gray Co., New Bern.	Dec. 15, '08	100
2940	---do	Liberty Mills, Nashville, Tenn.	J. Taylor, Wilmington	Nov. 28, '08	100
3080	---do	Efland Milling Co., Efland, N. C.	I. A. Burnett & Son, Durham.	Jan. 13, '09	
3055	---do	---do			
3076	---do	J. D. Manor & Co., Newmarket, Va.	Eureka Grocery Co., Durham.	Jan. 13, '09	100
3179	Wheat and Screenings Bran.	---do			
3074	Bran	---do	Perry, Wood & Co., Durham.	Jan. 13, '09	100
3159	---do	Southern Mills, Nashville, Tenn.	Sanford Supply Co., Sanford.	Feb. 13, '09	
3261	---do	---do	L. H. Adams, Raleigh	May 12, '09	100
3072	Mixed Bran Feed	Alfalfa Feed Mills, Nashville, Tenn.	J. R. Maxwell & Co., Reidsville.	Jan. 21, '09	100
3287	---do	---do	J. H. Walker & Co., Reidsville.	May 26, '09	100
3297	Pure Wheat Bran	Carrolina Roller Mills, Durham, N. C.	J. R. Ferrall, Raleigh	June 22, '09	100
3127	Bran	Asheville Milling Co., Asheville, N. C.	Bristol & Harbison, Morganton.	Jan. 27, '09	80
3126	---do	---do	P. F. Newton & Co., Morganton.	Jan. 27, '09	80
2936	---do	Acme Mills and Elevator Co., Hopkinsville, Ky.	B. F. Mitchell & Co., Wilmington.	Nov. 28, '08	100
3227	Pure Wheat Bran	---do	B. F. Mitchell & Co., Wilmington.	April 12, '09	100
3226	---do	---do	Hood Bros. & Co., Southport.	April 10, '09	100
2986	Bran	Ballard & Ballard Co., Louisville, Ky.	F. V. Johnston, Greenville.	Dec. 22, '08	
3309	---do	---do	McLaurin & Shaw, Laurinburg.	July 16, '09	
3262	Coarse Wheat Bran	Washburn-Crosby Co., Minneapolis, Minn.	L. H. Adams, Raleigh	May 12, '09	100
3172	---do	---do			
3206	Wheat Bran	Washburn-Crosby Co., Louisville, Ky.			
2974	---do	Dunlop Mills, Richmond, Va.	Edwards & Pegram, Kinston.	Dec. 14, '08	100
3002	---do	---do	C. B. Hill, New Bern	Dec. 14, '08	100

BRAN AND MIXED BRANS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3151	15.00	4.00	7.00	-----	16.12	4.52	7.25	55.74	9.95	6.42	Wheat bran.
3318	-----	-----	-----	-----	15.12	4.68	8.31	53.79	11.05	7.05	do.
2928	14.50	4.00	9.50	-----	15.87	4.70	10.12	54.13	7.68	7.50	do.
2937	14.50	4.00	9.50	-----	15.12	3.92	8.15	59.98	6.83	6.00	do.
3315	-----	-----	-----	-----	14.50	4.13	5.50	56.90	14.08	4.89	Wheat product.
3100	14.00	4.00	11.00	-----	14.62	4.17	8.75	58.59	6.73	7.14	Wheat bran and corn bran.
3155	14.75	4.00	9.00	-----	15.12	4.86	8.62	54.45	9.84	7.11	Wheat bran.
3217	14.50	3.00	8.00	-----	14.50	4.57	6.12	57.96	9.90	6.95	do.
3096	14.00	4.00	11.00	-----	14.62	4.49	8.92	57.73	7.33	6.91	Wheat bran and corn bran.
3093	14.00	4.00	11.00	-----	15.12	4.92	9.02	55.84	7.71	7.39	Wheat product.
3068	16.37	4.48	3.82	-----	15.00	4.55	8.22	57.21	8.41	6.61	Wheat bran.
3006	14.50	4.00	9.50	-----	14.62	4.06	8.50	56.92	9.49	6.41	Wheat product.
2940	14.50	4.00	9.50	-----	15.37	3.86	8.08	60.28	6.71	5.70	do.
3080	-----	-----	-----	-----	15.12	4.99	7.95	57.72	8.19	6.03	Wheat bran.
3055	-----	-----	-----	-----	14.50	5.06	8.80	-----	-----	-----	do.
3076	14.75	4.00	9.50	-----	14.75	4.57	9.27	56.15	7.71	7.55	do.
3179	-----	-----	-----	-----	14.12	3.95	9.51	59.78	7.78	4.86	Wheat product and oat hulls.
3074	14.75	4.20	8.53	-----	14.87	4.75	9.73	54.47	8.36	7.82	Wheat bran.
3159	14.50	4.00	9.50	-----	15.12	4.13	8.20	57.14	8.43	6.98	do.
3261	14.50	4.00	9.50	-----	15.12	4.44	8.32	51.00	13.89	7.23	do.
3072	10.25	3.00	-----	-----	11.25	3.38	9.30	63.55	7.64	4.88	Wheat bran and cob meal.
3287	10.25	3.00	13.50	55.00	10.50	3.75	15.93	53.01	11.58	5.23	do.
3297	17.00	4.00	8.25	-----	15.39	4.78	6.20	53.88	13.04	6.71	Wheat bran.
3127	11.30	3.00	9.50	-----	16.00	4.20	8.00	57.16	8.54	6.10	do.
3126	14.50	4.00	9.50	-----	16.14	4.30	8.62	55.84	8.79	6.31	Wheat bran and small amount corn bran.
2936	16.09	4.68	7.49	-----	15.75	4.35	6.11	62.59	6.62	4.58	Wheat bran.
3227	16.09	4.68	7.49	53.58	16.50	4.77	5.77	57.87	9.40	5.69	do.
3226	16.09	4.68	7.49	53.58	15.25	4.77	5.45	58.12	10.60	5.81	do.
2986	14.44	4.10	9.00	-----	14.12	4.28	8.80	55.68	10.06	7.06	do.
3309	15.78	4.42	8.04	-----	14.37	3.76	7.34	52.32	15.33	6.88	do.
3262	14.00	4.00	11.00	-----	14.50	5.50	9.35	52.73	10.82	7.10	do.
3172	-----	-----	-----	-----	14.62	5.43	11.15	54.26	8.51	6.03	Wheat bran (spring wheat).
3206	-----	-----	-----	-----	15.87	4.72	8.45	55.60	8.43	6.93	Wheat bran (winter wheat).
2974	14.50	4.00	9.50	-----	14.37	4.09	8.38	56.61	10.50	6.05	Wheat bran.
3002	14.50	4.00	9.50	-----	14.75	4.20	8.82	56.78	8.56	6.89	do.

ANALYSES OF WHEAT BRAN

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3003	Wheat Bran	Dunlop Mills, Richmond, Va.	New Bern Fruit Co., New Bern.	Dec. 14, '08	100
3049	---do	---do	H. H. Patterson, Chapel Hill.	Jan. 11, '09	100
3040	Bran	Dan Valley Mills, Danville, Va.	Hobgood & Montague, Oxford.	Jan. 9, '09	100
3036	---do	---do	Geo. A. Rose Co., Henderson.	Jan. 8, '09	100
2976	---do	---do	Wells Grocery Co., Wilson	Dec. 26, '08	100
2951	---do	---do	J. W. Isler & Co., Goldsboro.	Nov. 23, '08	100
3029	---do	Piedmont Mills, Lynchburg, Va.	Seaboard Feed and Produce Co., Henderson.	Jan. 8, '09	100
2977	---do	---do	Wilson Grocery Co., Wilson.	Dec. 26, '08	100
2957	---do	---do	J. W. Brooks, Wilmington	Nov. 28, '08	100
2956	---do	---do	W. B. Cooper, Wilmington.	Nov. 28, '08	100
2997	---do	J. Allen Smith & Co., Knoxville, Tenn.	City Hay and Grain Co., Elizabeth City.	Dec. 19, '08	100
2961	---do	---do	A. E. Rankin & Co., Fayetteville.	Nov. 4, '08	100
3334	Wheat Bran	Crews & Nunn, Walkertown, N. C.			
3338	Bran	Jefferson Milling Co., Charlestown, W. Va.			
3305	---do	South River Milling Co., Salisbury, N. C.			
3283	Seal of Minnesota Bran	New Prague Flouring Mill Co., New Prague, Minn.	L. L. Lunsford, Roxboro	May 22, '09	100
3267	Wheat Bran	Bonner Roller Mills, Lincolnton, N. C.			
3143	---do	Waynesville Milling Co., Waynesville, N. C.	Sampled at mill	Feb. 1, '09	80
3142	Wheat and Corn Bran	Clyde Roller Mills, Clyde, N. C.	Feed and Lumber Co., Waynesville.	Feb. 1, '09	80
3139	Wheat Bran	Tennessee Mill Co., Estill Springs, Tenn.	J. G. Hyder, Hendersonville.	Jan. 28, '09	75
3131	Bran	Read Bros., Morristown, Tenn.	Farney & Co., Morganton	Jan. 27, '09	80
3121	---do	Hickory Milling Co., Hickory, N. C.	Whitener & Morton, Hickory.	Jan. 25, '09	100
3112	---do	Harrisonburg Milling Co, Harrisonburg, Va.	Brockett & Son Co., High Point.	Jan. 21, '09	100
3105	---do	High Point Milling Co., High Point, N. C.	Sampled at mill		
3067	---do	Milton Milling Co., Milton, N. C.	Harris & Hubbard, Reidsville.	Jan. 21, '09	
3053	Old Dominion Wheat Bran.	Front Royal Milling Co., Front Royal, Va.	A. G. Bowman, Mt. Airy	Jan. 20, '09	100
3014	Bran	The Garland Milling Co., Greensburg, Ind.	F. G. Paul & Bro., Washington.	Dec. 17, '08	
3012	Wheat Bran	Stuart's Draft Milling Co., Stuart's Draft, Va.	Hooker, Churchill & Co., Kinston.	Dec. 14, '08	100
2994	Bran	J. Havens, Washington, N. C.	J. Havens, Washington	Dec. 17, '08	

Sixty-four samples of Wheat Bran and Mixed Brans were analyzed. Seventeen are below the guarantee in protein; nine are below the guarantee in fat and eleven are above the guarantee in fiber. Fifty-two of these are pure wheat

AND MIXED BRANS—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25)	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3003	14.50	4.00	9.50	-----	14.75	4.06	8.38	57.58	8.61	6.62	Wheat bran.
3049	14.50	4.00	9.50	-----	15.12	4.65	8.20	57.18	8.09	6.76	do.
3040	14.50	4.00	9.50	-----	14.12	4.68	9.25	54.05	9.72	8.18	do.
3036	14.50	4.00	9.50	-----	14.12	4.67	9.50	55.56	8.95	7.20	do.
2976	14.00	4.00	9.50	-----	14.50	4.41	9.25	55.51	8.60	7.73	do.
2951	14.50	4.00	8.50	-----	15.00	4.63	9.35	56.52	7.39	7.11	do.
3029	14.50	4.00	9.50	-----	15.12	4.55	10.05	56.37	6.75	7.16	do.
2977	14.50	4.00	8.50	-----	14.12	4.03	9.42	57.84	8.10	6.49	do.
2957	14.50	4.00	9.50	-----	14.25	4.24	9.25	56.46	8.67	7.13	do.
2956	14.50	4.00	9.50	-----	14.12	4.42	9.07	58.79	6.98	6.62	do.
2997	14.50	4.50	9.50	-----	15.00	4.13	9.35	55.54	9.10	6.88	do.
2961	14.50	4.50	9.50	-----	14.12	4.65	9.92	54.45	7.89	8.97	do.
3334	-----	-----	-----	-----	16.50	4.98	5.95	54.88	12.31	5.38	do.
3338	-----	-----	-----	-----	14.50	4.28	7.55	53.91	12.64	7.12	do.
3305	-----	-----	-----	-----	16.87	4.48	6.47	57.86	8.84	5.48	do.
3283	13.00	4.00	13.00	-----	14.75	6.12	8.95	50.74	12.47	6.97	do.
3267	-----	-----	-----	-----	15.25	4.13	8.97	52.70	12.54	6.41	do.
3143	13.00	3.50	8.00	-----	15.25	4.89	7.44	57.58	8.57	6.27	do.
3142	12.50	4.00	7.00	-----	12.50	4.34	8.72	60.02	9.39	5.03	Wheat and corn bran.
3139	14.50	5.00	9.50	-----	15.40	4.43	7.55	56.36	10.05	6.21	Wheat bran.
3131	18.00	3.50	8.00	-----	15.37	4.40	9.62	55.07	8.63	6.91	do.
3121	14.50	4.00	9.50	-----	13.37	4.28	9.65	59.09	6.60	7.01	Wheat bran and corn bran.
3112	17.25	4.61	10.70	-----	15.00	4.55	7.41	56.38	9.25	7.41	Wheat bran.
3105	15.10	5.18	11.39	-----	15.00	4.20	8.27	57.29	8.91	6.33	do.
3067	-----	-----	-----	-----	14.87	4.65	9.12	55.14	8.86	7.36	do.
3053	14.00	3.80	10.00	-----	14.50	4.27	9.67	58.66	8.96	3.94	Wheat bran and small amount corn bran.
3014	14.10	3.70	-----	-----	15.87	3.93	8.61	58.44	7.33	5.82	Wheat bran.
3012	16.00	4.00	-----	-----	14.87	4.68	8.82	58.02	6.90	6.71	do.
2994	14.50	4.00	9.50	-----	14.50	4.02	8.47	56.19	10.11	6.71	do.

bran; six are mixtures of wheat and corn bran; four are mixed products and two are wheat bran adulterated with corncobs.

ANALYSES OF MID

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3266	Standard Middlings	Washburn-Crosby Co., Minneapolis, Minn.	Peebles Bros., Raleigh	May 12, '09	100
3173	do	do			
3207	do	Washburn-Crosby Co., Louisville, Ky.			
3038	Ben Hur Middlings	Hennepin Mill Co., Minneapolis, Minn.	H. Thomasen, Henderson	Jan. 8, '09	100
3022	Middlings	Washburn-Crosby Co., Minneapolis, Minn.	D. Lichenstein & Co., Tarboro.	Dec. 23, '08	
2973	do	do	Edwards & Pegram, Kinston.	Dec. 14, '08	100
2964	do	do	Carolina Grocery Co., Fayetteville.	Dec. 5, '08	100
2965	Shorts	Washburn-Crosby Co., Louisville, Ky.	W. C. Chenk, Fayetteville	Dec. 4, '08	
2966	Wheat Shorts	do	B. F. Mitchell & Co., Wilmington.	Nov. 28, '08	100
2967	Middlings	Washburn-Crosby Co., Minneapolis, Minn.	Caldwell & Carlyle, Lumberton.	Dec. 2, '08	100
3175	Red Dog Adrian	do			
3298	Flour Middlings	do	Hunter & Dunn, Raleigh	June 22, '09	100
3174	do	do			
3264	Pure Wheat Shorts	Southern Mills, Nashville, Tenn.	J. T. Edwards & Son, Raleigh.	May 12, '09	100
3341	do	do	Pool & Hobby, Raleigh	Aug. 13, '09	100
3342	do	do	Hunter & Dunn, Raleigh	Aug. 19, '09	100
3343	do	do	Carpenter Bros., Durham	Sept. 16, '09	100
2978	Daisy Middlings	Pillsbury Mills, Minneapolis.	Hales & Edwards, Rocky Mount.	Dec. 28, '08	100
3060	do	do	W. E. Jackson & Co., Mt. Airy.	Jan. 20, '09	100
3063	do	do	C. L. Marshall, Mt. Airy	Jan. 20, '09	100
2979	Middlings	do	Matthews, Weeks & Co., Rocky Mount.	Dec. 28, '08	
3061	do	do	W. E. Jackson & Co., Mt. Airy.	Jan. 24, '09	100
3257	do	do	P. A. Reaves, Louisburg	May 10, '09	100
3326	B. Middlings	do	W. W. Upchurch & Co., Raleigh.	July 15, '09	100
3085	Red Dog Middlings	Eagle Roller Mills, New Ulm, Minn.	R. G. Hiatt, Greensboro	Dec. 14, '08	100
3088	do	do	The Patterson Co., Greensboro.	Jan. 14, '09	100
3273	Superb Red Dog Wheat Feed.	do	do	Apr. 7, '09	100
2941	Middlings	The Dunlop Milling Co., Clarksville, Tenn.	Armfield Co., Fayetteville	Dec. 5, '08	80
3023	do	do	Hales & Edwards, Rocky Mount.	Dec. 28, '08	100
3084	do	do	Elmore-Maxwell Co., Greensboro.	Jan. 14, '09	100
2938	do	Northwestern Consolidated Milling Co., Minneapolis, Minn.	K. M. Briggs, Lumberton	Dec. 2, '08	100
2975	Red Dog Middlings	do	Matthews, Weeks & Co., Rocky Mount.	Dec. 28, '08	100
3089	Comet Middlings	do	Norman, Moir, Dalton & Co., Winston.	Jan. 15, '09	100
3091	Flour Middlings	do	do	Jan. 15, '09	100

DLINGS OR SHORTS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3266	15.00	4.00	8.00	-----	16.50	6.03	7.57	53.13	11.58	5.19	Wheat middlings.
3173	-----	-----	-----	-----	15.87	5.83	8.06	57.73	7.75	4.76	Wheat middlings (spring wheat).
3207	-----	-----	-----	-----	17.25	5.05	6.22	58.33	8.31	4.84	Wheat middlings (winter wheat).
3038	15.00	4.00	9.00	-----	17.62	5.79	7.07	55.85	9.27	4.40	Wheat middlings.
3022	15.00	4.00	-----	-----	16.37	4.83	7.07	58.11	8.84	4.78	do.
2973	15.00	4.00	9.00	-----	15.36	5.52	7.03	58.45	9.07	4.57	do.
2964	15.00	4.00	9.00	-----	17.00	5.64	6.86	57.33	7.97	5.20	do.
2965	14.00	4.00	6.50	-----	15.50	4.20	6.37	60.78	7.43	5.72	do.
2966	14.00	4.00	6.50	-----	15.75	4.45	6.12	60.51	7.82	5.35	do.
2967	15.00	4.00	9.00	-----	16.75	5.47	6.87	57.41	7.84	5.66	do.
3175	-----	-----	-----	-----	17.25	5.07	2.74	63.78	8.30	2.86	Wheat product (spring wheat).
3298	17.00	5.00	6.00	-----	18.50	6.52	3.30	56.78	10.78	4.12	Wheat product.
3174	-----	-----	-----	-----	17.50	6.09	4.46	59.86	7.91	4.18	Wheat product (spring wheat).
3264	16.00	4.00	6.00	-----	16.62	4.79	4.10	59.06	11.21	4.22	Wheat product.
3341	16.00	4.00	6.00	-----	17.62	5.14	4.43	56.11	11.97	4.73	Wheat middlings and small amount of screenings.
3342	16.00	4.00	6.00	-----	15.75	5.06	5.48	58.71	10.48	4.52	do.
3343	16.00	4.00	6.00	-----	14.62	5.00	4.95	57.11	10.49	7.83	do.
2978	16.00	4.50	4.00	-----	18.25	4.97	5.53	59.80	8.74	2.71	Wheat product.
3060	16.00	4.50	4.50	-----	16.75	4.81	2.22	64.42	8.53	3.27	do.
3063	16.00	4.50	4.00	-----	17.12	4.64	2.11	66.10	7.12	2.91	do.
2979	14.50	4.50	8.00	-----	16.12	5.40	7.60	57.09	8.75	5.04	do.
3061	14.50	4.50	8.00	-----	16.25	5.59	7.65	56.87	8.20	5.44	do.
3257	15.00	4.50	9.00	-----	14.00	6.23	9.77	55.51	9.38	5.11	do.
3326	15.00	4.50	8.00	-----	17.00	6.63	6.63	54.96	9.88	4.90	do.
3085	16.50	4.50	3.90	-----	17.37	5.17	2.62	63.09	8.40	3.35	do.
3088	15.50	4.90	9.60	-----	16.37	5.34	8.05	56.30	8.61	5.33	do.
3273	16.00	4.00	3.00	-----	18.00	5.07	1.70	61.57	10.31	3.35	do.
2941	16.04	4.17	4.58	-----	17.62	4.96	5.80	60.76	7.03	3.83	do.
3023	16.04	4.17	4.58	-----	17.00	5.11	6.00	58.64	8.95	4.30	do.
3084	16.04	4.17	4.58	-----	16.11	4.92	5.35	60.24	8.68	4.70	do.
2938	15.75	5.75	10.00	-----	16.12	5.56	8.20	58.57	6.73	4.82	do.
2975	18.25	5.26	2.50	-----	17.75	4.98	1.95	64.71	8.01	2.60	do.
3089	15.25	6.25	2.50	-----	18.00	5.71	2.67	61.78	8.34	3.50	do.
3091	15.25	6.25	2.50	-----	16.62	5.83	4.55	61.19	7.79	4.02	do

ANALYSES OF MIDDLINGS

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2980	White Middlings	C. A. Gambrill Mfg. Co., Baltimore, Md.	Hadley, Harris & Co., Wilson.	Dec. 26, '08	80
2981	Wheat White Middlings	----do	Wells Grocery Co., Wilson	Dec. 26, '08	100
3245	Pure White Middlings	----do	Matthews, Weeks & Co., Rocky Mount.	May 3, '09	80
2931	Middlings	Star and Crescent Milling Co., Chicago, Ill.	Crump & Floyd, Lumberton.	Dec. 2, '08	100
3286	Red Dog Middlings	----do	Pass & Moore, Roxboro	May 22, '09	100
3328	Pure Wheat Shorts	Tennessee Mill Co., Estill Springs, Tenn.	Kiser & Manney, King's Mountain.	Aug. 4, '09	75
2935	Middlings	Berger-Crittenden Milling Co., Milwaukee, Wis.	W. H. Powell, Fayetteville	Dec. 4, '08	----
2934	----do	----do	Adams Grain and Provision Co., Fayetteville.	Dec. 4, '08	----
3095	----do	Gambill & Davis, Roanoke, Va.	P. R. Lamb & Co., Winston.	Jan. 15, '09	100
3138	Pure Wheat Shorts	Eagle Flouring Mill Co., Sweetwater, Tenn.	S. A. Privett, Hendersonville.	Jan. 28, '09	80
3144	Shorts	Waynesville Milling Co., Waynesville, N. C.	Sampled at mill	Feb. 1, '09	----
3155	Middlings	The Riverton Mills Co., Riverton, Va.	F. B. Ashcraft, Monroe	Feb. 10, '09	100
3222	Pure Wheat Shorts	Nashville Roller Mills, Nashville, Tenn.	J. H. McDuffie, Laurinburg.	Apr. 8, '09	100
3339	Middlings	Jefferson Milling Co., Charlestown, W. Va.	----	----	----
3335	Wheat Shorts	Crews & Nunn, Walkertown, N. C.	----	----	----
3324	Middlings	Walnut Cove Roller Mills, Walnut Cove, N. C.	----	----	----
3303	Shorts	South River Milling Co., Salisbury, N. C.	----	----	----
3163	Middlings	Efland Milling Co., Efland, N. C.	----	----	----
3130	Shorts	Read Bros., Morristown, Tenn.	Farney & Co., Morganton	Jan. 27, '09	80
3129	Wheat Shorts	Glen Alpine Milling Co., Glen Alpine, N. C.	Green & Kincaid, Morganton.	Jan. 27, '09	80
3128	Mixed Middlings	Asheville Milling Co., Asheville, N. C.	Bristol & Harbison, Morganton.	Jan. 27, '09	80
3122	Shorts	Hickory Milling Co., Hickory, N. C.	City Feed Store, Hickory	Jan. 25, '09	100
3103	----do	Tri-State Milling Co., Nashville, Tenn.	W. H. Turner, Winston	Jan. 16, '09	100
3090	Middlings	The Hunter Bros. Milling Co., St. Louis, Mo.	Norman, Moir, Dalton Co., Winston.	Jan. 15, '09	100
3079	Shorts	Holt-Granite Mfg. Co., Haw River, N. C.	Markham, Stevens & Co., Durham	Jan. 13, '09	----
3077	Brown Shorts	Atlanta Milling Co., Atlanta, Ga.	----do	Jan. 13, '09	----
3071	Wheat Middlings	Andrew Bowling, Staunton, Va.	J. H. Walker & Co., Reidsville.	Jan. 21, '09	100
3065	Middlings	Front Royal Milling Co., Front Royal, Va.	A. G. Bowman, Mt. Airy	Jan. 20, '09	----
3059	Shorts	Liberty Mills, Nashville, Tenn.	Blair & Co., North Wilkesboro.	Jan. 19, '09	100
3011	----do	Stuarts Draft Milling Co., Stuarts Draft, Va.	Hooker, Churchill & Co., Kinston.	Dec. 14, '08	100
2932	Wheat Shorts	Star Mills, Nashville, Tenn.	R. E. Lee, Laurinburg.	Dec. 3, '08	100

Sixty-five samples of Middlings or Shorts were analyzed. Eight are below the guarantee in protein, seven are below in fat and fifteen are above the guarantee in fiber.

OR SHORTS—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2980	16.85	4.40	3.00	-----	17.50	5.30	3.22	60.96	9.96	3.06	Wheat product.
2981	16.85	4.40	3.00	-----	17.00	5.05	3.89	61.93	9.04	3.09	do.
3245	16.85	4.40	3.00	-----	16.37	4.67	2.45	63.71	9.42	3.38	do.
2931	14.16	3.55	8.18	-----	16.87	5.18	8.50	56.95	7.53	4.97	do.
3286	14.50	4.50	4.50	-----	18.25	5.50	2.32	59.85	10.74	3.34	do.
3328	16.00	4.00	6.00	-----	16.62	5.49	4.50	59.11	10.11	4.17	do.
2935	16.50	4.50	-----	-----	19.00	4.58	7.27	55.38	8.35	5.42	do.
2934	16.50	4.50	-----	-----	17.62	4.96	7.55	55.45	9.17	5.25	do.
3095	15.00	4.00	6.00	-----	16.87	5.06	3.43	62.59	8.22	3.83	do.
3138	16.50	5.75	5.50	-----	17.25	6.00	5.20	57.90	9.80	3.85	do.
3144	15.00	4.00	6.00	-----	15.00	5.75	6.32	58.74	9.37	4.82	do.
3155	16.35	3.96	4.42	-----	14.37	3.70	4.67	64.80	9.35	3.11	do.
3222	15.00	4.00	6.00	56.97	15.75	5.31	2.82	61.74	10.77	3.61	do.
3339	-----	-----	-----	-----	17.75	5.69	5.05	56.05	10.96	4.50	do.
3335	-----	-----	-----	-----	13.75	3.17	1.32	67.88	12.13	1.75	do.
3324	-----	-----	-----	-----	15.00	3.45	1.90	69.31	8.27	2.07	do.
3303	-----	-----	-----	-----	17.00	5.03	2.82	61.75	10.55	2.85	do.
3163	-----	-----	-----	-----	16.12	4.36	5.02	62.34	8.79	3.37	do.
3130	16.50	6.00	6.00	-----	17.25	4.76	4.65	60.19	9.60	3.55	do.
3129	16.00	5.00	6.00	-----	18.52	5.82	5.22	57.61	8.92	3.91	do.
3128	14.00	3.00	4.00	-----	14.00	3.62	4.42	62.52	12.12	3.32	do.
3122	15.00	4.00	6.00	-----	15.12	4.79	6.02	62.24	7.60	4.23	do.
3103	16.01	9.44	-----	-----	16.62	5.42	4.26	60.69	9.75	3.26	do.
3090	16.00	4.00	-----	-----	19.12	4.82	4.68	59.21	7.60	4.57	do.
3079	16.00	2.50	3.00	-----	15.25	4.03	3.10	65.55	9.27	2.80	do.
3077	15.00	4.00	6.00	-----	14.87	3.91	5.70	62.24	8.52	4.76	do.
3071	15.00	4.00	6.00	-----	15.77	4.85	3.75	64.65	8.13	2.85	do.
3065	14.00	4.00	7.00	-----	16.62	4.25	3.44	64.78	7.94	2.97	do.
3059	16.00	4.00	8.00	-----	16.75	4.14	5.72	60.38	7.93	5.08	do.
3011	15.00	4.00	6.00	-----	15.87	5.02	7.80	58.83	6.70	5.78	do.
2932	16.00	4.00	6.00	-----	18.50	5.61	6.36	55.94	8.23	5.36	do.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3148	Bran and Shorts	J. Lee Koiner, Richmond, Va.	F. D. Barkley & Co., Gastonia.	Feb. 8, '09	----
3146	---do	---do	Irwin-Graham Co., Charlotte.	Feb. 5, '09	80
3125	---do	Lenoir Milling Co., Lenoir, N. C.	Sampled at mill	----	80
3123	---do	Home Milling Co., Lenoir, N. C.	---do	----	----
3116	---do	Salisbury Milling Co., Salisbury, N. C.	Overman & Co., Salisbury	Jan. 22, '09	----
3110	---do	The Dunlop Milling Co., Clarksville, Tenn.	Parker & Johnson, High Point.	Jan. 21, '09	100
3322	---do	D. B. Tuttle, Lenoir, N. C.	----	----	----
3314	---do	J. W. Sloan, China Grove, N. C.	----	----	----
3307	---do	South River Milling Co., Salisbury, N. C.	----	----	----
3214	Meal, Bran and Shorts	Grimes Bros., Lexington, N. C.	----	----	----
3042	Bran and Shorts	Augusta Milling and Mercantile Co., Mossy Creek, Va.	Howell Bros., Oxford	Jan. 9, '09	100
3043	---do	---do	L. Thomas, Oxford	Jan. 9, '09	100
3320	---do	Statesville Flour Mill Co., Statesville, N. C.	----	----	----
3120	---do	---do	W. P. McLain, Statesville	Jan. 23, '09	80

Fourteen samples of Bran and Shorts were analyzed. Two are below the guarantee in protein; one is below in fat and two are above guarantee in fiber.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer	Date of Collection.	Claimed Weight of Package—lbs.
2952	Shipstuff	Tennessee Mill Co., Estill Springs, Tenn.	Adams Grain and Provision Co., Fayetteville.	Dec. 5, '08	----
2953	---do	---do	M. L. McRae, Maxton	Dec. 3, '08	80
3099	---do	Wachovia Mills, Winston, N. C.	Sampled at mill	Jan. 16, '09	----
3094	---do	Forsyth Roller Mills, Winston, N. C.	Farmers' Stock Co., Winston.	Jan. 15, '09	100
3098	---do	---do	Sampled at mill	Jan. 15, '09	----
2954	---do	Piedmont Milling Co., Lynchburg, Va.	W. B. Cooper, Wilmington	Nov. 28, '08	100
2955	---do	---do	Best & Thompson, Goldsboro.	Nov. 23, '08	----
3031	---do	---do	Seaboard Feed and Produce Co., Henderson.	Jan. 8, '09	100
3033	Shipstuff Mixed	Manchester Mills, Manchester, Va.	E. A. Kelly & Co., Henderson.	Jan. 8, '09	100
3035	---do	---do	Paraham Bros. Supply Co., Henderson.	Jan. 8, '09	100

BRAN AND SHORTS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3148	16.56	4.99	7.53	-----	15.50	5.01	7.05	56.76	9.86	5.82	Wheat product.
3146	16.56	4.99	7.53	-----	15.25	5.04	7.20	57.91	11.01	3.59	do.
3125	14.50	4.00	8.00	-----	16.00	4.77	6.93	58.77	7.99	5.54	do.
3123	15.12	5.69	6.59	-----	15.37	5.08	7.72	59.95	6.79	5.09	do.
1316	12.00	4.00	8.00	-----	16.25	5.25	6.45	58.33	8.60	5.12	do.
3110	15.00	4.00	8.50	-----	15.37	4.74	7.00	57.82	9.32	5.75	do.
3322	-----	-----	-----	-----	15.37	3.72	4.54	61.32	10.98	4.07	do.
3314	-----	-----	-----	-----	15.87	4.79	5.82	53.84	14.18	5.50	do.
3307	-----	-----	-----	-----	15.25	4.42	4.80	61.13	10.20	4.20	do.
3214	-----	-----	-----	-----	13.25	4.58	5.51	65.57	7.05	4.04	Wheat and corn product.
3042	-----	-----	-----	-----	16.02	4.33	4.92	61.90	9.62	3.21	Wheat product.
3043	-----	-----	-----	-----	16.37	4.47	4.70	61.88	9.12	3.46	do.
3320	-----	-----	-----	-----	16.00	5.04	5.56	56.75	11.08	5.57	do.
3120	15.50	3.88	5.99	-----	15.75	6.01	7.00	57.11	7.91	6.22	do.

Thirteen of these samples are pure wheat products; one is a wheat and corn product.

SHIPSTUFF.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2952	16.00	4.00	6.00	-----	17.37	5.30	5.36	61.08	6.96	3.93	Wheat product.
2953	16.00	4.00	6.00	-----	17.37	5.34	4.90	61.26	7.10	4.03	do.
3099	14.00	4.00	4.00	-----	15.12	6.43	3.52	64.73	6.85	3.35	do.
3094	15.00	4.00	6.00	-----	15.50	4.61	5.00	62.75	8.21	3.93	do.
3098	15.00	4.00	6.00	-----	14.87	4.28	4.80	63.33	9.02	3.70	do.
2954	15.00	4.00	6.00	-----	16.12	4.28	5.85	61.48	7.85	4.42	do.
2955	15.00	4.00	6.00	-----	16.62	4.82	6.65	59.89	7.00	5.02	do.
3031	15.00	4.00	6.00	-----	17.12	4.61	7.53	57.74	8.37	4.63	do.
3033	12.00	4.00	8.00	-----	12.75	4.19	8.42	62.39	8.55	3.70	Wheat and corn product and small amount cob meal.
3035	12.00	4.00	8.00	-----	12.25	4.02	8.57	63.80	8.35	3.01	do.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2950	Shipstuff	Dan Valley Mills, Danville, Va.	J. W. Isler & Co., Goldsboro.	Nov. 23, '08	100
3032	---do	---do	Southern Grocery Co., Henderson.	Jan. 8, '09	100
3037	---do	---do	Geo. A. Rose Co., Henderson.	Jan. 8, '09	100
3047	---do	---do	R. L. Stroud, Chapel Hill	Jan. 11, '09	100
3050	---do	---do	R. A. Eubanks, Chapel Hill	Jan. 11, '09	100
2959	---do	J. Allen Smith & Co., Knoxville, Tenn.	J. H. Culbreth & Co., Fayetteville.	Dec. 5, '08	100
2960	---do	---do	A. E. Rankin & Co., Fayetteville.	Dec. 4, '08	100
2962	---do	---do	Mimocks & Co., Fayetteville.	Dec. 4, '08	100
2963	---do	---do	L. H. Caldwell, Lumberton	Dec. 2, '08	100
3056	---do	---do	Taylor Grocery Co., Winston.	Jan. 15, '09	100
3149	---do	Harrisonburg Milling Co., Harrisonburg, Va.	H. L. Parker & Co., Concord.	Feb. 9, '09	100
3156	---do	---do	W. G. Lairy, Rockingham	Feb. 12, '09	100
3137	---do	Mountain City Mill Co., Chattanooga, Tenn.	S. K. Breeding & Co., Hendersonville.	Jan. 28, '09	----
3141	---do	---do	Asheville Grain and Hay Co., Asheville.	Jan. 30, '09	80
3104	---do	High Point Milling Co., High Point, N. C.	Jones Grocery Co., High Point.	Jan. 21, '09	80
3106	---do	---do	Sampled at mill	----------	----
3107	Bran and Shipstuff	---do	---do	----------	----
2984	Shipstuff	Ballard & Ballard Co., Louisville, Ky.	Murphy, Jenkins & Co., Tarboro.	Dec. 23, '08	----
2985	---do	---do	J. V. Johnston, Greenville	Dec. 21, '08	----
3157	---do	---do	H. C Watson, Rockingham	Feb. 12, '09	100
3169	---do	---do	C. V. Williams & Co., Hamlet.	Feb. 25, '09	100
2942	---do	Dunlop Mills, Richmond, Va.	Crump & Floyd, Lumberton.	Dec. 2, '08	100
3001	---do	---do	Wilson Grocery Co., Wilson.	Dec. 26, '08	100
3048	---do	---do	R. L. Stroud, Chapel Hill	Jan. 11, '09	100
3051	---do	---do	S. J. Brockwell, Chapel Hill.	Jan. 11, '09	100
3205	---do	---do	The Nash Supply Co., Nashville.	Apr. 9, '09	----
3269	Bran and Shipstuff	Banner Roller Mills, Lincolnton, N. C.	----------	----------	----
3268	Shipstuff	---do	----------	----------	----
3281	Wheat Shipstuff	Lynchburg Milling Co., Lynchburg, Va.	C. H. Hunter, Roxboro	May 22, '09	100
3332	Pure Wheat Shipstuff	Carrolina Roller Mills, Durham, N. C.	L. H. Adams, Raleigh	Aug. 19, '09	100
3218	Shipstuff	Holt-Granite Mfg. Co., Haw River, N. C.	Pool & Hobby, Raleigh	Mar. 25, '09	100
3296	Wheat and Corn Shipstuff.	---do	----------	----------	----
2939	Shipstuff	Statesville Flour Mills, Statesville, N. C.	L. H. Caldwell, Lumberton.	Dec. 2, '08	100
3119	---do	---do	Madison Grocery Co., Statesville.	Jan. 23, '09	80
3158	---do	---do	Lackey Bros., Hamlet	Feb. 12, '09	100

SHIPSTUFF—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2950	15.00	4.00	8.00	-----	16.25	4.92	6.52	60.44	7.06	4.71	Wheat product.
3032	15.00	4.00	8.00	-----	16.37	4.87	6.60	58.83	8.57	4.76	do.
3037	15.00	4.00	8.00	-----	16.37	5.18	6.50	59.04	8.22	4.69	do.
3047	15.00	4.00	8.00	-----	15.87	4.86	6.08	61.01	7.73	4.45	do.
3050	15.00	4.00	8.00	-----	16.25	5.14	6.77	59.23	7.73	4.88	do.
2959	15.00	4.00	7.00	-----	14.62	4.55	6.45	61.00	9.03	4.35	Wheat product and corn bran.
2960	15.00	4.00	7.00	-----	14.62	4.13	6.86	60.45	9.24	4.70	do.
2962	15.00	4.00	7.00	-----	14.62	4.73	6.75	59.96	9.02	4.92	do.
2963	15.00	4.00	7.00	-----	14.62	5.07	6.95	60.51	7.97	4.88	do.
3056	15.00	4.00	7.00	-----	12.62	4.33	4.50	65.36	8.97	4.22	Wheat product.
3149	15.00	4.00	6.00	-----	15.75	4.75	5.85	59.25	9.88	4.52	do.
3156	15.00	4.00	6.00	-----	15.87	5.06	5.87	59.85	8.74	4.61	do.
3137	-----	-----	-----	-----	13.12	5.60	4.85	63.84	9.33	3.26	Wheat and corn product.
3141	13.00	5.50	7.00	-----	13.00	5.62	3.56	65.60	9.42	2.80	do.
3104	15.12	4.45	4.25	-----	16.50	4.62	4.00	61.01	10.58	3.29	Wheat product.
3106	15.12	4.45	4.25	-----	16.87	4.83	4.00	60.98	9.77	3.55	do.
3107	15.75	4.50	7.00	-----	16.87	4.80	4.85	59.79	9.72	3.97	do.
2984	16.45	4.32	6.42	-----	16.00	4.22	6.00	60.37	9.20	4.21	do.
2985	16.45	4.32	6.42	-----	16.37	3.41	5.75	59.58	9.68	5.21	do.
3157	16.50	4.80	6.87	-----	16.12	4.38	6.41	57.88	10.22	4.99	do.
3169	16.50	4.80	6.87	-----	16.00	4.72	5.32	59.93	9.57	4.46	do.
2942	14.50	4.00	8.00	-----	14.37	4.84	7.31	60.94	7.42	5.12	do.
3001	14.50	4.00	8.00	-----	15.75	4.93	6.42	58.43	9.36	5.11	do.
3048	14.50	4.00	8.00	-----	16.75	5.08	6.02	59.58	7.78	4.79	do.
3051	14.50	4.00	8.00	-----	16.00	4.96	5.75	60.37	8.28	4.64	do.
3205	-----	-----	-----	-----	16.00	4.84	6.58	59.36	7.83	5.39	do.
3269	-----	-----	-----	-----	15.50	4.92	6.77	57.70	11.66	3.45	do.
3268	-----	-----	-----	-----	16.00	4.41	7.08	54.42	13.23	4.86	do.
3281	15.00	4.45	8.50	-----	16.12	5.76	5.80	55.42	11.73	5.17	do.
3332	16.00	4.00	8.00	-----	15.60	4.69	5.55	58.56	10.94	4.66	Wheat and corn product.
3218	17.00	6.00	7.00	-----	17.00	5.44	4.70	57.78	10.25	4.83	Wheat product.
3290	-----	-----	-----	-----	11.25	4.22	3.54	66.97	11.47	2.55	Wheat and corn product.
2939	16.00	4.00	6.75	-----	16.12	4.76	7.05	60.31	6.71	5.05	Wheat product.
3119	16.00	4.00	6.75	-----	15.50	6.56	7.35	57.82	7.29	5.48	do.
3158	16.00	4.00	6.75	-----	15.37	4.69	6.80	57.33	10.55	5.26	do.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3319	Shipstuff	Statesville Flour Mills, Statesville, N. C.			
3070	---do	J. H. Walker & Co., Reidsville, N. C.	Sampled at mill	Jan. 21, '09	
3152	---do	Concord Milling Co., Concord, N. C.	H. M. Blackwelder, Concord.	Feb. 9, '09	100
3337	---do	Crews & Nunn, Walkertown, N. C.			
3219	---do	Stuarts Draft Milling Co., Stuarts Draft, Va.	W. A. Myatt, Raleigh	Mar. 25, '09	100
3210	---do	J. D. Manor & Co., New Market, Va.			
3066	---do	Milton Roller Mills, Milton, N. C.	Harris & Hubbard, Reidsville.	Jan. 21, '09	
3044	---do	Hico Milling Co., Burlington, N. C.	D. McCauley, Chapel Hill	Jan. 11, '09	100
2958	---do	Mayo Milling Co., Richmond, Va.	Baker, Bizzell & Thornton, Goldsboro.	Nov. 23, '08	100

Fifty-four samples of Shipstuff were analyzed. Thirteen are below the guarantee in protein, six are below in fat and seven are above the guarantee in fiber.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3280	Rye Feed	M. G. Rankin & Co., Milwaukee, Wis.	M. V. Lawrence, Durham	May 21, '09	100
3256	---do	---do	E. A. Kelly & Co., Henderson.	May 8, '09	100
3272	Wheat Middlings and Rye Shorts	J. H. Moore, Madison, N. C.	J. H. Moore, Madison	Apr. 1, '09	100
3282	Rye Middlings	North Star Feed and Cereal Co., Minneapolis, Minn.	L. L. Lunsford, Roxboro	May 22, '09	100
3290	---do	---do	Madison Grocery Co., Madison.	May 31, '09	100
3177	---do	Washburn-Crosby Co., Minneapolis, Minn.			
3284	---do	---do	J. L. Garrett & Co., Roxboro.	May 22, '09	100
3336	Rye Middlings and Shorts.	Crews & Nunn, Walkertown, N. C.			

Eight samples of rye feeds were analyzed. All of them are above the guarantees in protein and fat and below the guarantees in fiber.

SHIPSTUFF—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3319	-----	-----	-----	-----	16.62	4.82	5.32	57.94	9.72	5.58	Wheat product.
3070	16.75	4.50	4.71	-----	15.77	5.04	3.87	63.33	8.68	3.31	do.
3152	15.00	4.00	7.00	-----	15.87	4.86	6.15	58.60	9.80	4.72	do.
3337	-----	-----	-----	-----	10.50	3.31	4.24	67.10	11.57	3.28	Wheat and rye middlings, oats and small amount corn meal.
3219	15.00	4.00	5.00	-----	16.37	4.92	1.95	64.36	9.26	3.14	Wheat product.
3210	-----	-----	-----	-----	14.37	4.31	4.94	63.08	9.51	3.79	do.
3066	-----	-----	-----	-----	16.62	5.24	3.70	63.18	7.76	3.50	do.
3044	14.00	4.00	6.00	-----	15.12	4.61	6.30	54.66	13.91	5.40	do.
2958	15.52	3.95	6.00	-----	16.12	4.83	5.50	60.75	8.52	4.28	do.

Forty-three of these samples are pure wheat products, four are wheat and corn products, four are wheat products and corn bran, two are wheat and corn products with cob meal, and one is a mixture of wheat, rye and oat products with corn meal.

RYE FEEDS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash	
3280	14.00	3.00	6.00	55.00	15.00	4.66	6.17	56.57	11.62	5.98	Rye product.
3256	14.00	3.00	6.00	55.00	14.62	3.70	5.67	59.86	10.32	5.83	do.
3272	-----	-----	-----	-----	16.12	3.73	2.37	62.90	11.31	3.57	Wheat and rye product.
3282	14.50	1.50	5.20	63.10	15.75	4.34	3.77	59.84	12.39	3.91	Rye middlings.
3290	14.50	1.50	5.20	63.10	15.75	3.76	3.38	61.86	11.10	4.15	do.
3177	-----	-----	-----	-----	16.37	3.51	5.22	62.95	7.58	4.37	do.
3284	14.00	3.00	6.00	-----	15.75	4.39	4.60	58.99	11.70	4.57	do.
3336	-----	-----	-----	-----	15.50	3.66	4.61	60.08	11.76	4 39	Rye product.

ANALYSES OF CORN

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3292	Corn and Oat Feed	Wachovia Mills, Winston, N. C.	Sampled at mill	May 31, '09	100
3285	Henkel's Chop Feed	The Commercial Milling Co., Detroit, Mich.	Hugh Woods, Roxboro	May 22, '09	100
3236	Boss Chop Feed	The Great Western Cereal Co. Chicago, Ill.	New Bern Fruit Co., New Bern.	Apr. 20, '09	100
3083	Schumacher Stock Feed	Quaker Oats Co., Chicago, Ill.	E. H. Lawrence, Durham	Jan. 13, '09	100
3008	Victor Feed	do	Burrus & Gray Co., New Bern.	Dec. 15, '08	100
3007	do	do	New Bern Fruit Co., New Bern.	Dec. 14, '08	100
2989	Mixed Corn and Oat Feed	City Hay and Grain Co, Elizabeth City, N. C.	Sampled at mill	Dec. 19, '08	100
3209	Cracked Corn and Oats	Albemarle Hay and Grain Co., Elizabeth City, N. C.			

Eight samples of corn and oat feeds were analyzed. Four are below the guarantee in protein, four are below in fat. All of them come under the guarantee in fiber.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3249	Carolina Rice Meal	West Point Mill Co., Charleston, S. C.	Wilson Grocery Co., Wilson.	May 3, '09	100
2992	Rice Meal	Carolina Rice Mills, Goldsboro, N. C.	W. S. Clark & Son, Tarboro.	Dec. 23, '08	
2926	do	do	Best & Thompson, Goldsboro.	Nov. 23, '08	

Three samples of rice feeds were analyzed. Two are below the guarantee in

ANALYSES OF MOLASSES

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3242	Sugarota Horse Feed	North West Mills Co, Winona, Minn.	City Hay and Grain Co., Elizabeth City.	May 28, '09	100
3237	Dairy Feed	Milwaukee Grain and Feed Co., Milwaukee, Wis.	Burrus & Co., New Bern	May 21, '09	100
3311	XXX Dairy Feed	do	J. H. Davis, Beaufort	July 10, '09	100

AND OAT FEEDS.

Laboratory Number.	Guarantee. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Analysis. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	Microscopic Examination Shows the Following Ingredients.
3292	10.00	4.00	9.00	60.00	8.87	4.38	1.60	72.25	11.26	1.64	Corn and oat product.
3285	8 75	5.25	8.75	65.45	9.25	4.28	4.90	66.97	12.10	2.50	Corn chops, oats and oat hulls.
3236	10.00	4.00	9.00	60.00	10.00	4.95	9.12	62.65	8.76	4.52	Corn, oats and oat hulls.
3083	10.00	4.00	10.00	-----	11.87	4.43	8.57	62.82	8.18	4.13	Oats, oat hulls and corn product.
3008	9.00	4.00	-----	-----	8.87	2.91	10.16	64.97	8.42	4.67	Cracked corn, oat hulls and some oats.
3007	9.00	4.00	-----	-----	8.75	2.82	10.12	65.55	8.37	4.39	do.
2989	10.00	4.00	5.00	-----	7.87	3.84	4.02	72.70	9.62	1.95	Cracked corn and oats.
3209	-----	-----	-----	-----	8.24	4.71	2.56	71.73	10.71	2.05	do.

RICE FEEDS.

Laboratory Number.	Guarantee. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Analysis. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	Microscopic Examination Shows the Following Ingredients.
3249	11.15	9.25	7.50	-----	9.25	7.67	8.10	56.15	10.38	8.45	Rice meal and small amount hulls.
2992	12.00	9.00	8.00	-----	10.75	11.41	15.50	39.50	8.69	14.15	Rice meal and some rice hulls.
2926	12.25	13.25	7.75	-----	13.75	10.72	7.27	52.97	7.44	7.85	Rice meal.

protein, two are below in fat and two are above the guarantee in fiber.

OR SUGAR FEEDS.

Laboratory Number.	Guarantee. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Analysis. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	Microscopic Examination Shows the Following Ingredients.
3242	12.00	3.50	-----	56.00	13.59	8.96	9.32	54.45	7.16	6.61	Screenings, weed seed, wheat middlings, small amount of corn meal and molasses.
3237	15.00	2.50	10.00	50.00	25.37	4.51	8.25	45.85	10.02	6.00	Malt sprouts, oat hulls, small amount cotton-seed meal and molasses.
3311	15.00	2.23	10.00	-----	22.25	5.58	8.29	46.23	12.70	4.95	Screenings, malt sprouts, brewers' grains, cotton-seed meal and molasses.

ANALYSES OF MOLASSES OR

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2957	Mueller's Molasses Grains	E. P. Mueller, Norfolk, Va.	H. M. & M. L. Lee, Goldsboro.	Nov. 23, '08	----
3057	----do----------	----do----------	Piedmont Feed Co., North Wilkesboro.	Jan. 19, '09	100
3232	----do----------	----do----------	J. P. Walters, La Grange--	May 19, '09	100
3278	----do----------	----do----------	Pitman & Best, Goldsboro-	May 28, '09	100
2947	Sugarine Horse Feed----	The Sugarine Co., Chicago, Ill.	A. S. Melvin & Co., Fayetteville.	Dec. 4, '08	----
3216	Badger Feed----------	Chas. A. Krause Milling Co., Milwaukee, Wis.	R. B. Phillips, Raleigh----	Mar. 25, '09	100
3263	Badger Dairy Feed-----	----do----------	----do----------	May 12, '09	100
3288	----do----------	----do----------	The Patterson Co., Greensboro.	May 26, '09	100
3073	Sucrene Dairy Feed-----	American Milling Co., Minneapolis, Minn.	C. E. Jourdan, Durham---	Jan. 13, '09	100
3215	----do----------	American Milling Co., Chicago, Ill.	Job P. Wyatt & Son, Raleigh.	Mar. 25, '09	100
2944	----do----------	----do----------	J. W. Carter, Maxton-----	Dec. 3, '08	100
2945	----do----------	----do----------	O. H. Wright & Co., Wilmington.	Nov. 30, '08	100
2946	----do----------	----do----------	Best & Thompson, Goldsboro.	Nov. 23, '08	100
2943	Sucrene Horse and Mule Feed.	----do----------	O. H. Wright & Co., Wilmington.	Nov. 30, '08	100
2990	Sucrene Horse, Mule and Ox Feed.	----do----------	R. B. Peters Grocery Co., Tarboro.	Dec. 23, '08	100
2991	----do----------	----do----------	C. Woodard & Co., Wilson-	Dec. 26, '08	100
3030	----do----------	----do----------	Seaboard Feed and Produce Co., Henderson.	Jan. 8, '09	100
3265	Molasses Feed---------	Globe Molasses Feed Co., Brooklyn, N. Y.	W. A. Myatt, Raleigh-----	May 12, '09	100

Twenty-one samples of Molasses or Sugar Feeds were analyzed. Four of these are below the guarantee in protein, four are below in fat and three above the guarantee in fiber. Two samples contain a small amount of salt.

The samples which fall below the guarantee in considerable amount are all of one brand—Mueller's Molasses Grains. One of these samples is 6.25 per

SUGAR FEEDS—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbo-hydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2957	-----	-----	-----	-----	5.87	2.77	12.57	60.11	9.06	9.62	Barley, barley hulls and clippings, cotton-seed hulls, weed seed and molasses.
3057	15.00	2.50	15.00	-----	8.75	1.05	16.60	52.39	8.97	12.24	Dried brewers' grains, oat clippings, rice hulls, weed seed, cotton-seed hulls, cotton-seed meal, corn meal and molasses.
3232	10.00	3.25	12.00	48.00	4.12	1.94	11.70	69.42	6.72	6.10	Screenings, oat hulls, weed seeds and molasses, small amount of salt.
3278	10.00	3.25	12.00	48.00	7.37	2.26	8.47	62.45	9.71	9.74	Oat hulls, screenings, cotton-seed hulls, small amount cotton-seed meal and molasses.
2947	16.50	3.50	12.00	-----	19.62	5.59	8 40	49.83	7.76	8.80	Screenings, weed seed, small amount whole oats and barley, oat and barley hulls, cotton-seed meal, corn meal and molasses.
3216	18.50	4.50	14.00	58.00	15.87	4.52	9.77	50.73	10.69	8.42	Malt sprouts, dried brewers' grains, screenings, cotton-seed meal, ground corn and molasses.
3263	16.00	3.50	12.00	-----	18.87	4.55	9.57	43.99	14.65	8.37	Screenings, malt sprouts, brewers' grains, cotton-seed meal, wheat middlings and molasses.
3288	16.00	3.50	12.00	-----	17.87	5.53	10.22	46.80	10.51	9.07	Malt sprouts, screenings, brewers' grains, distillers' grains, cotton-seed meal, corn meal and molasses.
3073	16.50	9.50	12.00	-----	16.62	5.95	13.37	48.10	7.60	8.36	Screenings, dried brewers' grains, cotton-seed hulls and meal, middlings, weed seed and molasses.
3215	16.50	3.50	12.00	-----	17.75	6.60	8.15	49.48	9.27	8.75	Wheat screenings, oat hulls, wheat middlings, cotton-seed meal and small amount of hulls and molasses.
2944	16.50	3.50	12.00	-----	17.12	5.61	10.97	59.99	7 41	7.90	Screenings, weed seed, whole oats and barley, oat hulls, cotton-seed meal, corn meal and molasses.
2945	16.50	3.50	12.00	-----	18.75	5.46	9.55	50.89	7.14	8.21	do.
2946	16.50	3 50	12.00	-----	18.87	5.58	9.38	50.47	7.18	8.52	do.
2943	10.00	3.00	13.50	-----	9.87	3.86	7.07	66.10	7.59	5.51	Cracked corn, corn meal, barley, screenings, weed seed and molasses.
2990	10.00	3.00	13.50	-----	11.50	3.04	8.70	61.51	9.55	5.70	Cracked corn, corn meal, barley, oat hulls, screenings, weed seed and molasses.
2991	10.00	3.00	8.50	-----	9.87	4.02	9.90	60.76	9.76	5.69	Cracked corn, barley, oat hulls, screenings, corn meal, weed seed and molasses.
3030	10.00	3.00	13.50	-----	12.62	4.77	11.47	57.65	6.90	6.59	Cracked corn, barley, oat hulls, screennge, weed seed and molasses.
3265	1.00	1.00	-----	-----	6.87	1.89	10.28	53.34	18.76	8.86	Screenings, oat hulls, few oats and molasses, small amount salt.

cent below the guarantee in protein, 2.00 per cent below in fat and 1.60 per cent above guarantee in fiber. One of these samples also contains ground rice hulls, which is an adulterant. While the samples of this brand of feeds contain some nutritious ingredients, they are present in small amount, the feeds being composed principally of screenings, oat hulls and weed seed.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2929	Corno Horse and Mule Feed.	The Corno Mills Co., East St. Louis, Ill.	Adams Grain and Provision Co., Fayetteville.	Dec. 5, '08	100
2930	----do----------	----do----------	B. W. Cooper, Wilmington.	Nov. 28, '08	80
2982	----do----------	----do----------	Burrus & Gray Co., New Bern.	Dec. 15, '08	100
3220	----do----------	----do----------	Peebles Bros., Raleigh----	Mar. 25, '09	100
2983	Corno Dairy Feed----------	----do----------	Wilson Grocery Co., Wilson.	Dec. 26, '09	100
3021	Eagle Alfalfa Feed------	Jones & Rogers, Memphis, Tenn.	R. B. Peters Grocery Co., Tarboro.	Dec. 23, '08	100
3300	Manna Alfalfa Horse and Mule Feed.	J. B. Edgar Grain Co., Memphis, Tenn.	----------	----------	----
3310	Alfacorn Feed----------	Capital Grain and Mill Co., Nashville, Tenn.	Beaufort Grocery Co., Beaufort.	July 10, '09	100
3231	Kornfalfa Feed----------	Kornfalfa Feed Milling Co., Kansas City, Mo.	Best & Thompson, Goldsboro.	Apr. 19, '09	100
3247	----do----------	----do----------	J. D. Odam, Rocky Mount.	May 3, '09	100
3234	Pioneer Alfalfa Meal----	----do----------	H. C. Edwards, Kinston---	May 20, '09	100
3241	Protena Feed----------	Purina Mills, St. Louis, Mo.	M. G. Brown, Edenton----	May 28, '09	----
3327	Purina Feed----------	----do----------	Dixie Grocery Co., Lincolnton.	Aug. 5, '09	----
3086	Ceralfa Stock Feed------	J. B. Edgar Grain Co., Memphis, Tenn.	R. G. Hiatt, Greensboro---	Jan. 14, '09	----
3087	----do----------	----do----------	J. H. & W. L. Low, Greensboro.	Jan. 14, '09	----
3250	----do----------	----do----------	R. B. Peters Grocery Co., Tarboro.	May 4, '09	100
3299	----do----------	----do----------	----------	----------	----
3004	Universal Dairy Feed---	Universal Stock Food Co., Lebanon, Tenn.	W. R. White & Co., Elizabeth City.	Dec. 19, '08	----
3291	----do----------	----do----------	W. H. Turner, Winston----	May 31, '09	100
3005	Universal Horse and Mule Feed.	----do----------	W. S. White & Co., Elizabeth City.	Jan. 19, '08	100
3229	Otto Weiss Alfalfa Stock Food.	Otto Weiss Alfalfa Stock Food Co., Wichita, Kan.	J. W. Isler & Co., Goldsboro.	Feb. 19, '09	100
3246	----do----------	----do----------	Matthews, Weeks & Co., Rocky Mount.	May 3, '09	100

Twenty-two samples of Alfalfa Feeds have been analyzed. Six samples are below the guarantee in protein, eight are below in fat and seven are above the guarantee in fiber. Eight samples contain a small amount of salt.

ALFALFA FEEDS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2929	10.00	3.50	12.00	-----	10.25	3.90	8.50	65.55	8.05	3.75	Alfalfa meal, cracked corn, oats and oat hulls.
2930	10.00	3.50	12.00	-----	10.02	4.14	13.82	60.62	7.25	4.15	do.
2982	10.00	3.50	12.00	-----	10.50	4.32	13.25	60.89	6.47	4.57	do.
3220	10.00	3.50	12.00	-----	13.87	4.56	13.35	54.23	9.29	4.70	do.
2983	14.50	5.00	18.00	-----	17.75	5.42	17.40	47.56	5.31	6.56	do.
3021	13.50	4.50	12.00	-----	14.50	4.07	10.30	57.59	5.49	8.05	Alfalfa meal, cracked corn, oats and small amount salt.
3300	-----	-----	-----	-----	14.75	4.61	8.45	58.47	9.07	4.65	Alfalfa meal, cracked corn and cotton-seed meal.
3310	12.00	3.50	12.00	-----	10.75	3.23	11.90	57.10	12.49	4.53	Alfalfa meal, cracked corn and oats.
3231	12.00	4.00	11.00	58.00	12.25	3.37	10.49	58.92	10.52	4.45	Alfalfa meal, cracked corn, corn meal and oats, small amount salt.
3247	12.00	4.00	11.00	58.00	10.37	3.72	10.77	60.52	10.49	4.13	do.
3234	15.00	2.00	22.00	45.00	14.62	2.49	28.34	35.88	9.03	9.64	Alfalfa meal.
3241	-----	-----	-----	-----	12.00	4.21	9.31	59.74	10.25	4.49	Alfalfa meal, cracked corn, oats and dried brewers' grains.
3327	-----	-----	-----	-----	12.62	5.69	8.36	57.75	10.25	5.33	do.
3086	-----	-----	-----	-----	14.50	3.97	9.23	61.16	5.01	6.13	Alfalfa meal, cracked corn, dried brewers' grains, cotton-seed meal, small amount salt.
3087	-----	-----	-----	-----	13.62	4.05	9.45	60.95	5.40	6.53	Alfalfa meal, cracked corn, dried brewers' grains, cotton-seed meal, small amount salt.
3250	14.00	4.50	11.50	50.00	13.37	3.95	12.80	51.27	8.98	9.63	Alfalfa meal, cracked corn, dried brewers' grains, cotton-seed meal, wheat bran, small amount salt.
3299	-----	-----	-----	-----	14.00	4.14	9.10	58.07	8.75	5.94	Alfalfa meal, cracked corn, cotton-seed meal, small amount salt.
3004	22.50	5.25	12.95	-----	19.87	3.33	19.07	44.31	5.92	7.50	Alfalfa meal, wheat bran, middlings, cotton-seed meal.
3291	22.50	5.25	12.95	42.00	18.50	4.42	17.70	39.09	12.21	8.08	do.
3005	11.50	4.75	16.75	-----	11.00	2.91	14.70	61.36	6.29	3.74	Alfalfa meal, cracked corn, oats, oat hulls, small amount cotton-seed meal.
3229	12.00	3.50	15.00	53.00	13.25	3.70	11.02	54.27	10.38	7.38	Alfalfa meal, cracked corn, wheat bran and middlings and linseed oil meal, small amount salt.
3246	12.00	3.50	15.00	53.00	14.00	4.47	11.50	52.95	9.82	7.26	do.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer	Date of Collection.	Claimed Weight of Package—lbs.
3221	Dried Beet Pulp	German American Sugar Co., Bay City, Mich.	Hunter & Dunn, Raleigh	Mar. 25, '09	100
3270	do	Larrowe Milling Co., Detroit, Mich.	Elmore-Maxwell Co., Greensboro.	Apr. 1, '09	100
2933	do	do	Southerland Co., Goldsboro.	Nov. 25, '08	100

Only three samples of Dried Beet Pulp were taken. All of these samples exceed the guarantees in protein and fat and are well under the guarantees in fiber.

ANALYSES OF CHOP

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2948	Corn Chops	Boney & Harper Milling Co., Wilmington, N. C.	Caldwell & Carlyle, Lumberton.	Dec. 2, '08	100
2949	do	do	J. W. Isler & Co., Goldsboro.	Nov. 23, '08	100
3248	do	do	Wilson Grocery Co., Wilson.	May 3, '08	100
3097	do	Forsyth Roller Mills, Winston, N. C.	Sampled at mill	Jan. 15, '09	----
3101	do	Wachovia Mills, Winston, N. C.	do	Jan. 16, '09	----
3102	Wheat and Corn Chops	Gambill & Davis, Roanoke, Va.	W. H. Turner, Winston	Jan. 16, '09	100
3100	do	do	Parker & Johnson, High Point.	Jan. 21, '09	100
3024	Hominy	Elizabeth City Milling Co., Elizabeth City, N. C.	A. F. Foxey & Co, Elizabeth City.	Dec. 19, '08	----
3162	Corn Meal	Efland Milling Co., Efland, N. C.			----

Nine samples of Chop Feeds were analyzed. Five are below the guarantee in protein, four in fat and seven above the guarantee in fiber.

DRIED BEET PULP.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3221	8.00	0.50	20.00	-----	9.00	1.05	16.57	60.32	9.41	3.65	Dried beet pulp.
3270	8.00	0.50	20.00	-----	10.25	0.96	16.10	58.91	10.08	3.70	do.
2933	8.00	0.50	20.00	-----	9.25	1.10	19.63	59.28	7.38	3.36	do.

FEEDS AND MEALS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2948	10.00	7.25	7.50	-----	9.37	6.79	9.80	67.27	4.70	2.07	Corn product, large amount of corn bran and some ground cob.
2949	10.00	7.25	7.50	-----	8.75	5.38	10.27	68.27	5.37	1.96	do.
3248	10.00	7.25	7.50	-----	9.00	6.60	8.64	65.50	7.84	2.42	do.
3097	10.00	4.00	2.00	-----	9.00	3.64	2.15	75.50	8.26	1.45	Corn product.
3101	9.00	4.00	1.00	-----	8.87	4.66	1.85	73.52	9.48	1.62	do.
3102	12.00	3.00	4.00	-----	11.25	4.00	8.15	62.48	9.46	4.66	Wheat and corn products.
3100	12.00	3.00	4.00	-----	14.00	4.46	7.03	60.05	9.50	4.96	do.
3024	-----	-----	-----	-----	7.87	4.03	1.92	75.06	9.40	1.72	Corn product.
3162	-----	-----	-----	-----	8.62	4.23	1.94	75.27	8.71	1.23	do.

Three of these samples contain ground corncob; two are wheat and corn products and five are ground corn.

ANALYSES OF COTTON-

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3081	Cinco Cotton-seed Meal Feed.	Southern Cotton Oil Co., Charlotte, N. C.	L. S. Rochelle, Durham	Jan. 13, '09	100
3253	----do----------	----do----------	W. F. Redman, Charlotte	May 5, '09	100
3165	Piedmont Feed----------	----do----------	----------	----------	----
3166	Boveta Feed----------	----do----------	----------	----------	----
3164	Cotton-seed Hulls----------	----do----------	----------	----------	----
3203	----do----------	----do----------	----------	----------	----
3204	----do----------	----do----------	----------	----------	----
3211	----do----------	----do----------	----------	----------	----
3279	Creamo Brand Feed Meal.	Tennessee Fiber Co., Memphis, Tenn.	Carpenter Bros., Durham	May 21, '09	100
3167	Cotton-seed Meal----------	N. C. Cotton Oil Co., Henderson, N. C.	R. H. Riggsbee, Durham	Mar. 5, '09	100
3115	Cotton-seed Feed----------	Statesville Oil and Fertilizer Co., Statesville, N. C.	Kluttz Grain and Provision Co., Salisbury.	Jan. 22, '09	----
3118	----do----------	----do----------	H. Z. White, Salisbury	Jan. 22, '09	----
3082	Cotton-seed Meal----------	Louisburg Cotton Oil Mills, Louisburg, N. C.	J. T. Rogers & Co., Durham.	Jan. 13, '09	----
3252	Sunny South Cotton-seed Meal Feed.	J. Lindsay Wells Co., Memphis, Tenn.	F. D. Barkley & Co., Gastonia.	May 6, '09	100
3271	----do----------	----do----------	A. Blanton Grocery Co., Marion.	Apr. 19, '09	100
3289	Cotton-seed Meal----------	----do----------	Blair & Co., North Wilkesboro.	May 28, '09	100
2920	Diluted Cotton-seed Meal.	Worth Manufacturing Co., Wilmington, N. C.	----------	----------	----
3329	Cotton-seed Meal----------	Lancaster Cotton Oil Co., Lancaster, S. C.	F. D. Barkley, Gastonia	Aug. 4, '09	100
2968	Cotton-seed Meal and Hull Cake.	Universal Oil and Fertilizer Co., Wilmington, N. C.	W. E. Worth & Son, Wilmington.	Nov. 30, '08	----
2969	Cotton-seed Meal and Hulls.	----do----------	----do----------	Nov. 30, '08	----
2970	Cotton-seed Cake----------	----do----------	----------	----------	----
3233	----do----------	----do----------	W. P. Walters, La Grange	Apr. 19, '09	100

Twenty-two samples of Cotton-seed Meal Feeds were analyzed. Seven are below the guarantee in protein, and three in fat. All the samples having fiber guarantees are under the guarantee.

SEED MEAL FEEDS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3081	30.00	6.00	20.00	-----	36.25	6.07	11.10	33.62	6.60	6.36	Cotton-seed meal and hulls.
3253	30.00	6.00	20.00	-----	29.50	5.22	13.10	35.16	11.79	5.23	do.
3165	-----	-----	-----	-----	12.00	3.29	33.85	41.48	5.86	3.52	do.
3166	-----	-----	-----	-----	24.50	5.01	21.57	38.29	6.08	4.55	do.
3164	-----	-----	-----	-----	3.25	1.12	46.92	40.11	6.05	2.55	Cotton-seed hulls with lint.
3203	-----	-----	-----	-----	2.40	0.31	36.49	50.22	8.20	2.38	Delinted cotton-seed hulls.
3204	-----	-----	-----	-----	2.25	0.41	35.68	50.11	7.84	3.71	Cotton-seed hulls, delinted and ground.
3211	-----	-----	-----	-----	2.62	0.52	38.30	51.81	4.32	2.43	do.
3279	22.00	5.00	28.00	-----	18.00	4.83	22.80	39.58	10.20	4.59	Cotton-seed meal and hulls.
3167	38.50	7.00	10.00	-----	37.37	7.28	8.21	33.11	7.82	6.21	Cotton-seed meal and small amount of hulls.
3115	-----	-----	-----	-----	13.75	3.28	31.65	40.22	7.65	3.45	Cotton-seed meal and large amount of hulls.
3118	-----	-----	-----	-----	9.75	2.28	35.00	41.91	7.50	3.56	do.
3082	-----	-----	-----	-----	41.37	7.14	6.65	31.17	6.80	6.87	Cotton-seed meal.
3252	25.00	5.00	28.00	-----	21.00	4.59	22.71	38.88	7.90	4.92	Cotton-seed meal and hulls.
3271	25.00	5.00	-----	-----	21.00	5.16	20.05	39.57	9.61	4.61	do.
3289	25.00	5.00	-----	-----	19.00	5.46	20.16	40.65	10.30	4.43	do.
2920	-----	-----	-----	-----	29.62	13.14	14.97	29.81	7.91	4.55	do.
3329	-----	-----	-----	-----	39.12	8.97	7.34	29.29	9.05	6.23	Cotton-seed meal and few hulls.
2968	27.42	8.82	-----	-----	28.87	13.14	13.60	33.15	6.06	5.21	Cotton-seed meal and hulls.
2969	26.09	9.22	17.89	----	26.75	11.95	15.00	33.50	7.70	5.10	do.
2970	-----	-----	-----	-----	29.12	10.24	14.60	33.33	8.26	4.45	Cotton-seed meal and hulls (cake)
3233	29.00	5.50	-----	50.00	22.12	8.62	19.20	37.71	7.69	4.66	do.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3258	Old Process Oil Meal	American Linseed Co., New York, N. Y.	Job P. Wyatt & Son, Raleigh.	May 12, '09	100
3331	----do----------	----do----------	----do----------	Aug. 19, '09	100

Only two samples of Linseed Meals were taken. Both of these are old

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3170	Peanut Meal	Universal Oil and Fertilizer Co., Wilmington, N. C.	----------	----------	----
3171	----do----------	----do----------	----------	----------	----

Only two samples of Peanut Meals were analyzed. These were sent in by

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
2999	Cracked Corn	W. S. White & Co., Elizabeth City, N. C.	W. S. White & Co., Elizabeth City.	Dec. 19, '08	100
3015	----do----------	S. D. Scott & Co., Norfolk, Va.	New Bern Fruit Co., New Bern.	Dec. 15, '08	100
3016	----do----------	----do----------	Burrus & Gray Co., New Bern.	Dec. 15, '08	100
3240	----do----------	Dabney Brokerage Co., Newport News, Va.	F. G. Paul & Bro., Washington.	Apr. 24, '09	100
3293	----do----------	----do----------	----------	----------	100
3294	----do----------	----do----------	----------	----------	100
3208	----do----------	Albemarle Hay and Grain Co., Elizabeth City, N. C.	----------	----------	----
3239	----do----------	City Hay and Grain Co., Norfolk, Va.	Paul & Cutlar, Washington	Apr. 21, '09	100
3238	----do----------	The Virginia Mills, Suffolk, Va.	W. G. Willis, Washington	Apr. 24, '09	100
3009	----do----------	H. F. Munt, Petersburg, Va.	C. L. Spencer, New Bern	Dec. 14, '08	100
3010	----do----------	----do----------	Burrus & Gray Co., New Bern.	Dec. 15, '08	100

LINSEED MEALS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbo-hydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3258	32.00	5.00	7.00	-----	32.75	6.21	7.62	38.76	9.34	5.32	Linseed meal.
3331	32.00	5.00	7.00	-----	35.00	5.95	6.96	37.00	9.87	5.22	do.

process meals. They come up to the guarantees and are both of good quality.

PEANUT MEALS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber	Carbo-hydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3170	-----	-----	-----	-----	31.25	10.62	23.82	26.37	5.23	2.71	Peanut meal, middlings and some hulls.
3171	-----	-----	-----	-----	32.25	10.53	22.68	26.56	5.24	2.74	do.

the manufacturers, and hence are not accompanied by a guarantee.

CRACKED CORN.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbo-hydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
2999	10.00	4.00	4.00	-----	8.12	5.12	1.70	73.07	10.41	1.58	Cracked corn.
3015	10.00	4.00	4.00	-----	8.12	3.55	1.90	76.92	6.14	3.37	do.
3016	10.00	4.00	4.00	-----	9.75	3.91	1.85	71.40	6.02	7.07	do.
3240	8.00	2.50	5.00	-----	8.62	3.40	1.37	77.24	8.01	1.36	do.
3293	8.00	2.50	5.00	-----	10.01	3.65	1.77	72.20	10.89	1.48	do.
3294	8.00	2.50	5.00	-----	10.01	4.89	2.07	70.71	10.52	1.80	do.
3208	-----	-----	-----	-----	8.12	4.19	2.08	73.00	10.97	1.64	do.
3239	10.00	4.00	4.00	-----	8.50	2.23	1.42	77.05	9.52	1.28	do.
3238	10.00	4.00	4.00	-----	9.50	4.36	1.82	74.69	8.02	1.61	do.
3009	10.00	4.00	3.00	-----	9.00	4.27	2.12	76.06	7.05	1.50	do.
3010	10.00	4.00	3.00	-----	8.87	3.87	2.00	76.76	7.10	1.40	do.

ANALYSES OF CRACKED

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3254	Cracked corn	H. F. Munt, Petersburg, Va.	C. F. Hancock Grocery Co., Scotland Neck.	Apr. 5, '09	80
2996	----do	Tennessee Mill Co., Estill Springs, Tenn.	F. G. Paul & Bro., Washington.	Dec. 17, '08	100
2995	----do	J. Havens, Washington, N. C.	J. F. Taylor, Washington	Dec. 17, '08	100
2993	----do	----do	Sampled at mill	Dec. 17, '08	100
2998	----do	Jas. I. Pritchett & Co., Lynchburg, Va.	F. G. Paul & Bro., Washington.	Dec. 17, '08	100
2988	----do	Elizabeth City Milling Co., Elizabeth City, N. C.	Sampled at mill	Dec. 19, '08	100

Seventeen samples of Cracked Corn were analyzed. Fifteen of these are below the guarantee in protein, only one sample coming up to the guarantee;

ANALYSES OF SPE

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3255	Peerless Feed	J. Allen Smith & Co., Knoxville, Tenn.	J. H. Harris, Weldon	May 6, '09	100
3340	----do	----do	R. B. Peters Grocery Co., Tarboro.	Aug. 30, '09	100
3078	Dairy and Stock Feed	Atlanta Milling Co., Atlanta, Ga.	Markham, Stevens & Co., Durham.	Jan. 13, '09	100
3333	----do	----do	F. B. Phillips, Raleigh	Aug. 19, '09	100
3111	Roller King Feed	Brackett & Son Co., High Point, N. C.	Sampled at mill	Jan. 21, '09	80
3330	Wyatt's Special Cow Feed.	Job P. Wyatt & Son, Raleigh, N. C.	Job P. Wyatt & Son, Raleigh.	Aug. 19, '09	100
3092	Acme Feed	Acme Milling Co., Talbot, Tenn.	H. D. Poindexter, Winston.	Jan. 15, '09	100
3135	----do	----do	S. K. Breeding & Co., Hendersonville.	Jan. 28, '09	80
3140	----do	----do	J. S. Aiken, Brevard	Jan. 28, '09	100
2972	Thoroughbred Feed	Lexington Roller Mills Co., Lexington, Ky.	Edwards & Pegram, Kinston.	Dec. 13, '08	100
3136	----do	----do	S. K. Breeding & Co., Hendersonville.	Jan. 28, '09	100
3013	Blue Grass Mixed Feed	A. Waller & Co., Henderson, Ky.	Zimmerman & Co., Elizabeth City.	Dec. 19, '09	100
2987	Kyome Feed	The J. E. M. Milling Co., Frankfort, Ky.	Lyles-Ruffin Co., Tarboro	Dec 23, '09	----
3275	Union Grains	J. W. Biles Co., Cincinnati, Ohio.	E. W. Perry, Hendersonville.	May 8, '09	100

Fourteen samples of Special Mixed Feeds were analyzed. Five of these are below their guarantee in protein; one in fat and two above their guarantee in fiber.

These feeds are composed of mixtures of wheat products, wheat and corn

CORN—CONTINUED.

Laboratory Number.	Guarantee. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Analysis. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	Microscopic Examination Shows the Following Ingredients.
3254	10.00	4.00	3.00	-----	9.50	3.89	1.80	73.89	9.31	1.61	Cracked corn.
2996	9.50	4.00	2.00	-----	8.25	4.08	1.82	74.21	10.23	1.41	do.
2995	10.00	4.00	4.00	-----	9.12	4.74	2.70	72.07	9.65	1.72	do.
2993	10.00	4.00	4.00	-----	9.37	4.34	2.52	72.95	9.23	1.59	do.
2998	10.00	4.00	4.00	-----	8.75	4.02	2.20	73.66	9.87	1.50	do.
2988	10.00	4.00	4.00	-----	8.37	4.66	2.05	72.43	10.97	1.52	do.

five are below the guarantee in fat; all the samples come well under the guarantees in fiber.

CIAL MIXED FEEDS.

Laboratory Number.	Guarantee. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Analysis. Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	Microscopic Examination Shows the Following Ingredients.
3255	15.00	4.00	7.00	58.00	15.25	4.45	5.47	59.63	10.15	5.05	Wheat and corn product.
3340	15.00	4.00	7.00	58.00	16.38	4.38	6.61	56.11	11.08	5.44	do.
3078	21.00	4.00	9.50	-----	22.37	5.59	7.30	50.94	8.05	5.75	Wheat product and cotton-seed meal.
3333	18.00	4.00	9.50	-----	22.50	5.69	5.95	50.76	9.93	5.17	Wheat bran and middlings and cotton-seed meal.
3111	16.50	4.26	5.94	-----	16.50	5.00	5.63	58.48	9.74	4.65	Wheat product.
3330	21.00	3.50	14.00	-----	24.75	6.75	6.64	46.41	10.10	5.35	Wheat bran, cotton-seed meal, corn meal, and linseed meal.
3092	16.00	5.00	7.17	-----	13.50	6.16	6.45	61.70	7.78	4.41	Wheat and corn product.
3135	16.00	5.00	7.17	-----	14.74	5.93	6.20	59.61	8.73	4.79	Wheat product and corn bran.
3140	16.00	5.00	7.17	-----	14.12	5.73	6.83	58.83	9.61	4.88	do.
2972	15.05	3.34	6.56	-----	15.36	4.62	6.70	60.07	8.09	5.16	do.
3136	15.05	3.34	6.56	-----	14.87	5.14	7.77	57.93	8.70	5.59	Wheat and corn products.
3013	10.00	2.50	-----	-----	11.02	2.86	14.45	61.16	6.40	4.11	Wheat product and ground corncob.
2987	15.05	3.34	6.56	-----	15.87	4.50	6.55	58.13	9.68	5.27	Wheat and corn product.
3275	24.00	7.00	9.00	-----	22.00	7.11	8.15	45.40	12.42	4.92	Wheat bran and middlings, distillers' grains, dried brewers' grains, malt sprouts, corn meal and cotton-seed meal.

products, wheat products and corn bran, wheat and corn products with the addition of cotton-seed meal or oil meal, and two samples contain distillers' grains, malt sprouts and brewers' grains. Only one sample contained ground corncob.

ANALYSES OF

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3168	Wood's Poultry Grain Feed.	T. W. Wood & Sons, Richmond, Va.	Sanford Grocery Co., Sanford.	Feb. 27, '09	100
3312	----do----------	----do----------	L. H. Caldwell, Lincolnton.	July 15, '09	100
3224	Chick Feed----------	----do----------	J. S. McQueen, Maxton ---	Apr. 8, '09	100
3230	Corno Hen Feed--------	The Corno Mills Co., East St. Louis, Ill.	M. C. Maye & Son, Goldsboro.	Jan. 19, '09	100
3260	Globe Scratch Feed-----	The Albert Dickinson Co., Chicago, Ill.	Job P. Wyatt & Son, Raleigh.	May 12, '09	100
3243	----do----------	----do----------	Matthews, Weeks & Co., Rocky Mount.	May 3, '09	100
3244	Crescent Chick Feed----	----do----------	----do----------	May 3, '09	100
3259	----do----------	----do----------	Job P. Wyatt & Son, Raleigh.	May 12, '09	100
3274	Purina Mill Feed, Scratch Size.	Purina Mills, St. Louis, Mo.	The Patterson Co., Greensboro.	Apr. 7, '09	100

Nine samples of Poultry Feeds were analyzed. All of them came up to their guarantees. As will be seen from the microscopic examination, these feeds are

ANALYSES OF MISCEL

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3019	Feed----------	Boney & Harper Milling Co., Wilmington, N. C.	C. L. Spencer, New Bern--	Dec. 14, '08	100
3018	----do----------	J. A. Meadows, New Bern, N. C.	J. A. Meadows, New Bern-	Dec. 15, '08	100
3017	Cow Feed----------	----do----------	----do----------	Dec. 15, '08	----
3000	Crushed Ear Corn Feed -	W. S. White, Elizabeth City, N. C.	W. S. White, Elizabeth City.	Dec. 19, '08	----
3325	Feed----------	Presnell & Walton, Morganton, N. C.	----------	----------	----
3323	Mill Feed----------	Charleston Milling and Produce Co., Charleston, W. Va.	----------	----------	----
3316	Feed----------	Murray & Minges, Claremont, N. C.	----------	----------	----
3313	----do----------	China Grove Roller Mills, China Grove, N. C.	----------	----------	----
3308	----do----------	W. A. Watson & Co., Greensboro, N. C.	----------	----------	----
3295	----do----------	F. M. Thompson, Salisbury, N. C.	----------	----------	----
3213	Mixed Feed----------	Grimes Bros., Lexington, N. C.	Sampled at mill----------	----------	----
3212	----do----------	Conover Roller Mills, Conover, N. C.	----------	----------	----
3178	Mill Feed----------	Horne Bros. & Johnstone, Mocksville, N. C.	----------	----------	----
3176	Mixed Feed ----------	Washburn-Crosby Co., Minneapolis, Minn.	----------	----------	----

POULTRY FEEDS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3168	11.50	3.00	4.50	-----	12.62	3.92	3.91	59.41	8.69	11.45	Cracked corn, whole oats, small amount barley, sorghum seed, several unidentified seed and ground limestone.
3312	11.50	3.00	4.50	-----	11.37	3.05	2.84	64.24	11.64	6.86	Cracked corn, wheat, sorghum seed, few peas, buckwheat, barley and ground limestone.
3224	4.25	3.50	4.00	-----	10.75	4.05	2.12	69.28	10.90	2.90	Cracked corn, cracked wheat, cracked sorghum seed and millet seed.
3230	10.00	3.70	2.30	70.00	11.37	4.21	2.10	70.86	8.02	3.44	Wheat, sorghum seed, sunflower seed, and cracked corn.
3260	10.00	3.00	5.00	-----	11.50	3.61	2.67	69.57	9.26	3.39	Cracked corn, wheat, barley, sorghum seed, oil meal, and ground limestone.
3243	10.00	3.00	5.00	-----	11.37	3.40	2.58	72.72	7.87	2.06	Wheat, sorghum seed, cracked corn, oats, barley, buckwheat and sunflower seed.
3244	10.50	3.00	5.00	-----	10.62	3.07	1.72	70.54	7.71	6.34	Cracked corn, cracked wheat, cracked sorghum seed, millet seed and ground limestone.
3259	10.50	3.00	5.00	-----	10.12	2.42	2.17	66.43	8.34	10.52	do.
3274	11.00	3.00	4.00	-----	11.25	3.94	2.97	65.42	14.25	2.17	Cracked corn, wheat, sorghum seed, barley, buckwheat and sunflower seed.

composed of mixtures of whole and cracked grains in some cases, with the addition of ground limestone.

LANEOUS MIXED FEEDS.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients.
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3019	10.00	7.25	7.50	-----	10.00	6.68	7.80	65.69	7.60	2.23	Ground corn and small amount cob.
3018	11.00	4.00	4.50	-----	9.50	4.28	4.80	70.89	8.49	2.04	Corn chops, wheat bran and oats.
3017	22.00	5.00	5.60	-----	20.25	6.26	5.82	54.55	8.01	5.11	Wheat bran, corn bran, corn meal and cotton-seed meal.
3000	7.43	4.07	3.35	-----	8.00	4.34	2.37	73.22	10.10	1.97	Cracked corn and small amount cob.
3325	-----	-----	-----	-----	16.00	4.10	5.32	59.00	10.62	4.96	Wheat product.
3323	-----	-----	-----	-----	15.25	4.36	6.41	60.29	8.95	4.74	Wheat product and corn bran.
3316	-----	-----	-----	-----	14.87	4.15	4.54	58.18	13.73	4.53	Wheat product.
3313	-----	-----	-----	-----	14.00	3.22	4.90	59.95	13.20	4.73	do.
3308	-----	-----	-----	-----	10.63	3.66	3.68	66.78	12.26	2.99	Wheat and corn product.
3295	-----	-----	-----	-----	15.37	5.09	6.95	56.54	11.35	4.70	Wheat product.
3213	-----	-----	-----	-----	15.15	4.81	7.21	59.69	7.25	5.89	Wheat bran and middlings and small amount corn bran.
3212	-----	-----	-----	-----	14.62	4.58	6.47	62.63	7.10	4.60	Wheat and corn product.
3178	-----	-----	-----	-----	13.75	3.06	6.37	66.83	5.71	4.28	Wheat product.
3176	-----	-----	-----	-----	16.50	5.65	7.55	57.64	7.33	5.33	Wheat product (spring wheat).

ANALYSES OF MISCELLANEOUS

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.	Retail Dealer.	Date of Collection.	Claimed Weight of Package—lbs.
3124	Feed	Lenoir Milling Co., Lenoir, N. C.	Sampled at mill		80
3034	Mill Feed	J. M. Koiner, Grottoes, Va.	Parham Bros. Supply Co., Henderson.	Jan. 8, '09	100
3025	....do	W. H. Parrish, High Point, N. C.			
3301	Feedstuff	North Wilkesboro Roller Mills, North Wilkesboro, N. C.			
3147	Mill Feed	Riverside Milling and Power Co., Cartersville, Ga.	J. Flem Johnson, Gastonia.	Feb. 8, '09	80
3132	Mixed Feed	Asheville Milling Co., Asheville, N. C.	J. H. Pearson, Morganton	Jan. 27, '09	80
3108	Mill Feed	High Point Milling Co., High Point, N. C.	Sampled at mill		80
3075	Feed	J. H. Walker & Co., Reidsville, N. C.	Perry, Wood & Co., Durham.	Jan. 13, '09	100
3069	....do	....do	Sampled at mill	Jan. 21, '09	
3058	....do	....do	Blair & Co., North Wilkesboro.	Jan. 19, '09	100
3027	....do	Hickory Milling Co., Hickory, N. C.			
3026	....do	....do			
3020	Mill Feed	Harmon & de Rundeau, Crimora, Va.	Boykin Grocery Co., Wilson.	Dec. 26, '08	100
3046	....do	....do	R. L. Stroud, Chapel Hill	Jan. 11, '09	100
3160	....do	....do	Sanford Mercantile Co., Sanford.	Feb. 13, '09	100
3302	Mixed Feed	South River Milling Co., Salisbury, N. C.			
3304	Corn and Cob Meal	....do			
3306	Wheat Product	....do			
3113	Mixed Feed	Newport Mill Co., Newport, Tenn.	Thompson Grain and Feed Store, Salisbury.	Jan. 22, '09	80
3114	....do	....do	Max Moses & Co., Salisbury.	Jan. 22, '09	80
3276	....do	....do	W. H. & Ira Plemmons, Hot Springs.	May 10, '09	80
3153	Mill Feed	Henderson Roller Mill Co., Monroe, N. C.	Bruner & Huey, Monroe	Feb. 10, '09	100
3117	Feed	Salisbury Milling Co., Salisbury, N. C.	Overman & Co., Salisbury	Jan. 22, '09	80
3251	....do	....do			
3317	....do	Cabarrus Roller Mills, Concord, N. C.			
3145	Mill Feed	Statesville Flour Mills, Statesville, N. C.	W. F. Redman, Charlotte	Feb. 5, '09	80
3321	....do	....do			
3045	Mixed Feed	Douthat-Riddle Co., Danville, Va.	D. McCauley, Chapel Hill	Jan. 11, '09	100
3150	....do	....do	H. W. Blackwelder, Concord.	Feb. 9, '09	100
3277	....do	....do	Pittman & Best, Goldsboro.	May 28, '09	100

Forty-four samples of Miscellaneous Mixed Feeds were analyzed. Of these, five were below their guarantees in protein, eight were below their guarantees in fat and four were above their guarantees in fiber.

These mixtures are as follows: Pure wheat product, 13; wheat and corn

MIXED FEEDS—CONTINUED.

Laboratory Number.	Guarantee.				Analysis.						Microscopic Examination Shows the Following Ingredients
	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Carbohydrates.	Protein (N x 6.25).	Fat (Ether Extract).	Fiber.	Nitrogen-free Extract.	Moisture.	Ash.	
3124	15.50	5.08	6.50	-----	14.00	4.21	5.73	62.77	8.28	5.01	Wheat and corn products.
3034	14.50	4.00	9.50	-----	17.00	4.87	5.30	60.55	8.70	3.58	Wheat product.
3025	-----	-----	-----	-----	9.37	3.65	4.58	70.93	9.29	2.18	Wheat and corn product.
3301	-----	-----	-----	-----	14.38	4.41	6.45	61.56	9.60	3.60	do.
3147	12.38	4.32	4.43	-----	12.37	4.30	6.89	62.26	8.90	5.28	do.
3132	13.00	3.00	9.50	-----	15.00	4.39	8.40	57.60	8.63	5.98	Wheat bran and middlings.
3108	10.00	3.00	3.50	-----	11.87	4.24	5.85	64.85	9.75	3.44	Wheat and corn product.
3075	12.25	4.00	7.50	-----	12.50	3.34	3.85	68.19	9.07	3.05	do.
3069	12.75	4.60	7.50	-----	11.12	2.80	4.77	70.15	8.42	2.74	do.
3058	12.75	4.80	7.50	-----	13.75	3.83	6.17	64.17	8.46	3.62	do.
3027	-----	-----	-----	-----	12.75	3.62	23.33	49.50	7.50	3.30	Cotton-seed hulls, wheat product, corn bran and cotton-seed meal.
3026	-----	-----	-----	-----	12.62	3.37	26.52	45.97	7.40	4.12	Cotton-seed hulls, wheat and corn bran and cotton-seed meal.
3020	14.50	4.00	8.00	-----	16.00	4.91	7.13	57.39	9.31	5.26	Wheat product.
3046	14.50	4.00	8.00	-----	16.25	4.76	5.35	61.39	8.48	3.77	do.
3160	14.50	4.00	8.00	-----	17.25	5.12	6.20	61.09	5.35	4.99	do.
3302	-----	-----	-----	-----	10.50	3.95	4.55	67.30	11.07	2.63	Wheat and corn product.
3304	-----	-----	-----	-----	7.86	4.32	3.20	72.68	10.50	1.44	Corn and cob meal.
3306	-----	-----	-----	-----	13.88	3.61	5.10	63.05	9.35	5.01	Wheat product.
3113	13.00	4.00	8.00	-----	15.12	5.26	5.18	60.19	9.46	4.79	Wheat and corn product.
3114	13.00	4.00	8.00	-----	14.62	6.00	6.62	60.35	7.70	4.71	do.
3276	13.00	4.00	8.00	-----	11.00	4.72	2.62	65.91	13.51	2.24	do.
3153	16.00	5.00	4.00	-----	16.50	5.52	3.47	61.81	9.77	2.93	Wheat product.
3117	12.00	4.00	10.00	-----	13.25	5.28	7.17	61.93	8.09	4.28	Wheat product and corn bran.
3251	-----	-----	-----	-----	11.87	4.33	4.54	67.94	7.75	3.57	Wheat and corn product.
3317	-----	-----	-----	-----	14.37	4.40	5.94	57.77	12.87	4.65	Wheat product and corn bran.
3145	14.00	4.00	6.00	-----	14.87	5.34	5.73	59.39	9.51	5.16	Wheat and corn products.
3321	-----	-----	-----	-----	15.00	4.47	5.89	59.18	10.27	5.19	Wheat product.
3045	10.40	4.30	10.00	-----	11.12	3.30	8.10	65.61	8.65	3.22	Wheat and corn product, some ground cob.
3150	10.00	4.00	10.00	-----	10.37	3.62	8.10	64.09	10.08	3.74	Wheat product and ground corn, cob and grain.
3277	10.40	4.30	10.00	-----	10.25	4.00	7.80	63.69	11.63	2.63	do.

products, 18; wheat products with corn bran, 3; mixtures of two or more ingredients, usually wheat, corn and cotton-seed products, 3; mixtures containing ground corncob, 7.

MICROSCOPIC EXAM

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.
300 M	Shipstuff	J. Allen Smith & Co., Knoxville, Tenn.
301 M	----do	----do
302 M	----do	----do
303 M	----do	Dunlop Mills, Richmond, Va.
304 M	Sucrene Dairy Feed	American Milling Co., Chicago, Ill.
305 M	Corno Horse and Mule Feed	The Corno Mills Co., East St. Louis, Ill.
306 M	Shipstuff	Dan Valley Mills, Danville, Va.
307 M	----do	----do
308 M	Bran	----do
309 M	----do	----do
310 M	Daisy Middlings	Pillsbury Mills, Minneapolis, Minn.
311 M	Shipstuff	Tennessee Mill Co., Estill Springs, Tenn.
312 M	----do	Piedmont Mills, Lynchburg, Va.
313 M	----do	Dan Valley Mills, Danville, Va.
314 M	Cotton-seed Feed	Statesville Oil and Fertilizer Co., Statesville, N. C.
315 M	Mixed Feed	Asheville Milling Co., Asheville, N. C.
316 M	----do	Newport Mill Co., Newport, Tenn.
317 M	----do	----do
318 M	Wheat Shipstuff	Tennessee Mill Co., Estill Springs, Tenn.
319 M	Bran	Asheville Milling Co., Asheville, N. C.
320 M	Mixed Feed	----do
321 M	Acme Feed	Acme Milling Co., Talbot, Tenn.
322 M	Shipstuff	Tennessee Mill Co., Estill Springs, Tenn.
323 M	Shipstuff	Mountain City Mill Co., Chattanooga, Tenn.
324 M	Mixed Feed	Newport Mill Co., Newport, Tenn.
325 M	Acme Feed	Acme Milling Co., Talbot, Tenn.
326 M	Shipstuff	J. Allen Smith & Co., Knoxville, Tenn.
327 M	----do	Dunlop Mills, Richmond, Va.
328 M	----do	Piedmont Mills, Lynchburg, Va.
329 M	----do	Tennessee Mill Co., Estill Springs, Tenn.
330 M	Middlings	The Northwestern Consolidated Milling Co., Minneapolis, Minn.
331 M	Bran	Piedmont Mills, Lynchburg, Va.
332 M	Shipstuff	----do
333 M	----do	Harrisonburg Milling Co., Harrisonburg, Va.
334 M	----do	Mountain City Mill Co., Chattanooga, Tenn.
335 M	----do	J. Allen Smith & Co., Knoxville, Tenn.

INATION OF FEEDS.

Laboratory Number.	Retail Dealer.	Microscopic Examination Shows the Following Ingredients.
300 M	T. P. Nash, Elizabeth City	Wheat product and corn bran.
301 M	Zimmerman & Co., Elizabeth City	do.
302 M	City Hay and Grain Co., Elizabeth City	do.
303 M	Wiggins Grocery Co., Wilson	Wheat product.
304 M	C. Woodard Co., Wilson	Screenings, wheat middlings, cotton-seed meal, small amount hulls and molasses.
305 M	Wilson Grocery Co., Wilson	Alfalfa meal, cracked corn, oats and oat hulls.
306 M	Horner Bros. Co., Oxford	Wheat product.
307 M	J. D. Brooks, Oxford	do.
308 M	H. H. Patterson, Chapel Hill	Wheat bran.
309 M	F. M. Poore, Mount Airy	Wheat bran and small amount screenings.
310 M	A. G. Bauman, Mount Airy	Wheat middlings.
311 M	F. M. Carlton, Durham	Wheat product.
312 M	Elmore-Maxwell Co., Greensboro	do.
313 M	J. W. Jones & Co., Greensboro	do.
314 M	J. B. Gill, Statesville	Cotton-seed hulls and meal.
315 M	W. M. Goodson, Marion	Wheat product and corn bran.
316 M	J. D. Blanton, Marion	do.
317 M	S. K. Breeding & Co., Hendersonville	do.
318 M	G. Y. Hyder, Hendersonville	Wheat product.
319 M	Asheville Grain and Hay Co., Asheville	do.
320 M	----do	Wheat product and corn bran.
321 M	J. C. Bennett & Co., Waynesville	Wheat and corn product (corn bran).
322 M	Haywood Grocery Co., Waynesville	Wheat product.
323 M	----do	do.
324 M	Wampum Department Store, Lincolnton	Wheat product and corn bran.
325 M	F. D. Barkley & Co., Gastonia	Wheat and corn product (corn bran).
326 M	The Lane-Thompson Co., Lincolnton	Wheat and corn product.
327 M	Patterson Grocery Co., Concord	Wheat product.
328 M	W. J. Glass, Concord	do.
329 M	Chas. Blume, Concord	do.
330 M	J. D. Horne, Wadesboro	Wheat middlings.
331 M	F. C. Allen & Co., Wadesboro	Wheat bran.
332 M	----do	Wheat product.
333 M	W. I. Everett, Rockingham	do.
334 M	H. D. Baldwin, Rockingham	Wheat and corn product (corn bran).
335 M	Keith & Co., Aberdeen	Wheat and corn product.

MICROSCOPIC EXAMINATION

Laboratory Number.	Brand Name from Label.	Manufacturer or Wholesaler.
336 M	Bran	Asheville Milling Co., Asheville, N. C.
337 M	Middlings	Dunlop Milling Co., Clarksville, Tenn.
338 M	Shipstuff	J. Allen Smith & Co., Knoxville, Tenn.
339 M	Pure Wheat Shorts	Liberty Mills, Nashville, Tenn.
340 M	Shipstuff	Piedmont Mills, Lynchburg, Va.
341 M	Cinco Cotton-seed Meal Feed	Southern Cotton Oil Co., Charlotte, N. C.
342 M	Purina Feed	Ralston Purina Co., St. Louis, Mo.
343 M	Pure Shipstuff	Holt Granite Mfg. Co., Haw River, N. C.
344 M	Shipstuff	Ballard & Ballard Co., Louisville, Ky.
345 M	Daisy Middlings	Pillsbury Mills, Minneapolis, Minn.
348 M	Feed	
349 M	Pure Wheat Shipstuff	Statesville Flour Mills Co., Statesville, N. C.
350 M	Feed	J. H. Walker & Co., Reidsville, N. C.
351 M	Shipstuff	Dan Valley Mills, Danville, Va.
353 M	Peerless Feed	J. Allen Smith & Co., Knoxville, Tenn.
354 M	Shorts	
355 M	Rye Feed	M. G. Rankin & Co., Milwaukee, Wis.
356 M	Pure Wheat Shorts	Tennessee Mill Co., Estill Springs, Tenn.
357 M	Hominy Feed	Southern Mills, Nashville, Tenn.
359 M	Pure Wheat Bran	Mountain City Mill Co., Chattanooga, Tenn.
360 M	----do	----do
361 M	Bran	Eagle Milling Co., Siler City, N. C.
362 M	Shipstuff	----do
363 M	Bran	Read Bros., Morristown, Tenn.
364 M	Shorts	----do
365 M	Bran and Shorts	----do
366 M	White Shorts	----do
367 M	Pure Wheat Middlings	Dunlop Milling Co., Clarksville, Tenn.
368 M	Peerless Feed	J. Allen Smith & Co., Knoxville, Tenn.
369 M	Corn Meal	
370 M	Royal Feed	C. L. Spencer, New Bern, N. C.

OF FEEDS—CONTINUED.

Laboratory Number.	Retail Dealer.	Microscopic Examination Shows the Following Ingredients.
336 M	Cochrane-McLaughlin Co., Charlotte	Wheat bran.
337 M	J. Flem Johnson, Gastonia	Wheat middlings.
338 M	W. T. Buchanan, Sanford	Wheat product.
339 M	H. S. Toms, Rutherfordton	Wheat middlings.
340 M	L. H. Adams, Raleigh	Wheat product.
341 M	L. S. Rochelle, Durham	Cotton-seed meal and hulls.
342 M	Allen-Owens Co., Durham	Alfalfa meal, cracked corn, oats and dried brewers' grains.
343 M	Blackman & Ferrall, Graham	Wheat product and corn bran.
344 M	Alonzo Thomas, Beaufort	Wheat product.
345 M	H. Schaffer, Mount Airy	Wheat middlings.
348 M	J. C. Kinett, Franklinville	Wheat and corn product.
349 M	Crowder & Rand, Raleigh	Wheat product.
350 M	Peebles Bros., Raleigh	Wheat and corn product.
351 M	----do	Wheat product.
353 M	E. W. Morris, Franklinton	Wheat and corn product.
354 M	Pearce, Williams & Co., Youngsville	Wheat product and corn meal.
355 M	James & Davis, Walnut Cove	Rye product.
356 M		Wheat middlings.
357 M	W. T. Buchanan, Sanford	Corn product.
359 M	J. H. Jenkins, Asheville	Wheat bran.
360 M	Asheville Grocery Co., Asheville	do.
361 M		do.
362 M		Wheat product.
363 M		Wheat bran.
364 M		Wheat middlings.
365 M		Wheat bran and middlings.
366 M		Wheat middlings.
367 M	C. Woodard Co., Wilson	do.
368 M	J. T. Winstead, Macclesfield	Wheat and corn product.
369 M	E. C. McLaurin, Stedman	Corn meal.
370 M		Corn chops, cotton-seed meal, wheat bran, whole oats.

SUMMARY.

Wheat Bran and Mixed Brans.—Sixty-four samples were analyzed. Seventeen are below the guarantee in protein, nine are below the guarantee in fat and eleven are above the guarantee in fiber.

Fifty-two of these are pure wheat bran; six are mixtures of wheat and corn bran; four are mixed products and two are wheat bran adulterated with corncobs.

Middlings or Shorts.—Sixty-five samples were analyzed. Eight are below the guarantee in protein, seven are below in fat and fifteen are above the guarantee in fiber.

Bran and Shorts.—Fourteen samples were analyzed. Two are below the guarantee in protein, one is below in fat and two are above the guarantee in fiber.

Thirteen of these samples are pure wheat products; one is a wheat and corn product.

Shipstuff.—Fifty-four samples were analyzed. Thirteen are below the guarantee in protein, six are below in fat and seven are above the guarantee in fiber.

Forty-three of these samples are pure wheat products; four are wheat and corn products; four are wheat products and corn bran; two are wheat and corn products with cob meal, and one is a mixture of wheat, rye and oat products with corn meal.

Rye Feeds.—Eight samples were analyzed. All of them are above the guarantees in protein and fat and below the guarantees in fiber.

Corn and Oat Feeds.—Eight samples were analyzed. Four are below the guarantee in protein; four are below in fat. All of them came under the guarantee in fiber.

Rice Feeds.—Three samples were analyzed. Two are below the guarantee in protein, two are below in fat and two are above the guarantee in fiber.

Dried Beet Pulp.—Three samples were analyzed. All of these samples exceed the guarantees in protein and fat and are well under the guarantees in fiber.

Chop Feeds.—Nine samples were analyzed. Five are below the guarantee in protein, four in fat and seven above the guarantee in fiber.

Three of these samples contain ground corncob; two are wheat and corn products, and five are ground corn.

Cracked Corn.—Seventeen samples were analyzed. Fifteen are below the guarantee in protein, only one sample coming up to the guarantee; five are below the guarantee in fat. All of the samples come well under the guarantee in fiber.

Molasses Feeds.—Twenty-one samples were analyzed. Four are below the guarantee in protein, four are below in fat and three are above the guarantee in fiber. Two samples contain a small amount of salt.

Alfalfa Feeds.—Twenty-two samples were analyzed. Six are below the guarantee in protein, eight are below in fat and seven are above the guarantee in fiber. Eight samples contain a small amount of salt.

Cotton-seed Meal Feeds.—Twenty-two samples were analyzed. Seven are below the guarantee in protein and three in fat. All the samples having fiber guarantees came under the guarantee.

Peanut Meals.—Only two samples were analyzed. These were sent in by the manufacturers, and hence are not accompanied by a guarantee.

Linseed Meals.—Only two samples were taken. Both of these are old process meals. They come up to the guarantees and are both of good quality.

Special Mixed Feeds.—Fourteen samples were analyzed. Five are below the guarantee in protein, one in fat and two above the guarantee in fiber.

These feeds are composed of mixtures of wheat products, wheat and corn products and corn bran, wheat and corn products with the addition of cotton-seed meal or oil meal, and two samples contain distillers' grains, malt sprouts and brewers' grains. Only one sample contained ground corncob.

Poultry Feeds.—Nine samples were analyzed. All of them came up to the guarantees. As will be seen from the microscopic examination, these feeds are composed of mixtures of whole and cracked grains in some cases, with the addition of ground limestone.

Miscellaneous Mixed Feeds.—Forty-four samples were analyzed. Five are below the guarantees in protein, eight are below in fat and four above the guarantees in fiber.

These mixtures are as follows: Pure wheat products, 13; wheat and corn products, 18; wheat products with corn bran, 3; mixtures of two or more ingredients, usually wheat, corn and cotton-seed products, 3; mixtures containing ground corncob, 7.

Microscopic Examinations on Feeds Not Analyzed.—Sixty-seven samples were examined that were not analyzed chemically.

Cotton-seed Meals.—Ninety-five samples were analyzed. Twenty-five are below the guarantee of 6.18 per cent nitrogen or 7.50 per cent ammonia (38.62 per cent protein).

INSPECTION AND ANALYSIS OF COTTON-SEED MEAL.

The Cotton-seed Meal Law of this State requires that all cotton-seed meal sold in the State shall contain 6.18 per cent nitrogen (equivalent to 7.50 per cent ammonia and 38.63 per cent protein) or more. Ninety-five samples of cotton-seed meal have been analyzed. These samples were taken in different parts of the State at different times, and represent the quality of this product that is offered for sale in the State. Twenty-five of the samples analyzed, or 26.3 per cent, were below the standard of 6.18 per cent nitrogen.

ANALYSES OF COTTON-SEED MEAL.

Laboratory Number.	Name and Address of Manufacturer.	Per Cent Nitrogen Guaranteed.	Equivalent to Ammonia.	Per Cent Nitrogen Found.	Equivalent to Ammonia.	Per Cent Protein Found.
2567	Battleboro Oil Co., Battleboro, N. C.	6.18	7.50	6.70	8.13	41.88
2429	....do	6.18	7.50	6.58	7.99	41.13
2530	....do	6.18	7.50	6.30	7.65	39.38
2443	....do	6.18	7.50	6.64	8.06	41.50
2433	....do	6.18	7.50	6.18	7.58	38.63
2476	....do	6.18	7.50	6.08	**7.38**	38.00
2474	....do	6.18	7.50	6.06	**7.36**	37.88
2413	....do	6.18	7.50	5.98	**7.26**	37.38
2558	Blacksburg Oil Mill, Blacksburg, S. C.	6.18	7.50	6.78	8.23	42.38
2569	Chatham Oil Co., Pittsboro, N. C.	6.18	7.50	6.42	7.79	40.13
2425	Consumers Cotton Oil Co., Tarboro, N. C.	6.18	7.50	6.18	7.50	38.63
2440	Dunn Oil Mill Co., Dunn, N. C.	6.18	7.50	6.72	8.16	42.00
2457	....do	6.18	7.50	6.70	------	41.88
2551	Eastern Cotton Oil Co., Hertford, N. C.	6.18	7.50	6.68	8.11	41.75
4006	....do	6.18	7.50	6.20	7.53	38.75
2427	....do	6.18	7.50	6.12	**7.45**	38.25
2479	....do	6.18	7.50	6.08	**7.38**	38.00
4009	....do	6.18	7.50	5.94	**7.21**	37.13
2465	....do	6.18	7.50	5.86	**7.11**	36.63
2528	Elba Manufacturing Co., Charlotte, N. C.	6.18	7.50	6.38	7.75	39.88
2431	Farmers Cotton Oil Co., Wilson, N. C.	6.18	7.50	6.50	7.86	40.63
2453	....do	6.18	7.50	6.26	7.60	39.13
2584	Farmers Oil Mill, Gaffney, S. C.	6.18	7.50	6.82	8.28	42.63
2418	Fremont Oil Mill Co., Fremont, N. C.	6.18	7.50	6.54	7.94	40.88
2451	Havens Oil Co., Washington, N. C.	6.18	7.50	6.36	7.72	39.75
2518	....do	6.18	7.50	6.24	7.58	39.00
2423	....do	6.18	7.50	5.88	**7.14**	36.75
2412	Kings Mountain Cotton Oil Co., Kings Mountain, N. C.	6.18	7.50	7.12	8.64	44.50
2562	....do	6.18	7.50	7.06	8.57	44.13
2513	Laurinburg Oil Co., Laurinburg, N. C.	6.18	7.50	6.84	7.87	42.75
2404	....do	6.18	7.50	------	------	------
2526	....do	6.18	7.50	5.90	**7.16**	36.88
4005	Lorene Cotton Oil Mill, Mooresville, N. C.	6.18	7.50	6.76	8.21	42.25
2463	Louisburg Cotton Oil Mills, Louisburg, N. C.	6.18	7.50	7.06	8.57	44.13
2507	....do	6.18	7.50	6.80	8.26	42.50
2430	....do	6.18	7.50	6.08	**7.38**	38.00

ANALYSES OF COTTON-SEED MEAL—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Per Cent Nitrogen Guaranteed.	Equivalent to Ammonia.	Per Cent Nitrogen Found.	Equivalent to Ammonia.	Per Cent Protein Found.
2508	Lumberton Cotton Oil and Ginning Co., Lumberton, N. C.	6.18	7.50	5.94	**7.21**	37.13
2515	Morgan Oil and Fertilizer Co., Red Springs, N. C.	6.18	7.50	6.44	7.82	40.25
2543	----do	6.18	7.50	6.24	7.58	39.00
2579	McCaw Manufacturing Co., Macon, Ga.	6.18	7.50	6.26	7.60	39.13
2441	Nashville Cotton Mill Co., Nashville, N. C.	6.18	7.50	6.68	8.11	41.75
2467	New Bern Cotton Oil and Fertilizer Mills, New Bern, N. C.	6.18	7.50	6.70	8.13	41.88
2466	----do	6.18	7.50	6.62	8.04	41.38
2544	----do	6.18	7.50	6.36	7.72	39.75
2422	----do	6.18	7.50	6.38	7.75	39.88
2546	North Carolina Cotton Oil Co., Charlotte, N. C.	6.18	7.50	7.06	8.57	44.13
2527	----do	6.18	7.50	6.38	7.75	39.88
2420	----do	6.18	7.50	6.20	7.53	38.75
2542	----do----Henderson, N. C.	6.18	7.50	6.00	**7.28**	37.50
2416	----do----Wilmington, N. C.	6.18	7.50	6.08	**7.38**	38.00
2511	----do	6.18	7.50	6.12	**7.43**	38.25
2437	----do	6.18	7.50	6.08	**7.38**	38.00
2469	----do	6.18	7.50	6.34	7.70	39.63
2456	----do	6.18	7.50	6.06	**7.36**	37.88
2458	----do	6.18	7.50	5.92	**7.19**	37.00
2411	Pine Level Oil Mill Co., Pine Level, N. C.	6.18	7.50	6.68	8.11	41.75
2549	----do	6.18	7.50	6.42	7.79	40.13
2492	----do	6.18	7.50	6.34	7.70	39.63
2407	----do	6.18	7.50	6.18	7.50	38.63
2432	Planters Cotton-seed Oil Co., Rocky Mount, N. C.	6.18	7.50	5.96	7.24	37.25
2428	Rowland Oil and Fertilizer Co., Rowland, N. C.	6.18	7.50	6.22	7.55	38.88
2442	Southern Cotton Oil Co., Battleboro, N. C.	6.18	7.50	6.44	7.82	40.25
2525	----do----Charlotte, N. C.	6.18	7.50	6.20	7.55	38.75
2575	----do----Concord, N. C.	6.18	7.50	6.40	7.77	40.00
2580	----do----Conetoe, N. C.	6.18	7.50	6.70	8.13	41.88
2449	----do	6.18	7.50	6.54	7.94	40.88
2445	----do	6.18	7.50	6.16	7.48	38.50
2419	----do	6.18	7.50	5.54	**6.73**	34.63
2460	----do----Fayetteville, N. C.	6.18	7.50	6.60	8.01	41.25
2439	----do	6.18	7.50	6.44	7.82	40.25
2545	----do----Gastonia, N. C.	6.18	7.50	6.74	8.18	42.13
2560	----do----Gibson, N. C.	6.18	7.50	6.36	7.72	39.75

ANALYSES OF COTTON-SEED MEAL—CONTINUED.

Laboratory Number.	Name and Address of Manufacturer.	Per Cent Nitrogen Guaranteed.	Equivalent to Ammonia.	Per Cent Nitrogen Found.	Equivalent to Ammonia.	Per Cent Protein Found.
2424	Southern Cotton Oil Co., Goldsboro, N. C.	6.18	7.50	6.52	7.92	40.75
2414	....do	6.18	7.50	6.46	7.84	40.38
2438	....do	6.18	7.50	6.36	7.72	39.75
2454	....do	6.18	7.50	6.36	7.72	39.75
2517	....do	6.18	7.50	6.34	7.70	39.63
2516	....do....Monroe, N. C.	6.18	7.50	6.82	8.28	42.63
2573	....do....Rocky Mount, N. C.	6.18	7.50	6.42	7.79	40.13
2514	....do....Selma, N. C.	6.18	7.50	6.50	7.89	40.63
2557	....do	6.18	7.50	6.16	**7.48**	38.50
2561	....do....Shelby, N. C.	6.18	7.50	6.66	8.09	41.63
2470	....do....Tarboro, N. C.	6.18	7.50	6.32	7.67	39.50
2421	....do....Union, S. C.	6.18	7.50	5.90	**7 16**	36.88
2415	....do....Wilson, N. C.	6.18	7.50	6.04	**7.33**	37.75
2504	....do	6.18	7.50	5.98	**7.26**	37.38
2510	Speed Milling Co., Speed, N. C.	6.18	7.50	6.24	7.58	39.00
2512	Spring Hope Cotton Oil Co., Spring Hope, N. C.	6.18	7.50	6.86	8.33	42.88
2576	Statesville Oil and Fertilizer Co., Statesville, N. C.	6.18	7.50	6.76	8.21	42.25
2559	....do	6.18	7.50	6.68	8.11	41.75
2452	Tar River Oil Co., Tarboro, N. C.	6.18	7.50	6.92	8.40	43.25
2434	Verner Oil Co., Lattimore, N. C.	6.18	7.50	6.80	8.26	42.50
2578	Victor Cotton Oil Co., Gaffney, S. C.	6.18	7.50	6.72	8.16	42.00
2455	Wilson Oil Mills, Wilson, N. C.	6.18	7.50	5.94	**7.22**	37.13
2566	Zebulon Cotton Oil Co., Zebulon, N. C.	6.18	7.50	6.42	7.79	40.13

LEAF TOBACCO SALES FOR OCTOBER, 1909.

Pounds sold for producers, first hand	27,009,158
Pounds sold for dealers	868,517
Pounds resold for warehouses	1,838,688
Total	29,716,363

THE BULLETIN

OF THE

NORTH CAROLINA

DEPARTMENT OF AGRICULTURE,

RALEIGH.

Volume 30. DECEMBER, 1909. Number 12

TENTH ANNUAL REPORT

ON

FOOD ADULTERATION

UNDER THE PURE FOOD LAW.

PUBLISHED MONTHLY AND SENT FREE TO CITIZENS ON APPLICATION.

ENTERED AT THE RALEIGH POST-OFFICE AS SECOND-CLASS MAIL MATTER.

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*Assigned by the Bureau of Soils, United States Department of Agriculture.

RALEIGH, December 10, 1909.

SIR:—I submit herewith manuscript covering the investigations that have been made during the past year under the State Food Law, chapter 368, Laws of 1907. I recommend its publication as the December Bulletin and Tenth Annual Food Report.

Yours truly,

W. M. ALLEN,
State Food Chemist.

To HON. W. A. GRAHAM,
Commissioner of Agriculture.

REPORT ON FOOD ADULTERATION FOR 1909.

By W. M. ALLEN, State Food Chemist,

Assisted by HAMPDEN HILL.*

A general statement, decisions of the court, an extract from the Food Law, rules on labeling, a notice regarding the action of the Commissioner relative to the use of benzoate in food, comments on the use of chemical preservatives in food, a summary of results obtained during previous years, and the results of the examination of food products for the year 1909—constituting the tenth annual report under the Food Law—are presented in the following pages.

PROSECUTIONS UNDER THE FOOD LAW.

During the year eight violations have been sent to the State solicitors for prosecution under the Food Law. The following have been concluded, with the results stated below:

State v. Sol Caslar, in Buncombe County Superior Court, for the sale of adulterated vinegar. Defendant pleaded guilty and was fined $25 and cost.

State v. Peter Kernan, trading as Carolina Butter and Egg Company, in Buncombe County Superior Court, for the sale of adulterated butter. Defendant pleaded guilty, and was fined $50 and cost.

State v. James Dillingham, in Buncombe County Superior Court, for obstructing an officer in the performance of duty. Defendant pleaded guilty, and was fined $10 and cost.

State v. J. K. Boynton, in Buncombe County Superior Court, for obstructing an officer in the performance of duty. Defendant pleaded guilty, and was fined $10 and cost.

GENERAL STATEMENT.

When of general interest or when it will facilitate the enforcement of the Food Law, examinations will be made of food or beverage for parties within the State, provided samples of same are taken and sent to the Food Chemist in accordance with instructions from the Department, and the required information concerning the sample is furnished.

Results of analyses are sent to parties sending samples and parties from whom samples are obtained by the Department, as well as the manufacturer of the products.

It is the desire of the Department to put information into the hands of manufacturers, dealers and consumers of food, and to assist

*Resigned November 1, 1909.

them in every way it can to know and manufacture, handle and use the best, most desirable and most wholesome food products. The Food Control is in the interest of the honest manufacturer, the honest dealer, and for the protection of the consumer.

EXTRACT FROM FOOD LAW.

The following extract from the Pure Food Law is very important, and the same is herewith printed in order that the grocerymen may become more familiar with the requirements of the law.

State Food Law, section 6, defines and describes what constitutes food adulteration. Section 7 defines and describes what constitutes the misbranding of food products. Section 9 provides for a guaranty by which the retail dealer may be exempt from prosecution for violation of the law.

EXTRACT FROM FOOD LAW.

SEC. 6. That for the purpose of this act an article shall be deemed to be adulterated, in the case of food—

First. If any substance has been mixed or packed with it, so as to reduce or lower or injuriously affect its quality or strength.

Second. If any substance has been substituted wholly or in part for the article.

Third. If any valuable constituent of the article has been wholly or in part abstracted.

Fourth. If it be mixed, colored, powdered, coated, or stained in a manner whereby damage or inferiority is concealed.

Fifth. If it contains any added poisonous or other added deleterious ingredient which may render such article injurious to health. If it contains any of the following substances, which are hereby declared deleterious and dangerous to health when added to human food, to-wit: Colors which contain antimony, arsenic, barium, lead, cadmium, chromium, copper, mercury, uranium, or zinc; or the following colors: gamboge, corallin, picric acid, aniline, or any of the coal-tar dyes; dulcin, glucin, or any other artificially or synthetically prepared substitute for sugar except saccharine; paraffin, formaldehyde, beta-naphthol, abrastol, benzoic acid or benzoates, salicylic acid or salicylates, boric acid or borates, sulphurous acid or sulphites, hydrofluoric acid or any fluorine compounds, sulphuric acid or potassium sulphate or wood alcohol: *Provided*, that catsups and condimental sauces may, when the fact is plainly and legibly stated in the English language on the wrapper and label of the package in which it is retailed, contain not to exceed two-tenths of one per cent of benzoic acid or its equivalent in sodium benzoate. Fermented liquors may contain not to exceed two-tenths of one per cent of combined sulphuric acid and not to exceed eight-thousandths of one per cent of sulphurous acid.

Sixth. If it consists in whole or in part of a filthy, decomposed or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal or one that had died otherwise than by slaughter. In addition to the ways already provided, sausage shall be deemed to be adulterated if it is composed in any part of liver, lungs, kidneys or other viscera of animals: *Provided*, that the use of animal intestines as sausage casings shall not be deemed to be an adulteration.

Seventh. If it differs in strength, quality or purity from the standard of purity of food products that have been or may be from time to time adopted by the Board of Agriculture.

SEC. 7. That the term "misbranded," as used herein, shall apply to all drugs or articles of food, or articles which enter into the composition of food, the package or label of which shall bear any statement, design or device regarding

such article or the ingredients or substances contained therein which shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to the State, Territory or country in which it is manufactured or produced.

That for the purpose of this act an article shall also be deemed to be misbranded, in the case of food—

First. If it be an imitation of or offered for sale under the distinctive name of another article.

Second. If it be labeled or branded so as to deceive or mislead the purchaser, or purport to be a foreign product when not so, or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such package, or if it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilide, or any derivative or preparation of any such substances contained therein.

Third. If in package form and the contents are stated in terms of weight or measure, they are not plainly and correctly stated on the outside of the package.

Fourth. If the package containing it or its label shall bear any statement, design or device regarding the ingredients or the substances contained therein, which statement, design or device shall be false or misleading in any particular: *Provided*, that an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in the following cases:

First. In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the same label or brand with a statement of the place where said article has been manufactured or produced.

Second. In the case of articles labeled, branded or tagged so as to plainly indicate that they are compounds, imitations or blends, and the word "compound," "imitation," or "blend," as the case may be, is plainly stated on the package in which it is offered for sale: *Provided*, the labeling is according to the rules prescribed by the Board of Agriculture: *Provided*, that the term "blend," as used herein, shall be construed to mean a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only.

SEC. 9. That no dealer shall be prosecuted under the provisions of this act when he can establish a guaranty signed by the wholesaler, jobber, manufacturer or other party, residing in North Carolina, from whom he purchased such articles, to the effect that the same is not adulterated or misbranded within the meaning of this act, designating it.

RULES OF THE STATE BOARD OF AGRICULTURE UNDER THE FOOD LAW IN REGARD TO LABELING FOOD PRODUCTS.

A label must be, as far as possible, attached to each package, and contain, in addition to other information, the name of the material, the name and address of the manufacturer, importer or jobber. When the words "artificial," "imitation," "compound," "adulterated," or other words of similar import, are required, they must be on the principal label and immediately precede or follow the word or words they modify, which must be the principal word or words of the label, and be in at least half the size and same style of type and on the same kind of background as the word or words with which they are closely associated. The principal words in the label must be printed in either dark-colored letters on a light-colored background or light-colored let-

ters on a dark-colored background. Any statement that is required on the principal label of a barrel or cask of molasses, molasses compound, syrup or compound syrup, vinegar or compound vinegar, must appear on one end or head of the barrel or cask; and if the principal label or any part of it appears on both ends of barrel or cask, they shall be identical, one to the other.

The label on bottled soft drinks must bear the name and address of the bottler.

Where the presence of preservatives, coloring matter or other substance or substances is required to be printed on the label, the printing must be done clearly and conspicuously on the label, in type not smaller than *brevier heavy gothic caps,* and on the same kind of background as the rest of the label.

Retail dealers, while offering food or beverage for sale, must keep the label so that it may be seen by purchaser or inspector, and the label must be so kept that it will remain legible.

ACTION OF THE COMMISSIONER RELATIVE TO THE USE OF BENZOATE.

As the highest authorities differ regarding the effect of benzoate of soda on digestion and health, and as it appears that the constitutionality of the State law that forbids its use in food depends largely upon its effect on health, and as the attorney for the Department, under the circumstances, advises it, until further notice no prosecution will be made for the use of benzoate of soda in food in quantities not exceeding one-tenth of one per cent (0.1), provided that its presence is plainly stated on the principal label of the package in letters not smaller than eight point (brevier) caps.

THE USE OF CHEMICAL PRESERVATIVES IN FOOD PRODUCTS.

Food products that contain much moisture naturally tend to decompose or decay, especially in warm weather. Various means, such as drying, sterilizing by heat in air-tight containers, preserving and pickling with the natural food preservatives, such as sugar, salt, vinegar, spices, etc., are employed to prevent the decomposition of such products and to keep them in a suitable condition for food. These processes have long been in use and are recognized as being wholesome. These natural food preservatives are sometimes supplemented with another class of preservatives known as antiseptics or chemical preservatives, which are more or less poisonous in their nature.

While all food products can be kept in good condition by the natural methods above mentioned, there are a few, such as crushed fresh fruit, apple cider, etc., to which the application of the natural methods tend to either render less desirable or too expensive for general use. In these few products there is some reason for the use of a chemical

preservative to keep them in good condition; but in most products, especially in such as condensed milk, canned meats, canned soups, canned vegetables, canned fruit, mince-meat, preserves, jam, jelly, pickles, etc., there is absolutely no need for the use of a chemical preservative. The high-class manufacturers of this country have shown beyond a doubt that chemical preservatives are unnecessary in such products. A few manufacturers claim that a better product can be made by the use of a chemical preservative than can be made without it. The facts in the case, however, do not bear out their statement. The results of the examinations of this Department during the past ten years show that chemical preservatives have not been used in the higher class products; but, on the contrary, they were found in the lower, cheaper grades, that were often otherwise adulterated. If a better product can be made by the use of a chemical preservative, then why has the use of the chemical preservative been confined so much to the inferior and often otherwise adulterated products instead of the higher class ones? And why have most of the high-class manufacturers either never used or have discontinued the use of chemical preservatives? It would seem that the only conclusion is that the preservative was not and is not used to improve the quality of the product, but to cheapen it. That being the case, then why use a product that contains a chemical that may be injurious to health? The effect of benzoate of soda on health is a disputed question, of course; but why take the risk of permanent injury to health that may produce an earlier death when there is no need for it?

After having made experiments for the government to test the effect of benzoate of soda on health, one set of officials say that it is injurious to health; another set say that it is not. Many State officials think the use of benzoate in food objectionable, and the Medical Association of America, composed of the leading physicians of the country, has condemned its use in food. Then, if just as good products can be made without the use of benzoate as can be made with it, why use a product that is questionable, and probably injurious to health? If benzoate is injurious to health, or even questionable, the question arises, then, why not prevent its use in food by law? The answer is this: If benzoate in food is not injurious to health, the State probably cannot prevent its use. To-day no man can say with certainty that it is or is not injurious to health. Manufacturers only who profit by its use have questioned the constitutional right of States to prohibit its use. The matter is now before the Federal courts to determine whether States have the power to prevent the use of benzoate or not.

It is to be hoped that the mattter will soon be settled by the courts. Until that time, we can only warn the public of the possible danger and advise against the use of benzoate in food.

SUMMARY OF RESULTS FOR COMPARISON.

For convenience of comparison of the work for the ten years, and to show at a glance the products which have been examined, and the extent of adulteration, misbranding and improper labeling of each, a summary of the results by year and by subject is given below.

SUMMARY OF WORK DONE BY YEAR.

1900. No. of samples examined, 507; per cent adulteration found, 56.0.
1901. No. of samples examined, 308; per cent adulteration found, 35.7.
1902. No. of samples examined, 589; per cent adulteration found, 21.3.
1903. No. of samples examined, 477; per cent adulteration found, 32.1.
1904. No. of samples examined, 347; per cent adulteration found, 17.0.
1905. No. of samples examined, 317; per cent adulteration found, 42.2.
1906. No. of samples examined, 466; per cent adulteration found, 24.7.
1907. No. of samples examined, 560; per cent adulteration found, 29.82.
1908. No. of samples examined, 730; per cent adulteration found, 16.45.
1909. No. of samples examined, 721; per cent adulteration found, 21.35.

Total number of samples examined since the law went into effect (1900), 5,022.

Average per cent of adulteration found, 25.74.

Name of Sample.	*Date.*	*Total No. Samples.*	*Per Cent Illegal.*
Baking Powders	1901	85	18.80
Baking Powders	1902	12	
Baking Powders	1906	64	1.50
Baking Powders	1908	7	2.56
Baking Powders	1909	39	
Beers—1900, 1902, etc. See Malts.			
Beers and Imitation Beers	1907	50	6.00
Beers and Imitation Beers	1908	86	4.64
Beers and Imitation Beers	1909	40	10.00
Breakfast Foods	1900	24	4.11
Breakfast Foods	1903	20	
Breakfast Foods	1904	39	
Breakfast Foods	1908	19	
Butter, Renovated Butter and Butterine	1900	11	
Butter, Renovated Butter and Butterine	1902	22	
Butter, Renovated Butter and Butterine	1904	15	
Butter, Renovated Butter and Butterine	1906	20	
Butter, Renovated Butter and Butterine	1908	10	20.00
Butter, Renovated Butter and Butterine	1909	54	18.51
Canned Fruit	1902	37	21.72
Canned Fruit	1904	96	42.98
Canned Fruit	1908	16	
Canned Fruit	1909	33	3.03
Canned Fish and Oysters	1904	53	1.88
Canned Meats	1904	33	39.39
Canned Vegetables	1900	225	33.46
Canned Vegetables	1902	81	11.60
Canned Vegetables	1904	47	27.10
Canned Vegetables	1905	29	

Name of Sample.	Date.	Total No. Samples.	Per Cent Illegal.
Canned Vegetables	1908	21	
Canned Vegetables	1909	16	
Canned Soups	1906	26	
Canned Soups	1907	4	
Catsups and Sauces	1900	43	91.61
Catsups and Sauces	1902	22	100.00
Catsups and Sauces	1903	49	100.00
Catsups and Sauces	1907	11	27.27
Catsups and Sauces	1908	4	25.00
Catsups and Sauces	1909	12	
Ciders and Imitation Ciders	1900	3	100.00
Ciders and Imitation Ciders	1902	2	50.00
Ciders and Imitation Ciders	1903	1	100.00
Ciders and Imitation Ciders	1905	33	81.82
Ciders and Imitation Ciders	1908	40	27.50
Ciders and Imitation Ciders	1909	38	51.89
Cheese	1902	33	6.00
Cheese	1904	11	
Chocolate	1904	10	20.00
Cocoa	1904	14	
Coffee	1900	55	36.30
Coffee	1903	38	
Coffee and Coffee Substitutes	1907	6	33.33
Coloring Matter	1907	7	
Coloring Matter	1908	12	
Condensed Milk	1907	16	
Condensed Milk	1909	2	50.00
Condiments	1901	44	20.40
Confectionery	1908	42	
Confectionery	1909	4	25.00
Corn Meal	1902	17	
Corn Meal	1903	23	
Corn Meal	1908	20	
Corn Meal	1909	23	
Distilled Liquors	1903	3	
Distilled Liquors	1904	14	
Distilled Liquors	1906	28	
Distilled Liquors	1907	6	
Distilled Liquors	1908	30	6.66
Distilled Liquors	1909	7	
Dried and Evaporated Fruit	1906	23	30.44
Fish and Oysters, fresh	1906	14	7.15
Fish and Oysters, fresh	1907	5	40.00
Fish and Oysters, fresh	1908	7	
Fish and Oysters, fresh	1909	22	
Flour	1900	37	
Flour	1902	70	1.40
Flour	1903	77	
Flour	1904	59	
Flour	1908	68	
Flour	1909	222	5.40

Name of Sample.	Date.	Total No. Samples.	Per Cent Illegal.
Fruit Butter, Plum	1901	5	100.00
Fruit Butter, Apple	1903	1	100.00
Fruit Butter	1907	6	100.00
Fruit Butter	1909	3	33.33
Fruit Juice	1900	4	75.00
Fruit Juice	1903	2	100.00
Fruit Juice	1909	4	25.00
Honey	1901	5	20.00
Honey	1903	6	33.30
Honey	1906	3	
Ice-cream and Ice-cream Substitutes	1909	45	80.00
Jams	1901	9	100.00
Jams	1903	14	78.40
Jams	1907	14	28.56
Jams	1908	3	
Jams	1909	10	30.00
Jellies	1901	10	100.00
Jellies	1903	14	76.60
Jellies	1907	50	48.00
Jellies	1908	12	
Jellies	1909	12	16.66
Lard	1900	11	9.00
Lard	1902	32	3.10
Lard, Compound	1902	24	
Malts, Beers, Ales, and Imitations	1900	30	80.00
Malts, Beers, Ales, and Imitations	1902	3	100.00
Malts, Beers, Ales, and Imitations	1903	14	86.00
Malts, Beers, Ales, and Imitations	1905	17	47.00
Malts, Beers, Ales, and Imitations	1906	91	31.68
Malts and Imitation Malts	1907	5	20.00
Maraschino Cherries	1907	8	100.00
Maraschino Cherries	1908	4	100.00
Maraschino Cherries	1909	10	10.00
Meats, fresh	1904	12	83.33
Meats, fresh	1906	107	47.66
Meats, fresh	1907	134	7.46
Meats, fresh	1908	13	7.69
Meats, fresh	1909	5	
Milk and Cream	1909	7	
Mince-meat	1907	9	27.22
Miscellaneous	1908	21	18.20
Molasses and Syrup	1901	32	81.20
Molasses and Syrup	1903	11	37.50
Molasses and Syrup	1909	51	76.47
Maple Sugar	1905	2	50.00
Maple Syrup	1905	15	86.66
Marmalade	1903	3	
Olive Oil and other Table Oils	1900	11	18.18
Olive Oil and other Table Oils	1905	14	
Olive Oil and other Table Oils	1908	6	
Olive Oil and other Table and Cooking Oils	1909	7	14.28

Name of Sample.	Date.	Total No. Samples.	Per Cent Illegal.
Phosphates	1902	6	100.00
Phosphates	1903	3	
Phosphates	1905	2	
Phosphates	1907	7	28.57
Phosphates	1908	3	66.66
Pickles	1907	6	66.66
Pickles	1909	5	
Prepared Mustard and Salad Dressings	1902	11	90.90
Prepared Mustard and Salad Dressings	1904	37	75.75
Prepared Mustard and Salad Dressings	1906	24	12.50
Preservatives, chemical	1907	31	
Preservatives, chemical	1908	4	
Preserves	1901	11	100.00
Preserves	1903	20	75.00
Preserves	1909	7	28.52
Preserves and Marmalades	1907	37	37.80
Preserves and Marmalades	1908	7	
Rice	1908	59	
Rice	1909	5	60.00
Soda Waters, bottled	1900	33	72.72
Soda Waters, bottled	1902	36	72.00
Soda Waters, bottled	1903	20	25.00
Soda Waters, bottled	1906	7	43.00
Soda Waters, bottled	1907	54	61.05
Soda Waters, bottled	1908	144	54.86
Soda Waters, bottled	1909	11	54.54
Sugar, white	1901	19	
Sugar, brown	1903	16	
Sugar, white	1903	29	
Sweeteners, Artificial	1908	5	
Tea	1901	25	
Tea	1903	21	33.33
Tapioca	1903	3	
Tonics and Bitters	1900	1	100.00
Tonics and Bitters	1902	3	33.33
Tonics and Bitters	1903	3	33.33
Tonics and Bitters	1905	14	7.14
Tonics and Bitters	1906	13	
Tonics	1907	4	
Tonics	1908	3	
Vinegar	1900	22	59.00
Vinegar	1901	13	30.70
Vinegar	1903	62	29.00
Vinegar	1905	52	34.61
Vinegar	1906	21	47.62
Vinegar	1907	39	30.72
Vinegar	1908	64	15.50
Vinegar	1909	27	48.14
Whiskys. See Distilled Liquors.			
Wines	1903	5	100.00
Wines	1905	1	100.00
Wines	1906	5	
Wines	1907	2	

WORK OF THE YEAR 1909.

During the year 721 samples of foods and beverages and products used in the manufacture and adulteration of the same have been analyzed. The samples were either sent to the Department by citizens of the State for analysis or were obtained by officers of the Department from various towns in the State.

SUMMARY OF RESULTS OF EXAMINATION OF FOOD PRODUCTS, 1909.

Name of Sample.	Total Number of Samples Examined.	Number of Samples Properly Branded, Labeled and not Adulterated.	Number of Samples Adulterated, Misbranded or Not Properly Labeled.	Per cent of Samples Illegal.
Meats	5	5		
Oysters	22	22		
Milk and cream	7	7		
Condensed milk	2	1	1	50.00
Ice-cream and ice-cream substitutes	45	9	36	80.00
Butter and butter substitutes	54	44	10	18.51
Table and cooking oils	7	6	1	14.28
Catsups	12	12		
Canned fruit	33	32	1	3.03
Fruit butter	3	2	1	33.33
Canned vegetables	16	16		
Preserves	7	5	2	28.52
Pickles	5	5		
Confectionery	4	3	1	25.00
Jam	10	7	3	30.00
Maraschino cherries	10	9	1	10.00
Vinegar	27	14	13	48.14
Baking powders	39	38	1	2.56
Jelly	12	10	2	16.66
Bottled soda waters	11	5	6	54.54
Fruit juices	4	3	1	25.00
Ciders and imitation ciders	38	22	16	57.89
Distilled liquors	7	7		
Beers and imitation beers	40	36	4	10.00

SUMMARY OF RESULTS OF THE EXAMINATION OF PRODUCTS FOR 1909—CONTINUED.

Name of Sample.	Total Number of Samples Examined.	Number of Samples Properly Branded, Labeled and not Adulterated.	Number of Samples Adulterated, Misbranded or Not Properly Labeled.	Per cent of Samples Illegal.
Molasses and syrups	51	12	39	76.47
Rice	5	2	3	60.00
Corn meal	23	23	----------	----------
Flour	222	210	12	5.40
Total	721	567	154	21.35

METHODS OF ANALYSIS.

The methods of analysis of the Association of Official Agricultural Chemists were followed in the examination of the products presented in this report.

MEAT.

(MEAT, OYSTERS AND FISH.)

Meat is any clean, sound, dressed and properly prepared edible part of animals in good health at the time of slaughter. The term "animal," as herein used, includes not only mammals, but fish, fowls, crustaceans, mollusks, and all other animals used as food.

Meat is adulterated if treated with any chemical preservative or dyestuff whose use and purpose are to retard, prevent or mask decomposition. In addition to the above, sausage will be regarded as adulterated if it contains liver, lungs, kidneys or other viscera of animals. except intestines used as sausage casings.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
7180	Meat, fresh beef		J. Schwartz, Raleigh
7181	----do		W. M. Dancey, Raleigh
7182	Meat, fresh pork		J. Schwartz, Raleigh
7183	Meat, fresh liver		J. J. Jones
7184	Meat, fresh mutton		A. Young, Raleigh

RESULTS OF THE EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6510	Oysters	Lighthiser & Co., West Point, Va.	Marshall Bros., Winston-Salem
6511	----do	----do	J. R. Pleasants, Winston-Salem
6512	----do	----do	E. A. Dorsett, Winston-Salem
6513	----do	Montgomery & Makely, Belhaven, N. C.	J. H. Turner, Winston-Salem
6514	----do	A. L. Willis, New Bern, N. C.	W. A. Brown, Salisbury
6515	----do	S. S. Keeling, Norfolk, Va.	----do
6516	----do		H. C. Holmes, Salisbury
6517	----do	J. W. Marshall, West Point, Va.	R. W. Gray, High Point
6518	----do	T. A. McNeal, Portsmouth, Va.	Star Market, High Point
6519	----do	J. W. Marshall, West Point, Va.	T. A. James & Co., Statesville

Five samples of meat other than oysters were examined, and no adulteration was found.

OYSTERS.

Under the head of meat, according to the standards, come fish and oysters.

Twenty-two samples of oysters were examined—ten of fresh oysters and twelve of canned oysters, and no adulteration was found except sample No. 6289 contained a very large amount of liquid matter compared with the solid matter present. Sample No. 6516 was not properly labeled, which made the sale illegal.

TION OF MEATS AND FISH.

Laboratory Number.	Adulterants.	Remarks and Conclusions.
7180	None found	Fresh beef.
7181	....do	do.
7182	....do	Fresh pork.
7183	....do	Fresh liver.
7184	....do	Fresh mutton.

INATION OF OYSTERS.

Laboratory Number.	Adulterants.	Remarks and Conclusions.
6510	None found	
6511	....do	
6512	....do	
6513	....do	
6514	....do	
6515	....do	
6516	....do	Not properly labeled; did not show name and address of packer; sale illegal.
6517	....do	
6518	....do	
6519	....do	

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6281	Oysters, canned, Old Tom.	De Foote & Co., Baltimore, Md.	Lynch Bros., Greensboro
6282	Oysters, canned, Cove Sound.	Taylor Bros., Wit, N. C.	Sockwell Bros., Greensboro
6283	Oysters, canned, Savannah.	L. P. Maggioni & Co., Savannah, Ga.	Southerland & Alexander, Greensboro.
6284	Oysters, canned, Bird Island Shoal.	Littleneck Clam Co., Beaufort, N. C.	P. H. Johnson, High Point
6285	Oysters, canned, Jekyl Island.	Glynn Canning Co., Brunswick, Ga.	T. F. Young & Co., Salisbury
6286	Oysters, canned, Dog Head.	Martin-Wagner Co., Baltimore, Md.	Dixie Club Grocery Co., Statesville.
6287	Oysters, canned, Pelican	Ruge Bros. Canning Co., Apalachicola, Fla.	Hunter & Boyd, Charlotte
6288	Oysters, canned, Beauty	Glynn Canning Co., Brunswick, Ga.	H. S. Parks & Co., Concord
6289	Oysters, canned, Oyster Bay.	H. A. Kain & Co., Baltimore, Md.	T. T. Caraway & Son, Wadesboro.
6290	Oysters, canned, Jekyl Island.	Glynn Canning Co., Brunswick, Ga	do
6291	Oysters, canned, Litchfield.	Breslauer, Lachicotte & Co., Waverly Mills, S. C.	H. C. Watson, Rockingham
6292	Oysters, canned	L. Pickert Fish Co., Boston, Mass.	Southerland & Alexander, Greensboro.

MILK AND CREAM.

Milk is the fresh, clean, lacteal secretion obtained by the complete milking of one or more healthy cows properly fed and kept, excluding that obtained within fifteen days before and ten days after calving, and contains not less than eight and one-half (8.5) per cent of solids not fat, and not less than three and one-quarter (3.25) per cent of milk fat.

Blended milk is milk modified in its composition so as to have a definite and stated percentage of one or more of its constituents.

RESULTS OF EXAMINATION

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6948	Milk	R. T. Mills, Raleigh, N. C.	R. T. Mills, Raleigh
6946	Cream	Leonard Tufts, Pinehurst, N. C.	King-Crowell Drug Co., Raleigh
6945	do	R. T. Mills, Raleigh, N. C.	R. T. Mills, Raleigh*
6947	do	do	California Fruit Store, Raleigh
6158	Milk, Breast		Dr. J. E. Patrick, Farmville*
6921	do		N. M. Pickett, Madison*
6922	do		do*

*Sample sent to the Department for analysis.

TION OF CANNED OYSTERS.

Laboratory Number.	Adulterants.	Remarks and Conclusions.
6281	None found	
6282	....do	
6283	....do	
6284	....do	
6285	....do	
6286	....do	
6287	....do	
6288	....do	
6289		Small amount of solid matter and large amount of water.
6290	None found	
6291	....do	
6292	....do	

Skim-milk is milk from which a part or all of the cream has been removed, and contains not less than nine and one-quarter (9.25) per cent of milk solids.

Cream is that portion of milk, rich in milk fat, which rises to the surface of milk on standing, or is separated from it by centrifugal force, is fresh and clean, and contains not less than eighteen (18) per cent of milk fat.

Seven samples were examined, 4 of milk and 3 of cream. No adulteration was found, and some of them proved to be very high-grade products, as will be seen by reference to the table below.

OF MILKS AND CREAM.

Laboratory Number.	Fat—Per Cent.	Solid Matter—Per Cent.	Adulterants.	Remarks and Conclusions.
6948	6.12	15.40	None found	Milk, very rich.
6946	35.37	42.40	....do	Cream.
6945	37.22	43.70	....do	do.
6947	28.83	35.40	....do	do.
6158	2.86	10.80	....do	Milk, breast.
6921	4.52	12.09	....do	do.
6922	4.28	12.50	....do	do.

CONDENSED OR EVAPORATED MILK.

Condensed or evaporated milk (sometimes erroneously known as evaporated cream) is milk from which a considerable portion of the water has been evaporated, and contains not less than 28 per cent of milk solids, of which not less than 27.66 per cent is milk fat.

Sweetened condensed milk is milk from which a considerable portion of the water has been evaporated and to which sugar (sucrose) has been added, and contains not less than 28 per cent of milk solids, of which not less than 27.66 per cent is milk fat.

Condensed skim-milk is skim-milk from which a considerable portion of water has been evaporated.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6139	Milk, condensed, skim, Square.	Hier's Condensed Milk Co., Philadelphia, Pa.	W. A. Whitehead & Son, Wilmington.*
6140	Milk, condensed, Jersey	---do---	---do*---

ICE-CREAM AND ICE-CREAM SUBSTITUTES.

1. Ice-cream is a frozen product made from cream and sugar, with or without a natural flavoring, and contains not less than fourteen (14) per cent of milk fat.

2. Fruit ice-cream is a frozen product made from cream, sugar, and sound, clean, mature fruits, and contains not less than twelve (12) per cent of milk fat.

3. Nut ice-cream is a frozen product made from cream, sugar, and sound, nonrancid nuts, and contains not less than twelve (12) per cent of milk fat.

Many products, such as eggs, gelatine, etc., are used in the manufacture of so-called ice-cream, which is often delicious, but is not ice-cream. Frozen custard, when properly made, is delicious; but if sold as ice-cream it would be a deception and, therefore, a violation of the Food Law.

The sale of a product as ice-cream containing gelatine, eggs, gum tragacanth or other vegetable gum, or the sale of a product as ice-cream which contains less than the required per cent of milk fat will not be contested, provided the same is labeled and sold as imitation

*Sample sent to the Department for analysis.

The composition of the product depends on the milk used, the degree of concentration and, if sweetened, the amount of sugar added.

The only form of adulteration practiced by manufacturers to any extent is the use of skim-milk in the place of whole milk.

Only two samples have been examined, one of which was a skim-milk, for which there is no standard, as to the amount of milk solids or fat that shall be present.

Sample No. 6140 proved to be a standard condensed milk, but was not properly labeled, which made its sale illegal.

TION OF CONDENSED MILK.

Laboratory Number.	Fat—Per Cent.	Solid Matter—Per Cent.	Adulterants.	Remarks and Conclusions.
6139	3.26	62.05	None found	Milk, condensed, skim, part of fat removed.
6140	7.97	68.72	----do	Milk, condensed, not labeled according to requirements.

ice-cream, compound ice-cream, gelatine ice-cream, egg ice-cream or gum ice-cream (as the case may be); or if a placard bearing the following statement—

Imitation ice-cream is served here.
Compound ice-cream is served here.
Egg ice-cream is served here.
Gelatine ice-cream is served here, or
Gum ice-cream is served here (as the case may be),

shall be posted in a conspicuous place in the room where any and all persons may see the same when purchasing cream; and *Provided further,* that the statement on the placard is printed in plain black letters, not less than one inch in size, on a white background.

Forty-four samples sold as ice-cream and one sold as frappé were examined, 8 of which proved to be standard or legal ice-creams, while 36 were below standard in milk fat and were, therefore, sold in violation of the law. However, as this is the first examination of ice-creams, no prosecutions will be made for this offense, but in future the law must be complied with.

RESULTS OF THE EXAMINATION OF ICE

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6930	Ice-cream, Strawberry	California Fruit Store, Raleigh, N. C.	California Fruit Store, Raleigh.
6931	Ice-cream, Tutti-frutti	do	do
6932	Ice-cream, Vanilla	do	do
6933	Ice-cream, Frappé	H. T. Hicks Co., Raleigh, N. C.	H. T. Hicks Co., Raleigh
6934	Ice-cream, Vanilla	do	do
6935	Ice-cream, Vanilla	A. Dughi, Raleigh, N. C.	A. Dughi, Raleigh
6936	Ice-cream, Peach	do	do
6937	Ice-cream, Sherry	King-Crowell Drug Co., Raleigh, N. C.	King-Crowell Drug Co., Raleigh.
6938	Ice-cream, Vanilla	do	do
6939	Ice-cream, Chocolate	do	do
6940	Ice-cream, Vanilla	Masonic Temple Pharmacy, Raleigh, N. C.	Masonic Temple Pharmacy, Raleigh.
6941	Ice-cream, Sherry	do	do
6942	Ice-cream, Strawberry	W. Furman Betts, Raleigh, N. C.	W. Furman Betts, Raleigh
6943	Ice-cream, Vanilla	do	do
6944	do	J. E. Hamlin & Co. (col.), Raleigh, N. C.	J. E. Hamlin & Co. (col.), Raleigh.
6952	do	Hawley's Pharmacy, Charlotte, N.C.	Hawley's Pharmacy, Charlotte.
6953	Ice-cream, Chocolate	do	do
6954	Ice-cream, Vanilla	Hahn's Candy Store, Charlotte, N. C.	Hahn's Candy Store, Charlotte.
6955	Ice-cream, fruit, Pineapple.	do	do
6956	Ice-cream, Vanilla	Tryon Drug Co., Charlotte, N. C.	Tryon Drug Co., Charlotte
6957	do	Woodall & Sheppard, Charlotte, N. C.	Woodall & Sheppard, Charlotte
6958	do	Jordan's Drug Store, Charlotte, N. C.	Jordan's Drug Store, Charlotte.
6959	do	Jas. P. Stowe & Co., Charlotte, N. C.	Jas. P. Stowe & Co., Charlotte.
6960	Ice-cream	Brannon-Hahn Co., Charlotte, N. C.	Brannon-Hahn Co., Charlotte.
6961	Ice-cream, Vanilla-strawberry.	D. Dulong, Charlotte, N. C.	D. Dulong, Charlotte
6962	Ice-cream, Peach	Smith Drug Store, Salisbury, N. C.	Smith Drug Store, Salisbury
6963	Ice-cream, Pineapple	do	do
6964	Ice-cream, Strawberry	A. B. Saleely, Salisbury, N. C.	A. B. Saleely, Salisbury
6965	Ice-cream, Vanilla	do	do
6966	do	Charles Marmora, Salisbury, N. C.	Charles Marmora, Salisbury
6967	do	Kluttz Drug Co., Salisbury, N. C.	Kluttz Drug Co., Salisbury
6968	Ice-cream, Chocolate	do	do
6969	Ice-cream, Vanilla	Plummer's Drug Co., Salisbury, N. C.	Plummer's Drug Co., Salisbury
6970	Ice-cream, Caramel	Corneilson & Cook, Salisbury, N. C.	Corneilson & Cook, Salisbury
6971	Ice-cream, Madeira	do	do
6972	Ice-cream, Vanilla	Womble's Restaurant, Greensboro, N. C.	Womble's Restaurant, Greensboro.

CREAM AND ICE-CREAM SUBSTITUTES.

Laboratory Number.	Fats—Per Cent.	Solid Matter—Per Cent.	Liquid Matter—Per Cent.	Results and Conclusions.	Remarks.
6930	13.90	34.60	65.40	Fruit ice-cream	
6931	16.89	36.10	63.90	....do	
6932	20.72	35.30	64.70	Ice-cream	
6933	4.81			Frappé	
6934	12.67			Not standard ice-cream	The sale of this product as ice-cream is illegal.
6935	7.78	23.63	76.37	....do	do.
6936	5.70	29.92	70.08	....do	The sale of this product as peach ice-cream is illegal.
6937	21.36	39.21	60.79	Ice-cream	
6938	22.51	42.75	57.25	....do	
6939	21.17	44.49	55.51	....do	
6940	13.73	39.98	60.02	Not standard ice-cream	Slightly below standard; sale illegal.
6941	17.49	31.79	68.21	Ice-cream	
6942	5.68	31.24	68.76	Not ice-cream	The sale of this product as strawberry ice-cream is illegal.
6943	4.00	40.89	59.11	....do	The sale of this product as ice-cream is illegal.
6944	10.30	21.44	78.56	....do	do.
6952	8.68	31.08	68.92	....do	do.
6953	9.56	39.61	60.39	....do	do.
6954	8.60	30.27	69.73	....do	do.
6955	13.14	29.42	70.58	Fruit ice-cream	
6956	6.32	52.23	47.77	Not ice-cream	The sale of this product as ice-cream is illegal.
6957	10.25	33.18	66.82	Not standard ice-cream	do.
6958	8.18	30.36	69.64	Not ice-cream	do.
6959	8.66	32.82	67.18	....do	do.
6960	8.64	34.65	65.35	....do	do.
6961	4.58	34.35	65.65	....do	do.
6962	6.38	31.74	68.26	Not peach ice-cream	The sale of this product as peach ice-cream is illegal.
6963	4.63	26.38	73.62	Not ice-cream	The sale of this product as ice-cream is illegal.
6964	3.76	25.36	74.64	....do	do.
6965	9.00	29.25	70.75	....do	do.
6966	7.48	36.37	63.63	....do	do.
6967	3.62	22.64	77.36	....do	do.
6968	1.79	19.79	80.21	....do	do.
6969	2.53	29.56	70.44	....do	do.
6970	2.75	24.61	75.39	....do	do
6971	2.00	24.34	75.66	....do	do.
6972	2.71	25.29	74.71	....do	do.

RESULTS OF THE EXAMINATION OF ICE-CREAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6973	Ice-cream, Vanilla	J. H. West, Greensboro, N. C.	J. H. West, Greensboro
6974	----do	Smith Ice-cream Co., Greensboro, N. C.	Holden Drug Co., Greensboro
6975	----do	----do	Smith Ice-cream Parlor, Greensboro.
6976	----do	Saleely's, Greensboro, N. C.	Saleely's, Greensboro
6977	Ice-cream, Sherry	Main Street Pharmacy Co., Durham, N. C.	Main Street Pharmacy Co., Durham.
6978	Ice-cream, Vanilla	Yearby's Drug Store, Durham, N. C.	Yearby's Drug Store, Durham
6979	----do	Five Points Drug Co., Durham, N. C.	Five Points Drug Co., Durham.
6980	----do	J. C. Colman (col.), Durham, N. C.	J. C. Colman (col.), Durham
6981	----do	E. C. King & Sons, Durham, N. C.	E. C. King & Sons, Durham

BUTTER AND BUTTER SUBSTITUTES.

Butter is the clean, nonrancid product made by gathering in any manner the fat of fresh or ripened milk or cream into a mass, which also contains a small portion of other milk constituents, with or without salt, and contains not less than 82.50 per cent of milk fat. It may also contain added coloring matter, provided the coloring matter is not of coal-tar origin.

Renovated butter, process butter, is the product made by melting butter and working, without the addition or use of chemicals or any substance except milk, cream or salt, and contains at least 82.50 per cent of milk fat and not more than 16 per cent of water.

Oleo, oleomargarine or butterine is a substitute for butter, made from other and cheaper fats than butter. It is manufactured so as to improve its granulation and texture, and a more or less butterlike flavor and odor are imparted to it by churning it with milk, skim-milk, cream or buttermilk, or, possibly, by mixing a small amount of butter

RESULTS OF THE EXAMINATION OF

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6182	Butter, process	F. H. Hobbs & Co., Norfolk, Va.	Caldwell & Carlyle, Lumberton.
6148	Butter	Carolina Butter and Egg Co., Asheville, N. C.	Yates & McGuire, Asheville
6197	Oleomargarine	Scott & Co., Norfolk, Va.	Peoples Supply Co., Wilmington.
6198	Butter, Fox River	Fox River Butter Co., Aurora, Ill.	----do

AND ICE-CREAM SUBSTITUTES.—CONTINUED.

Laboratory Number.	Fats—Per Cent.	Solid Matter—Per Cent.	Liquid Matter—Per Cent.	Results and Conclusions.	Remarks.
6973	6.73	26.83	73.17	Not ice-cream	The sale of this product as ice-cream is illegal.
6974	3.27	29.59	70.41	do	do.
6975	4.03	31.63	68.37	do	do.
6976	7.04	29.50	70.50	do	do.
6977	2.36	23.51	76.49	do	do.
6978	6.26	27.66	72.34	do	do.
6979	11.70	30.63	69.37	do	do.
6980	9.09	42.56	57.44	do	do.
6981	4.43	30.28	69.72	do	do.

with it. Oleomargarine is not materially, if at all, inferior in nutritive value to genuine butter. It has been found by various experiments that the comparative digestibility of butter and oleomargarine is about the same.

Fifty-seven samples of butter and butter substitutes were examined, five of which, Nos. 6148, 6226, 6562, 6563 and 6564, manufactured by the Carolina Butter and Egg Company,* Asheville, N. C., were found to be adulterated, as will be seen by reference to the table below. The samples proved to be composed of butter and other fats containing cotton-seed oil, and were artificially colored. They contained nothing deleterious to health, but the fat added cost less than half the price of butter.

Three samples proved to be oleomargarine and two to be renovated butter, but they were labeled and sold as such.

Five samples were found to be not properly labeled.

BUTTER AND BUTTER SUBSTITUTES.

Laboratory Number.	Reading Refractometer, 40°C.	Refractive Index.	Volatile Fatty Acid or Reichert-Meissl No.	Adulterants.	Remarks and Conclusions.
6182	42.75	1.4543		None found	Renovated butter.
6148	50.75	1.4596	6.00	Fats other than butter fat; cotton-seed oil.	Adulterated and misbranded; sale illegal.
6197	47.75	1.4577	8.02	None found	Oleomargarine.
6198	43.25	1.4546		do	Butter.

*See page 5 of this report.

RESULTS OF THE EXAMINATION OF BUTTER

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6199	Butter	L. B. Miller & Son, New York	Jurgenhaar, Wilmington
6200	Butter, renovated	Cudahy Packing Co., Kansas City, Mo.	King Grocery Co., Wilmington
6201	Butter	F. H. Hobbs, Norfolk, Va.	Carpenter & Miller, Wilmington
6202	Butter, Peerless	Kingan & Co., Richmond, Va.	C. B. Redmon, Lumberton
6203	Butter, Gilt Edge	W. B. Cooper, Wilmington, N. C.	R. H. Strickland, Maxton
6190	Butter, Meadow Gold	Continental Creamery Co., Topeka, Kan.	L. B. Bass, Goldsboro
6191	Butter, Fox River	Fox River Butter Co., Aurora, Ill.	Royall Grocery Co., Goldsboro
6192	Butter	R. H. Gower, Clayton, N. C.	----do----
6193	Butter, renovated, Gold Medal.	Ammon & Pearson, Jersey City, N. J.	Holmes Grocery Co., Wilmington.
6194	Butter	W. I. Young & Co., New York	Wilmington Grocery Co., Wilmington.
6195	Butter, Fox River	Fox River Butter Co., Aurora, Ill.	S. W. Saunders, Wilmington
6196	Butter	W. I. Young & Co., New York	Peoples Supply Co., Wilmington.
6183	Butter, Bouquet Creamery.	Russell Crego & Son, New York	Thomas & Co., Wilmington
6184	Butter, Creamery	Billy Bullard, Maxton, N. C.	M. L. McRae, Maxton
6185	Butter, Country	Sam McRae, Maxton, N. C.	----do----
6186	Butter, Jamestown	Russell Crego & Son, New York	W. H. Barnes, Goldsboro
6187	Butter, process	J. H. Pate, Goldsboro, N. C.	B. F. Grady, Goldsboro
6188	Oleomargarine	Scott & Co., Norfolk, Va.	Pittman Bros., Goldsboro
6189	Butter, Four-leaf Clover	----do----	----do----
6562	Butter, Sheaf of Wheat	Carolina Butter and Egg Co., Asheville, N. C.	Stradley & Luther, Asheville
6563	----do----	----do----	Yates & McGuire, Asheville
6564	----do----	----do----	Noland-Rowland Grocery Co., Asheville.
6565	Butter, Creamery	----do----	----------
6566	Butter	----do----	----------
6567	----do----	----do----	----------
6568	Oleomargarine	----do----	----------
6223	Butter	----------	S. R. Lentz, Charlotte
6224	----do----	----------	L. L. Sarratt, Charlotte
6225	----do----	John Troutman, Concord, N. C.	Gaddy & Troy, Concord
6226	----do----	Carolina Butter and Egg Co., Asheville, N. C.	Yates & McGuire, Asheville
6227	Butter, renovated, Anchor.	The D. E. Wood Butter Co., Elgin, Ill.	C. B. Redmon, Lumberton
6217	Butter, Country	----------	Thies & Burke, Charlotte
6218	Butter	L. P. Hunter, Charlotte, N. C.	Hunter & Boyd, Charlotte
6219	----do----	R. P. McLain, Hiddenite, N. C.	S. R. Lentz, Charlotte
6220	Butter, Fox River	Fox River Butter Co., Aurora, Ill.	----do----
6221	Butter	John Price, Charlotte, N. C.	L. L. Sarratt, Charlotte

AND BUTTER SUBSTITUTES.—CONTINUED.

Laboratory Number.	Reading Refractometer, 40°C.	Refractive Index.	Volatile Fatty Acid or Reichert-meissl No.	Adulterants.	Remarks and Conclusions.
6199	42.75	1.4543	.....	None found	Butter.
6200	42.75	1.4543	.....	....do.....	do.
6201	42.75	1.4543	.....	....do.....	do.
6202	43.75	1.4550	.....	....do.....	do.
6203	43.75	1.4550	.....	....do.....	do.
6190	42.75	1.4543	.....	....do.....	do.
6191	43.75	1.4550	.....	....do.....	do.
6192	41.25	1.4532	.....	....do.....	do.
6193	43.25	1.4546	.....	....do.....	Butter, renovated.
6194	43.75	1.4550	.....	....do.....	Butter.
6195	43.45	1.4550	.....	....do.....	do.
6196	43.25	1.4546	.....	....do.....	do.
6183	43.25	1.4547	.....	....do.....	do.
6184	39.75	1.4524	.....	....do.....	do.
6185	40.00	1.4524	.....	....do.....	do.
6186	43.30	1.4547	.....	....do.....	do.
6187	42.50	1.4541	.....	....do.....	do.
6188	47.80	1.4592	6.64	....do.....	Oleomargarine.
6189	43.85	1.4550	.....	....do.....	Butter.
6562	49.50	.....	7.07	Fats other than butter; cotton-seed oil.	Butter, containing other fats cotton-seed oil.
6563	49.05	.....	7.05	....do.....	do.
6564	49.00	.....	9.06	....do.....	do.
6565	45.00	.....	25.03	None found.....	Butter.
6566	43.05	.....	28.00	....do.....	do.
6567	43.05	.....	26.06	....do.....	do.
6568	50.00	.....	4.10	....do.....	Oleomargarine.
6223	43.25	1.4546	.....	....do.....	Butter, not properly labeled; sale illegal.
6224	43.25	1.4546	.....	....do.....	do.
6225	43.25	1.4546	.....	....do.....	Butter.
6226	48.75	1.4584	10 20	Fat other than butter—cotton-seed oil.	Butter, containing other fats—cotton-seed oil.
6227	43 25	1 4546	.....	None found.....	Butter, renovated.
6217	41.75	1.4536	.....	....do.....	Butter, not labeled.
6218	41.25	1.4532	25 10	....do.....	Butter.
6219	43.25	1.4540	.....	....do	do.
6220	42.75	1.4543	.....	....do.....	do.
6221	42 75	1.4543	.....	....do	do.

RESULTS OF THE EXAMINATION OF BUTTER

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6222	Butter	Open View Farms, Mount Holly, N. C.	Thies & Burke, Charlotte
6209	Butter, Fox River	Fox River Butter Co., Aurora, Ill.	J. G. Williams, New Bern
6210	Butter, Sterling	Sterling Butter Co., Sterling, Ill.	Lucas & Lewis, New Bern
6211	Butter	Scott & Co., Norfolk, Va.	----do
6212	Butter, Red Rose	Fentress & Co., Norfolk, Va.	H. C. Armstrong, New Bern
6213	Butter, Better Butter	The Fairmount Creamery Co., Omaha, Neb.	Ricks Bros., Greenville
6214	Butter, Willow Farm	Scott & Co., Norfolk, Va.	----do
6215	Butter	E. W. Green, Wakefield, N. C.	Moody & Carroll Co., Wilson
6216	----do	----------	T. F. Satterfield & Co., Mount Airy.
6204	Butter, Willow Farm	Scott & Co., Norfolk, Va.	W. J. Pace, Maxton
6205	Butter, Strawberry	Kingan & Co., Richmond, Va.	J. W. Carter, Maxton
6206	Butter, Country	Hector Livingston, Red Springs, N. C.	J. T. McNeill, Red Springs
6207	----do	----------	Garrett & McNeill, Red Springs.
6208	Butter, Blue Valley	Blue Valley Creamery Co., Chicago, Ill.	S. W. Willis, New Bern
6545	Butter	C. M. Dickson, Laurel Springs, N. C.	The School for the Colored D., D. and B., Raleigh.
6622	----do	Beb Emory, Raleigh, N. C.	T. E. Moore, Raleigh
7115	Butter, Fancy Separator	I. D. Harris, Mooresville, N. C.	S. W. Sanders, Wilmington*

*Sample sent to the Department for analysis.

TABLE AND COOKING OILS.

Olive oil is the principal table oil and is highly prized for its flavor. Before food laws were enforced olive oil was much adulterated with other oils, but of late very little adulteration is found in it.

Cooking oils are mostly highly refined cotton-seed oil, and are not

RESULTS OF EXAMINATIONS

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6415	Oil, olive, Beaumarchand	————, Nice, France	J. R. Chrisman, Greensboro
6416	Oil, olive, Lucca	S. Ray & Co., Leghorn, France	Eagle & Milholland, Statesville
6417	Oil, olive	L. A. Price, Bordeaux, France	----do
6418	----do	H. J. Heinz Co., Pittsburg, Pa.	Sherrill Grocery Co., Statesville
6419	Oil, cooking, Wesson	Wesson Co., New York City	Bristol & Harbison, Morganton
6420	Oil, cooking, Golden Glory.	Brannon Carbonating Co., Charlotte, N. C.	L. L. Sarratt, Charlotte
6246	Oil, olive, Beaumarchand	Morse & Co., New York City	W. H. Pearson, Asheville

AND BUTTER SUBSTITUTES.—CONTINUED.

Laboratory Number.	Reading Refractometer, 40°C.	Refractive Index.	Volatile Fatty Acid or Reichert-meissl No.	Adulterants.	Remarks and Conclusions.
6222	42.75	1.4543		None found	Butter.
6209	43.75	1.4550		do	do.
6210	42.75	1.4543		do	do.
6211	42.75	1.4543		do	do.
6212	42.75	1.4543		do	do.
6213	43.25	1.4546		do	do.
6214	43.75	1.4550		do	do.
6215	42.75	1.4543		do	do.
6216	40.75	1.4529		do	Butter, not properly labeled.
6204	43.25	1.4564		do	Butter.
6205	44.00	1.4552	32.20	do	do.
6206	41.75	1.4536		do	do.
6207	41.25	1.4532		do	Butter, not properly labeled.
6208	42.75	1.4543		do	Butter.
6545	45.00	1.4558	32.30	do	do.
6622	43.50	1.4550		do	do.
7115	43.50	1.4550	28.30	do	do.

much adulterated. Many of these oils are very desirable for cooking purposes.

Seven samples of oils were examined—five table and two cooking oils—and no adulteration was found in them. Sample No. 6415 was not properly labeled. It did not bear the name of the manufacturer, importer or jobber, as is required.

OF TABLE AND COOKING OILS.

Laboratory Number	Specific Gravity 15.5° C.	Reading Refractometer, 15.5° C.	Refractive Index 15.5° C.	Adulterants.	Remarks and Conclusions.
6415	.91544	65.97	1.4697	None found	Olive oil, not properly labeled.
6416	.91568	66 47	1.4700	do	Olive oil.
6417	.91564	66.47	1.4700	do	do.
6418	.91584	68 47	1.4713	do	do.
6419		72.47	1.4738	do	Cotton-seed oil.
6420		72.47	1.4738	do	do.
6246	91553	68 80	1 4707	do	Olive oil.

CATSUPS AND SAUCES.

As has been previously stated in these reports, there is to be found on the market quite a variety of catsups and sauces, but tomato catsup is probably the most popular of such condiments, and it is used in large quantities. In past years most of these catsups were artificially colored with bright-colored coal-tar dyes and preserved with chemical preservatives. There is possibly some excuse for the use of chemical preservatives in this class of goods, but absolutely none for the use of the coal-tar dyes. The objections to their use are many. They may serve to hide dirt and inferior materials, and are probably more or less injurious to health.

RESULTS OF EXAMINATIONS

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6645	Catsup, Tomato, Beechnut	Beechnut Packing Co., Canajoharie, N. Y.
6640	Catsup, Tomato, Heinz	H. J. Heinz Co., Pittsburg, Pa.
6398	Catsup, Tomato, Blue Label	Curtis Bros. Co., Rochester, N. Y.
6399	Catsup, Tomato, Emory	Emory Food Co., Chicago, Ill.
6400	Catsup, Tomato, Admiral	Knadler & Lucas, Louisville, Ky.
6401	Catsup, Tomato, Monarch	Reid-Murdoch Co., Chicago, Ill.
6402	Catsup, Tomato, Sunnyside	Jersey Packing Co., Cincinnati, Ohio
6403	Catsup, Tomato, O. K.	Alart & McGuire, New York
6404	Catsup, Tomato, Heinz	H. J. Heinz Co., Pittsburg, Pa.
6398	Catsup, Tomato, Blue Label	Curtis Bros. Co., Rochester, N. Y.
6399a	Catsup, Tomato, Emory	Emory Food Co., Chicago, Ill.
6642	Sauce, Chili, Heinz	H. J. Heinz Co., Pittsburg, Pa.

CANNED FRUIT.

The advantages to be gained by canning fruit are too well known to require explanation here.

Thirty-three samples of canned fruit of various kinds were examined, but no adulteration was found.

Since food officials have condemned the use of chemical preservatives and coal-tar colors so severely, they are disappearing from the market. Some manufacturers claim that they can make a better product by the use of chemical preservatives than they can without them, but their claim is not borne out by the facts in the case. Most of the high-class manufacturers are discontinuing the use of both coal-tar dyes and chemical preservatives, and the latter are used only in the medium and lower grade products.

Twelve samples of these products were examined and only four were found to contain chemical preservatives. It is to be hoped that the use of these preservatives will be entirely discontinued in the near future, especially where they are unnecessary.

OF CATSUPS AND SAUCES.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6645	D. T. Johnson & Son, Raleigh	None found	Tomato catsup.
6640	W. B. Mann Co., Raleigh	do	do.
6398	P. H. Johnson, High Point	Benzoate	do.
6399	W. P. McLain, Statesville	None found	do.
6400	Dixie Club Grocery, Statesville	Benzoate	do.
6401	L. L. Sarratt, Charlotte	None found	do.
6402	W. F. Kirby, Charlotte	Benzoate	do.
6403	Gaddy & Troy, Concord	None found	do.
6404	H. C. Watson, Rockingham	do	do.
6398	P. H. Johnson, High Point	Benzoate	do.
6399a	W. P. McLain, Statesville	None found	do.
6642	W. B. Mann Co., Raleigh	do	Chili sauce.

Sample No. 6304 was not properly labeled. The name of the manufacturer or packer not being stated on the label, the sale of the product was illegal.

RESULTS OF EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6293	Cherries, canned, The Old Homestead.	Bennett, Sloan & Co., New York
6294	Cherries, canned, Jumbo	Miller Bros. Co., Baltimore, Md.
6295	Cherries, canned, Ferndell	Sprague, Warner & Co., Chicago, Ill.
6296	Cherries, canned, Gondola	C. W. Antrim & Sons, Richmond, Va.
6297	Cherries, canned, Red Faultless	Wayne County Preserving Co., Newark, N. J.
6298	Cherries, canned, White Faultless	----do
6303	Apricots, canned, Bonita	Griffith-Durney Co., San Francisco, Cal.
6302	Pears, canned, Alfa	Torsch Packing Co., Smyrna, Del.
6301	Pears, canned, Gondola	C. W. Antrim & Sons, Richmond, Va.
6304	Apricots, canned, Peerless	
6305	Strawberries, canned, Winnow	The Pressing-Orr Co., Norwalk, Ohio
6306	Plums, canned	Bennett, Sloan & Co., New York
6307	Apples, canned, Piedmont	The American Canning Co., Winston-Salem, N. C.
6308	Pineapple, canned, Mountain Rose	Githens, Rexsamer & Co., Philadelphia, Pa.
6309	Peaches, canned	E. S. Cude, Colfax, N. C.
6310	Peaches, canned, Old Homestead	----do
6311	Peaches, canned	Tar Heel Canning Co., Colfax, N. C.
6312	----do	J. D. Pitts, Glen Alpine, N. C.
6313	Peaches, canned, Gondola	C. W. Antrim & Sons, Richmond, Va.
6314	Peaches, canned, Santiago	Butt Packing Co., Chapman, Cal.
6315	Peaches, canned, Lotus	Githens-Rexsamer Co., Philadelphia, Pa.
6316	Peaches, canned, Brownie	R. C. Williams & Co., New York
6317	Peaches, canned, Big Tree	Austin Nichols & Co., New York
6318	Peaches, canned, Linden	Linden Canning Co., Somerset County, Md.
6319	Peaches, canned, Fanen	J. S. Fanen & Co., Baltimore, Md.
6320	Peaches, canned, Big Tree	Austin Nichols & Co., New York
6321	Peaches, canned, Scottish Chief	----do
6322	Peaches, canned, Piedmont	The American Canning Co., Winston-Salem, N. C.
6323	Blackberries, canned, Standard	J. D. Pitts, Glen Alpine, N. C.
6324	Blackberries, canned, Catawba Valley.	Catawba Valley Canning Co., Morganton, N. C.
6325	Blackberries, canned, Dixie	Elkin Canning Co., Elkin, N. C.
6326	Blackberries, canned, Catawba Valley.	Catawba Valley Canning Co., Morganton, N. C.
6327	Blackberries, canned, Pilgrim	Bennett, Sloan & Co., New York

TION OF CANNED FRUITS.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6293	Lynch Bros., Greensboro	None found	Cherries, canned
6294	Sockwell Bros., Greensboro	do	do.
6295	Southerland & Alexander, Greensboro.	do	do.
6296	P. H. Johnson, High Point	do	do.
6297	M. F. Kirby, Charlotte	do	Cherries, canned, red.
6298	do	do	Cherries, canned, white
6303	P. H. Johnson, High Point	do	Apricots, canned.
6302	Gaddy & Troy, Concord	do	Pears, canned.
6301	H. C. Watson, Rockingham	do	do.
6304	W. P. McLain, Statesville	do	Apricots, canned; not properly labeled; sale illegal.
6305	M. F. Kirby, Charlotte	do	Strawberries, canned.
6306	Lynch Bros., Greensboro	do	Plums, canned.
6307	A. P. Grizzard, Winston-Salem	do	Apples, canned.
6308	L. L. Sarratt, Charlotte	do	Pineapple, canned.
6309	A. P. Grizzard, Winston-Salem	do	Peaches, canned.
6310	do	do	do.
6311	do	do	do.
6312	P. G. Harbison, Morganton	do	do.
6313	Bristol & Harbison, Morganton	do	do.
6314	Davis & Byerly, Charlotte	do	do.
6315	do	do	do.
6316	S. R. Lentz, Charlotte	do	do.
6317	J. F. Jamison, Charlotte	do	do.
6318	H. L. Parks & Co., Concord	do	do.
6319	H. L. Parks & Co., Concord	do	do.
6320	H. L. Parks & Co., Concord	do	do.
6321	do	do	do.
6322	Chas. H. A. Blume, Concord	do	do.
6323	P. G. Harbison, Morganton	do	Blackberries, canned.
6324	Bristol & Harbison, Morganton	do	do.
6325	Davis & Byerly, Charlotte	do	do.
6326	J. F. Jamison & Co., Charlotte	do	do.
6327	do	do	do.

FRUIT BUTTER.

Fruit butter is the sound product made from fruit juice and clean, sound, properly matured and prepared fruit, evaporated to a semisolid mass of homogeneous consistence, with or without the addition of sugar and spices or vinegar, and conforms in name to the fruit used in its preparation.

RESULTS OF THE EXAMI

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6497	Fruit Butter, Apple, Goodwin's Best.	The Goodwin Preserving Co., Louisville, Ky.
6498	Fruit Butter, Apple, Heinz	H. J. Heinz Co., Pittsburg, Pa.
6499	Fruit Butter, Apple, Goodwin's Best.	The Goodwin Preserving Co., Louisville, Ky.

CANNED VEGETABLES.

Vegetables are the succulent, clean, sound, edible parts of herbaceous plants used for culinary purposes.

Canned vegetables are prepared fresh vegetables, with or without salt, sterilized by heat, with or without previous cooking in vessels

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6299	Tomatoes, canned	J. D. Pitts, Glen Alpine, N. C.	P. G. Harbison, Morganton
6300	Tomatoes, canned, Monogram.	E. A. Saunders' Sons Co, Richmond, Va.	M. F. Kirby, Charlotte
6328	Beans, String, canned	J. D. Pitts, Glen Alpine, N. C.	P. G. Harbison, Morganton
6329	Beans, String, canned, Catawba Valley	Catawba Valley Canning Co., Morganton, N. C.	Bristol & Harbison, Morganton.
6330	Okra and Tomatoes, canned.	G. W. Dunbar's Sons, New Orleans, La.	J. F. Jamison, Charlotte
6331	Tomatoes, canned, Highland Beauty.	G. F. Barnhardt, Concord, N. C.	Chas. H. A. Bloom, Concord
6332	Tomatoes, canned	E. S. Marsh, Wadesboro, N. C.	Hardison Co., Wadesboro
6333	Peas, canned, Royal	Winters & Prophet Canning Co., Mt. Morris, N. Y.	Bristol & Harbison, Morganton.
6334	Peas, canned, Bijou	Austin Nichols & Co., New York, N. Y.	L. L. Sarratt, Charlotte
6335	Peas, canned, Herald	Githens, Rexsamer & Co., Philadelphia, Pa.	do
6336	Peas, canned, Harvest	Austin Nichols & Co., New York, N. Y.	do
6337	do	do	M. F. Kirby, Charlotte
6338	Peas, canned, Faultless	Wayne County Preserving Co., Newark, N. J.	do
6339	Peas, canned, Winnow	The Pressing & Orr Co., Norwalk, O.	do
6340	Peas, canned, Shirley	Fleming & Christian, Richmond, Va.	H. C. Watson, Rockingham
6341	Peas, canned, Princess Anne.	C. W. Antrim & Sons, Richmond, Va.	Davis & Byerly, Charlotte

The adulterants usually found in fruit butters are the same as those found in other similar fruit products.

Three samples of fruit butter were examined and no chemical preservative or coal-tar dye was found in any of them.

In 1907 benzoate was found in all the samples of apple butter examined. It is gratifying to see that the use of this preservative is disappearing as the public become better informed on the subject.

NATION OF FRUIT BUTTER.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6497	Vanvalkenberg & Co., Asheville	None found	Apple butter.
6498	M. F. Kirby, Charlotte	do	do.
6499	Davis & Byerly, Charlotte	do	do.

from which they take up no metallic substance, kept in suitable, clean, hermetically sealed containers, are sound and conform in name to the vegetables used in their preparation.

Sixteen samples of vegetables were examined and no adulterations were found.

TION OF CANNED VEGETABLES.

Laboratory Number.	Adulterants.	Chemical Preservatives.	Remarks and Conclusions.
6299	None found	None found	Canned tomatoes.
6300	do	do	do.
6328	do	do	Canned string beans.
6329	do	do	do.
6330	do	do	Canned okra and tomatoes.
6331	do	do	Canned tomatoes.
6332	do	do	do.
6333	do	do	Canned peas.
6334	do	do	do.
6335	do	do	do.
6336	do	do	do.
6337	do	do	do.
6338	do	do	do.
6339	do	do	do.
6340	do	do	do.
6341	do	do	do.

PRESERVES.

Preserves is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose) syrup, with or without spices or vinegar, and conforms in name to that of the fruit used, and in its preparation not less than forty-five pounds of fruit are used to each fifty-five pounds of sugar.

All preserves containing ingredients other than those named above should be so labeled that the fact would be made known to the purchaser, or the product will be regarded as adulterated.

Before the subject of food adulteration was so much agitated and the enforcement of food laws, preserves were much adulterated with coal-tar dyes and chemical preservatives, but their use is rapidly

RESULTS OF THE EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6485	Preserves, Goodwin's Best	The Goodwin Preserving Co., Louisville, Ky.
6486	Preserves, Exwaco	Exley-Watkins & Co., Wheeling, W. Va.
6496a	Preserves, Fresh Fruit	Curtis Bros. Co., Rochester, N. Y.
6481	Preserves, Old Virginia	J. B. Hamsburger, Front Royal, Va.
6482	Preserves, Purity	National Preserving Co., Baltimore, Md.
6483	Preserves, Heinz	H. J. Heinz Co., Pittsburg, Pa.
6484	Preserves, Flag	Fort Stanwick Canning Co., Rome, N. Y.

PICKLES.

Pickles are clean, sound, immature cucumbers, properly prepared, without taking up any metallic compound other than salt, and preserved in any kind of vinegar, with or without spices; pickled onions, pickled beets, pickled beans, and other pickled vegetables are vegetables prepared as described above, and conform in name to the vegetables used.

RESULTS OF THE EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6644	Pickles, sweet, Empire	Horton-Cato Mfg. Co., Detroit, Mich.
6643	Pickles, sour, Empire	----do
6641	Pickles, sour, Heinz	H. J. Heinz Co., Pittsburg, Pa.
6439	Pickles, Pin Money	Mrs. E. G. Kidd, Richmond, Va.
6342	Pickles, sweet, Peaches	W. N. Clark & Co., Rochester, N. Y.

disappearing, and most of the higher class packers of food products have discontinued the use of them almost entirely. The results of the examinations of this Department for the past ten years show that chemical preservatives have not been much used in high-class products, but their use was confined to medium and low grade goods, and mostly the latter. Some manufacturers claim that they can make a better product with the use of chemical preservatives than can be made without them. If this be true, it seems that chemical preservatives would have been used in the higher class products instead of having been confined largely to the lower grade goods.

Seven samples of preserves were examined and only one (No. 6496a) was found to contain a chemical preservative. It was manufactured by Curtis Bros. Company, and contained benzoate.

INATION OF PRESERVES.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6485	Davis & Byerly, Charlotte	None found	Preserves.
6486	T. T. Caraway & Son, Wadesboro.	----do----	do.
6496a	Lynch Bros., Greensboro	Benzoate	do.
6481	C. E. Jourdan, Durham	None found	do.
6482	Patterson Bros., Durham	----do----	do.
6483	M. F. Kirby, Charlotte	----do----	do.
6484	Davis & Byerly, Charlotte	----do----	do.

Salt pickles are clean, sound, immature cucumbers, preserved in a solution of common salt, with or without spices.

Sweet pickles are pickled cucumbers or other vegetables in the preparation of which sugar (sucrose) is used.

Five samples of pickles were examined, and no adulteration was found.

INATION OF PICKLES.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Adulterants.	Remarks and Conclusions.
6644	D. T. Johnson, Raleigh	None found	Sweet pickles.
6643	----do----	----do----	Sour pickles.
6641	W. B. Mann & Co., Raleigh	----do----	do.
6439	----do----	----do----	Pin-money pickles.
6342	Davis & Byerly, Charlotte	----do----	Sweet pickled peaches.

CONFECTIONERY.

Confectionery is a term applied to a wide range of products, which may be described as preparations of saccharine substances with or without color and flavor added. Candy is a term that is applied to a large part of confectionery.

The saccharine materials which are employed in the manufacture of confectionery are sugars of various kinds. Various colors and flavors, both natural and artificial, are used to flavor and color confectionery. The Food Law says that confectionery must not con-

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6468	Candy, Stick	Gate City Candy Co., Greensboro.	W. P. McLain, Statesville
6469	Candy, Chu-chu	Sands-Ritchey Co., Pittsburg, Pa.	W. N. Jeans, Wadesboro
6470	Candy, Peter Bunny	Plews, St. Louis, Mo.	do
6471	Candy, Chocolate		H. C. Watson, Rockingham

JAMS.

Jam, marmalade, is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose), with or without spices or vinegar, by boiling to a pulpy or semisolid consistence, and conforms in name to the fruit used, and in its preparation not less than forty-five pounds of fruit are used to each fifty-five pounds of sugar.

Glucose jam, glucose marmalades, is jam in which a glucose product is used in place of sugar (sucrose).

RESULTS OF EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6505	Jam, Premier	Francis H. Leggett & Co., New York
6506	Jam, Republic	Austin Nichols & Co., New York
6507	Jam, Highland	Williams Bros. Co., Detroit, Mich.
6508	Jam, Republic	Austin Nichols & Co., New York
6500	do	do

tain terra alba, barytes, talc, chrome yellow, or other mineral substances. It also provides that they must not contain poisonous color or flavor, or other ingredients deleterious to health.

Only four samples were examined, all of which were simple products, and no adulteration was found, though they all contained glucose.

Sample No. 6471 was not labeled according to requirements, and its sale was illegal.

TION OF CONFECTIONERY.

Laboratory Number.	Filler.	Glucose.	Adulterants.	Remarks and Conclusions.
6468		Present	None found	Candy, containing glucose.
6469		do	do	do.
6470		do	do	do.
6471		do	do	Candy, containing glucose, not properly labeled.

Besides the adulterants found in preserves,* as jam is cooked to a pulp, other and cheaper fruits than the one specified are often used to adulterate it.

If jam contains anything other than fruit and cane sugar (sucrose), with or without spices, the fact must be indicated on the label by either naming the ingredients or labeling it "Imitation" or "Compound."

Ten samples of jam were examined, and a chemical preservative was found in only two samples, Nos. 6496 and 6502, manufactured by Curtis Bros. Company. They contained benzoate.

INATIONS OF JAM.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6505	Smathers & Young, Asheville	None found	Jam.
6506	Davis & Byerly, Charlotte	do	do.
6507	Hunter & Boyd, Charlotte	do	do.
6508	S. R. Lentz, Charlotte	do	do.
6509	Patterson Bros., Durham	do	do.

*See chemical preservatives, page 8.

RESULTS OF EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6501	Jam	West Virginia Preserving Co., Wheeling, W. Va.
6502	Jam, Fresh Fruit	Curtis Bros. Co., Rochester, N. Y.
6503	Jam	Austin Nichols & Co., New York
6504	Jam, Fresh Fruit	Webster Preserving Co., Webster, N. Y.
6496	Marmalade, Fresh Fruit	Curtis Bros. Co., Rochester, N. Y.

MARASCHINO AND CREME DE MENTHE CHERRIES.

Many cherries on the market that are represented to be Maraschino or Creme de Menthe cherries are preserved with benzoate of soda or sulphurous acid and contain no Maraschino brandy, etc. The natural color of the fruit, which is destroyed by the sulphurous acid, is replaced by coal-tar dyes, which are not affected by the acid.

It is difficult to say positively that these colors and preservatives, used in small quantities, are actually poisonous, but there is hardly any doubt in my mind but what they are more or less deleterious to health. The system is doubtless far better off without them.

Ten samples were examined (eight Maraschino and two Creme de

RESULTS OF THE EXAMINATION

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6232	Cherries, Maraschino	Dandicolle & Gaudin, Bordeaux, France.	A. P. Grizzard, Winston-Salem.
6233	Cherries, Maraschino, Belle.	----------	Theo. Atwell, Salisbury
6234	Cherries, Maraschino, Royal Ann.	Long Syrup Refining Co., San Francisco, Cal.	Eagle & Milholland, Statesville.
6235	Cherries, Maraschino, Richelieu.	Sprague, Warner & Co., Chicago, Ill.	Calvert Grocery Co., Statesville.
6236	Cherries, Maraschino	Dandicolle & Gaudin, Bordeaux, France.	L. L. Sarratt, Charlotte
6237	Cherries, Maraschino	R. C. Williams & Co., New York.	H. C. Watson, Rockingham
6238	Cherries, Maraschino, Vionana.	The Mihalovitch-Fletcher Co., Cincinnati, Ohio.	Dove-Bost Co., Concord
6239	Cherries, Maraschino, Yellow Vionana.	----do----------	----do----------
6240	Cherries, Creme de Menthe, Vionana.	----do----------	----do----------
6241	Cherries, Creme de Violette, Vionana.	----do----------	----do----------

TIONS OF JAM—CONTINUED.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6501	J. R. Chrisman & Bro., Greensboro.	None found	Jam.
6502	Lynch Bros., Greensboro	Benzoate	do.
6503	Calvert Grocery Co., Statesville	None found	do.
6504	Dixie Club Grocery Co., Statesville	do	do.
6496	Lynch Bros., Greensboro	Benzoate	do.

Menthe), of which five contained sulphurous acid and four contained coal-tar dyes.

Sample No. 6233 was not properly labeled, and the sale was illegal.

Probably no prosecution will be brought for the use of sulphites and certain coal-tar colors when used in food in very small quantities; but the Department, believing their use objectionable, advises strongly against it. Generally, the packers and manufacturers who make the highest class products do not use benzoate, sulphites, or coal-tar dyes.

OF MARASCHINO CHERRIES.

Laboratory Number.	Adulterants.	Chemical Preservatives.	Coloring Matter.	Remarks and Conclusions.
6232		None found	Coal-tar dye	Maraschino cherries.
6233	None found	do	Vegetable	Maraschino cherries, not properly labeled.
6234		do	Coal-tar dye	Maraschino cherries.
6235	None found	do	Vegetable	do.
6236		do	Coal-tar dye	do.
6237		Sulphites	Vegetable	do.
6238		do	Coal-tar dye	do.
6239		do	Vegetable	do.
6240		do	do	Creme de menthe cherries.
6241		do	do	Creme de violette cherries.

VINEGAR.

The subject of vinegar and its examination for adulteration has been discussed at considerable length in previous Food Reports of this Department, to which, for information not found here, the reader is referred.*

Acetic acid, of course, is the principal constituent of vinegar, but the latter also contains small amounts of ethyl acetate, aldehydes, alkaline acetate, tartrates, malates, and various other salts.

Vinegar, on long standing, exposed to the air, deteriorates and loses more or less of its acidity and should, therefore, be kept protected from the air.

The food standards recognize six kinds of vinegar, namely: (1) vinegar, cider vinegar; (2) wine vinegar; (3) malt vinegar; (4) sugar vinegar; (5) spirit vinegar; (6) glucose vinegar. Vinegar of the several kinds must contain at least 4 per cent acetic acid.

RESULTS OF THE EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6156	Vinegar, No. 1, artificially colored.	J. G. Clark, Baltimore, Md.	Pamlico Grocery Co., Washington.
6155	Vinegar, Apple Cider	Louisville Cider and Vinegar Works, Louisville, Ky.	Wiggins Grocery Co., Wilson
6154	Vinegar		Kuester-Pharr Co., Charlotte
6147	Vinegar, Apple Cider	Board, Armstrong & Co., Alexandria, Va.	
6579	Vinegar, White House	do	J. W. Hardy, Wilmington†
6596	Vinegar, Mott's Apple, 4 years old.	S. R. and J. C. Mott, Rochester, N. Y.	Wilmington Grocery Co., Wilmington.†
6598	Vinegar, Family, Distilled.	Caslar Bros., Asheville, N. C.	Caslar Bros., Asheville
6599	Vinegar, California Fruit	S. Caslar, Asheville, N. C.	Roland Grocery Co., Asheville
6600	Vinegar, Apple	Caslar Bros., Asheville, N. C.	Caslar Bros., Asheville
6601	Vinegar, Distilled, colored.	Southern Drug Co., Norfolk, Va.	
6602	Vinegar, Mount Vernon Brand.	Board, Armstrong & Co., Alexandria, Va.	J. A. Singleton, Red Springs
6603	Vinegar, Dixie, White Wine.	W. A. Jones, Norfolk, Va.	E. Burns, Maxton
6534	Vinegar	Sol. Baer & Co., Wilmington, N. C.	S. W. Sanders, Wilmington
6535	Vinegar, Apple		J. T. Joyner, Winston
6536	Vinegar, Distilled	Southern Drug Co., Norfolk, Va.	D. M. Wells, Hendersonville
6537	Vinegar, Apple	Coca-Cola Bottling Co., Asheville, N. C.	do
6538	Vinegar, Distilled	R. N. Hughes & Co., Louisville, Ky.	The Shuford Co., Gastonia
6539	do	do	Piedmont Grain and Provision Co., Hickory.

*First, second, fourth, sixth, seventh, eighth and ninth.
†Sample sent to the Department for analysis.

Vinegar is a product made from apple cider, and when sold without naming the class to which it belongs, it means an apple cider vinegar. When vinegar is sold under a brand or trade name, it should state the class to which it belongs; otherwise it will be presumed to be sold for an apple cider vinegar; then, in case it is not a cider vinegar, it will be classed as misbranded, and its sale in the State regarded as a violation of the Food Law.

During the year twenty-seven samples of vinegar have been examined, fourteen of which were either below standard in acidity, were misbranded or were not properly labeled. As will be seen by reference to the table below, several of the samples that did not comply with the law were not offered for sale in violation of it, but were sent to the Department for examination to see if they were legal products. However, others were offered for sale in violation of the law, and the dealers have been prosecuted.

INATION OF VINEGAR.

Laboratory Number.	Total Acidity (Acetic Acid)—Per Cent.	Solid Matter in Solution—Per Cent.	Ash—Per Cent.	Sodium Bicarbonate.	Remarks and Conclusions.
6156	4.65	.27		No change	Distilled spirit vinegar, colored, not properly labeled; sale illegal.
6155	3.94	1.72	.30	Very dark	Apple cider vinegar, slightly below standard; sale illegal.
6154	4.22			Black	Apple cider vinegar.
6147	4.18	1.90	.33	Black	do.
6579	4.03	2.02		do	do.
6596	4.86	2.86	.48	do	do.
6598	3.80	.07	.01	No change	Distilled spirit vinegar, below standard; sale illegal.
6599	3.31	1.42	.09	Darker	Product seems not to be made entirely from fruit and is below standard; sale illegal.
6600	3.99	1.98	.20	Black	Product not made wholly from apple juice; sale illegal.
6601	1.82	1.12	.05	Slightly darker	Is not distilled vinegar and is below standard; sale illegal.
6602	4.28	.21	.02	No change	Distilled vinegar, colored, misbranded; sale illegal.
6603	4.57			do	Distilled spirit vinegar, misbranded; sale illegal.
6534	4.57	1.58	.12	Very dark	Vinegar.
6535	3.33	1.04	.16	do	Vinegar, below standard; sale illegal.
6536	3.21	.06	.02	No change	Distilled spirit vinegar, below standard; sale illegal.
6537	4.64	2.52	.28	Very dark	Vinegar.
6538	4.06	.25	.02	No change	Distilled spirit vinegar.
6539	3.60	.45	.08	do	Distilled spirit vinegar, below standard; sale illegal.

RESULTS OF THE EXAMINATION

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6550	Vinegar, Apple Cider, White House.	Board, Armstrong & Co., Alexandria, Va.	E. Peterson & Co., Washington
6551	Vinegar, Apple Cider, Mott's.	D. J. Gregory Vinegar Co., Richmond, Va.	----------
6552	Vinegar, Apple Cider, 60 gr.	----do----------	----------
6359	Vinegar, Distilled, colored	Haynes Bottling Works, Rutherfordton, N. C.	K. J. & H. L. Carpenter, Rutherfordton.†
6163	Vinegar, Apple Cider----	Louisville Cider and Vinegar Co., Louisville, Ky.	Wiggins Grocery Co., Wilson---
6162	Vinegar, Distilled, colored	Carolina Cider and Vinegar Co., Tarboro, N. C.	Wilson Grocery Co., Wilson----
6161	Vinegar, Bluegrass Belle -	Jones Bros. & Co., Louisville, Ky.	----do----------
6159	Vinegar, Distilled, colored	Haynes Bottling Works, Rutherfordton, N. C.	K. J. & H. L. Carpenter, Rutherfordton.†
6157	Vinegar, Apple Cider----	The Hicks Co., Wilmington, N. C.†	----------

BAKING POWDERS.

The subject of aëration or leavening of breadstuffs by baking powders and yeast was treated at length in the Food Report of this Department, published in 1902. For information on the subject not found here, the reader is referred to that report. The subject is an important one and one that is well understood by chemists; but as it is not so well understood by housewives and grocerymen, we deem it advisable to repeat, to a certain extent, facts that were set forth in the former report.

The aëration or leavening of bread products, whether by yeast or baking powder, is accomplished by an evolution through the whole mass of dough of carbon-dioxide gas, which in escaping makes the bread light and porous. Most of the gas is generated before the process of baking begins, but, to a large extent, is mechanically held in the mass, the heat causing the gas to expand and do its work more effectively.

Yeast introduces into the dough microscopic plants or ferments which produce alcohol and carbon-dioxide gas, both of which largely escape during the baking, and the plant is killed by the heat.

Baking powder evolves carbon-dioxide gas in the dough, by the chemical reaction of bicarbonate of soda with cream of tartar, acid phosphate, alum, or other chemical, and leaves in the dough the nonvolatile product of the reaction, consisting partly or wholly of mineral matter.

The same chemical action takes place when bicarbonate of soda is used in conjunction with sour milk, only a different residue is left in the bread.

†Samples sent to the Department for analysis.

OF VINEGAR.—CONTINUED.

Laboratory Number.	Total Acidity (Acetic Acid)—Per Cent.	Solid Matter in Solution—Per Cent.	Ash—Per Cent.	Sodium Bicarbonate.	Remarks and Conclusions.
6550	4.00	3.13	.34	Black	Apple cider vinegar.
6551	5.98	3.65	.43	....do	do.
6552	6.27	2.67	.33	....do	do.
6359	3.43			No change	Distilled spirit vinegar, colored, below standard; sale illegal.
6163	4.10	2.30	.28	Black	Apple cider vinegar.
6162	4.28	.18	.02	No change	Distilled spirit vinegar, not properly labeled; sale illegal.
6161	4.30	2.21	.18	Black	Apple cider vinegar.
6159	3.70	.21	.01	No change	Distilled spirit vinegar, colored, below standard; sale illegal.
6157	5.98	4.70	.42	Black	Apple cider vinegar.

So far as the quality of the bread is concerned, there is no method that will approach the natural process. This means of leavening is at a slight loss to the bread, as the carbon-dioxide gas, which does the work, comes from the decomposition of sugar and starch, and, of course, to that extent, which is very small, lessens the value of the bread; but what is lost in quantity is gained in quality. The yeast or natural process of leavening is slow, and cannot be used when quicker rising is desired.

CONSTITUENTS OF POWDERS.

Two ingredients are essential in a baking powder: a carbonate which contains the carbon-dioxide gas necessary to raising the dough, and an acid or its equivalent, which in the presence of moisture liberates carbon-dioxide from the carbonate. In addition to the essential constituents, most baking powders contain a filler, consisting of starch or flour, which is used simply to improve the keeping quality. Some other substances, such as sulphate of lime, argolite and tremolite, are sometimes used as fillers, but are highly undesirable additions to food products.

Sodium bicarbonate, also known as baking soda, is the principal carbonate—in fact, practically the only one—used in making powders.

There is more diversity in the acid constituents employed, the principal ones being tartaric acid, cream of tartar, acid phosphate of lime and the alums, the acid in which is sulphuric acid.

The residue, the character of which depends upon the acid-furnishing material left in the bread, is the main objection to the use of baking powders, its amount and character determining, to a large extent, the healthfulness of the particular powder.

The efficiency of a baking powder as a leavening agent depends on the amount of gas it sets free in the dough, and must be considered apart from the wholesomeness of the residue it leaves.

CLASSIFICATION OF BAKING POWDERS.

Baking powders are classified according to the acid constituents they contain, as follows:

Tartrate Powders, in which the acid is tartaric acid in some form.

Phosphate Powders, in which the acid is phosphoric acid, as an acid phosphate.

Alum Powders, in which the acid is sulphuric acid, contained in some form of an alum salt.

Alum-phosphate Powders, in which the acids are both sulphuric and phosphoric acids.

TARTARIC ACID BAKING POWDERS.

Tartaric acid is the principal acid in grapes, and is contained in all grape wines.

The residue left in bread prepared with tartaric acid powders is sodium tartrate.

CREAM OF TARTAR BAKING POWDERS.

Cream of tartar is the name by which bitartrate of potash or acid tartrate of potash is known in commerce.

The residue left in bread made with cream of tartar baking powders is sodium-potassium tartrate or Rochelle salts.

PHOSPHATE BAKING POWDERS.

The acid constituent of these powders is a purified acid phosphate of lime.

The residue left in bread by a phosphate powder is phosphate of lime, phosphate of soda and calcium sulphate, the latter being an impurity in the calcium phosphate used in making the powder.

ALUM BAKING POWDER.

The acid material in an alum powder is some one of the class of salts known as alums, which are double sulphates of aluminium and an alkali. The acid in these is sulphuric acid and the carbon-dioxide is set free from the bicarbonate of soda by the substitution of sulphuric acid for the carbonic acid, the aluminium being left as a hydroxid.

The residue left in bread from an alum powder is more complex than the residue from any of the other classes mentioned, and depend on the kind of alum used. Sodium sulphate and aluminium hydroxid are necessarily present, and if potash and ammonium alum are used their respective sulphates would be present also.

There is a class of powders that contain two, and sometimes even more, acid-furnishing material; of these the alum-phosphate powders are the most important. They are mixtures of alum and phosphate powders, and the residue left in the bread by them would be a mixture of the residues already referred to under alum and phosphate powders, with a small amount of aluminium phosphate in addition.

All baking powders, without exceptions, leave in the bread certain salts, above mentioned, which are foreign to flour and objectionable, and most of which are used in medicine, though some of them not internally.

EXAMINATION OF SAMPLES.

Thirty-nine samples have been examined and classified as follows:

Phosphate Powders	10
Tartrate Powders	8
Alum Powders	20
Alum-phosphate Powders	1

No adulteration was found and only one sample (No. 6604) was not properly labeled. The acid ingredient was not stated on the label, as is required.

In the examination of these powders quantitative determinations were made of the carbon-dioxide gas (the active leavening constituent to which powders owe their value) and the insoluble ash, though qualitative tests were made to ascertain the materials from which the powders were made, as well as any impurities or adulterants.

On standing, baking powders, unless put up practically air-tight, gradually lose their leavening power; and the longer a powder stands, other things being equal, the lower its leavening power will be. If a powder is not put up dry and kept so, there will be a gradual decomposition or loss in leavening power. While no actual adulteration was found in the samples examined, several of them had practically lost their strength or leavening power, and a few of them were almost worthless because of it. Whether a powder has lost its leavening power or whether it never had any makes little difference to the consumer, for one is as worthless as the other.

As baking powders deteriorate on standing, merchants should never keep them in stock to be very old.

RESULTS OF EXAMINATION

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6250	Baking Powder, Snow King.	Kenton Baking Powder Co., Cincinnati, O.	L. R. Winecoff, Salisbury
6252	Baking Powder, Four Favorites.	The Sea Gull Specialty Co., Baltimore, Md.	D. J. Kimball, Statesville
6255	Baking Powder, Quaker	The E. M. Bergey Co., Chicago, Ill.	J. A. Grover, Asheville
6544	Baking Powder, Ellro	Ellison Bros., Washington, N. C.	Ellison Bros., Washington
6244	Baking Powder, Parrot and Monkey.	The Sea Gull Specialty Co., Baltimore, Md.	Lynch Bros., Greensboro
6245	Baking Powder, Good Luck.	The Southern Mfg. Co., Richmond, Va.	do
6247	Baking Powder, Red Cross.	The Red Cross Baking Powder Co., Chicago, Ill.	Sockwell Bros., Greensboro
6257	Baking Powder, Parrot and Monkey.	The Sea Gull Specialty Co., Baltimore, Md.	Hardison Co., Wadesboro
6259	Baking Powder, Good Luck.	Southern Mfg. Co., Richmond, Va.	do
6261	Baking Powder, Four Favorites.	The Sea Gull Specialty Co., Baltimore, Md.	B. F. Tarlton, Wadesboro
6262	Baking Powder, Snow King.	Kenton Baking Powder Co., Cincinnati, O.	do
6263	Baking Powder, Parrot and Monkey.	The Sea Gull Specialty Co., Baltimore, Md.	H. C. Watson, Rockingham
6264	Baking Powder, Good Luck.	Southern Mfg. Co., Richmond, Va.	do
6265	Baking Powder, Mascot	The E. E. Ware Coffee Co., Dayton, O.	D. J. Bost Co., Concord
6266	Baking Powder, Milk Pail.	Sanford Mercantile Co., Sanford, N. C.	Sanford Mercantile Co., Sanford.
6604	Baking Powder, Columbia.	Columbia Supply Co., St. Louis, Mo.	Monaghan & Co., Fayetteville
6605	Baking Powder, Perfection.	Hagood Mfg. Co., St. Louis, Mo.	do
6606	Baking Powder, Red Cross.	Red Cross Supply Co., St. Louis, Mo.	do
6607	Baking Powder, Health	Merrill Co., Chicago, Ill.	do
6630	Baking Powder, Good Luck.	Southern Mfg. Co., Richmond, Va.	W. B. Mann & Co., Raleigh
6631	do	do	D. T. Johnson, Raleigh

RESULTS OF THE EXAMINATION

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6248	Baking Powder, Excelsior.	J. F. Powers & Son, Fayetteville, N. C.	J. F. Powers & Son, Fayetteville.
6249	Baking Powder, Darnells.	Darnell Mfg. Co., St. Louis, Mo.	L. R. Winecoff, Salisbury
6253	Baking Powder, Rumford	Rumford Chemical Works, Providence, R. I.	D. J. Kimball, Statesville
6242	do	do	Lynch Bros., Greensboro
6256	do	do	N. Duls, Charlotte
6260	do	do	Hardison Co., Wadesboro

OF ALUM BAKING POWDERS.

Laboratory Number.	Carbon Dioxide—Per Cent Available.	Ash—Insoluble in Hydrochloric Acid—Per Cent.	Adulterants.	Remarks and Conclusions.
6250	13.00	.23	None found	Alum powder, starch filler.
6252	14.65	.42	do	do.
6255	9.60	.18	do	do.
6544	9.50	.44	do	do
6244	15.90	.26	do	do.
6245	10.40	.16	do	do.
6247	8.00	.58	do	do.
6257	13.55	.24	do	do.
6259	1.85	.26	do	do.
6261	13.05	.28	do	do.
6262	13.65	.18	do	do.
6263	12.40	.21	do	do.
6264	11.05	.33	do	do.
6265	11.90	.28	do	do.
6266	12.75	.27	do	do.
6604	2.85	.22	do	Alum powder, starch filler, not properly labeled; sale illegal.
6605	6.85	.17	do	Alum powder, starch filler.
6606	2.25	.15	do	do.
6607	10.00	.68	do	Alum phosphate powder, starch filler.
6630	11.20		do	Alum powder, starch filler.
6631	15.55		do	do.

OF PHOSPHATE BAKING POWDERS.

Laboratory Number.	Carbon Dioxide—Per Cent Available.	Ash—Insoluble in Hydrochloric Acid—Per Cent.	Adulterants.	Remarks and Conclusions.
6248	9.45	.65	None found	Phosphate powder, starch filler.
6249	5.30	.58	do	do.
6253	8.85	1.82		do.
6242	8.35	.24	None found	do.
6256	8.43	.80	do	do.
6260	1.85	.27	do	do.

RESULTS OF THE EXAMINATION OF

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6635	Baking Powder, Rumford	Rumford Chemical Works, Providence, R. I.	J. R. Ferrall & Co., Raleigh
6636	do	do	D. T. Johnson & Son, Raleigh
6637	do	do	M. Rosenthal & Co., Raleigh
6638	do	do	W. B. Mann & Co., Raleigh

RESULTS OF EXAMINATION OF

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6251	Baking Powder, Cream	Price Baking Powder Co., New York.	W. P. McLain, Statesville
6254	Baking Powder, Sea Foam	Sea Foam Baking Powder Co., New York.	Yates & McGuire, Asheville
6243	Baking Powder, Royal	Royal Baking Powder Co., New York.	Lynch Bros., Greensboro
6246	Baking Powder, Cream	Price Baking Powder Co., New York.	J. R. Chisman & Bro., Greensboro.
6258	Baking Powder, Royal	Royal Baking Powder Co., New York.	Hardison Co., Wadesboro
6632	do	do	D. T. Johnson & Son, Raleigh
6633	do	do	M. Rosenthal & Co., Raleigh
6634	do	do	J. R. Ferrall & Co., Raleigh

JELLY.

Jelly is the sound, semisolid, gelatinous product made by boiling clean, sound, properly matured and prepared fresh fruit with water, concentrating the expressed and strained juice, to which sugar (sucrose) is added, and conforms in name to the fruit used in its preparation.

Glucose jelly is jelly in which a glucose product is used in place of sugar (sucrose).

If jelly contains other than the ingredients mentioned above, the fact must be stated on the label by either naming the ingredients or by labeling it "Imitation" or "Compound."

Jelly, being made from the soluble matter of fruits, is much easier to adulterate without being detected than preserves or jam. Besides

PHOSPHATE BAKING POWDERS.—CONTINUED.

Laboratory Number.	Carbon Dioxide—Per Cent Available.	Ash—Insoluble in Hydrochloric Acid—Per Cent.	Adulterants.	Remarks and Conclusions.
6635	9.30	.....	None found.....	Phosphate powder, starch filler.
6636	7.00	.....	....do.....	do.
6637	8.25	.....	....do.....	do.
6638	10.10	.....	....do.....	do.

TARTRATE BAKING POWDERS.

Laboratory Number.	Carbon Dioxide—Per Cent Available.	Ash—Insoluble in Hydrochloric Acid—Per Cent.	Adulterants.	Remarks and Conclusions.
6251	10.20	.07	None found	Tartrate powder, starch filler.
6254	12.60	.06	....do.....	do.
6243	10.35	.05	....do.....	do.
6246	8.55	.34	....do.....	do.
6258	9.75	.07	....do.....	do.
6632	10.50	.....	....do.....	do.
6633	11.60	.....	....do.....	do.
6634	12.00	.....	....do.....	do.

objectionable chemical preservatives and coal-tar dyes, jelly is often adulterated with foreign gelatinous matter (starch paste, gelatine, etc.); sweetening materials (glucose, saccharine, etc.); artificial flavors; and fruit acids (citric and tartaric acids).

Artificial flavors used in imitation jellies and other fruit products are prepared from chemicals. They have a peculiar taste and odor and are unwholesome. Properly prepared pure fruit products are wholesome and nourishing, but products prepared from artificial flavoring, coloring, and chemical preservatives are necessarily more or less deleterious to health and should not be used as food.

Twelve samples of jelly were examined and only two (Nos. 6490a and 6494a) were found to contain benzoate, a chemical preservative.

RESULTS OF EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6574	Jelly	
6495	Jelly, Quaker	The John Boyle Co., Baltimore, Md.
6488	Jelly, Sunbeam	Austin Nichols & Co., New York
6489	Jelly, Empress	Francis H. Leggett & Co., New York
6490	Jelly	Austin Nichols & Co., New York
6490a	----do	Curtis Bros. Co., Rochester, N. Y.
6491	----do	Emory Food Co., Chicago, Ill.
6492	----do	----do
6493	----do	Mrs. T. J. Gattis, Charlotte, N. C.
6494	Jelly, Pomona	R. C. Williams & Co., New York
6494a	Jelly	Curtis Bros. Co., Rochester, N. Y.
6487	Jelly, Ferndell	Sprague, Warner & Co., Chicago, Ill.

BOTTLED SODA WATERS.

The bottling of soda waters has come to be one of the large industries of the State.

The bottling process is comparatively simple, and much of the business in the State is in the hands of men with very little intelligence. While many of the bottlers are highly intelligent and capable men, others have not sufficient intelligence to comprehend the requirements of the law, or to realize the great danger to which the health of thousands of people may be subjected from the bottling of soft drinks under insanitary conditions, to say nothing of the objectionable matter that may be put into the product. Many cases of fever may originate from the use of contaminated water by one bottling plant. We realize that inspections should be made of all such plants, and that they should be required to be operated in a sanitary condition, so that they would not endanger the health and lives of the people; but the Department hasn't the funds with which to do the work.

The labels for these drinks are usually furnished by the manufacturer of the syrup or flavoring from which the drink is made. As the

INATION OF JELLY.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Chemical Preservatives.	Remarks and Conclusions.
6574	R. C. Champion, Tryon	None found	Jelly.
6495	H. C. Watson, Rockingham	----do	do.
6488	P. W. Johnson, High Point	----do	do.
6489	M. A. Bethune, Fayetteville	----do	do.
6490	Calvert Grocery Co., Statesville	----do	do.
6490a	Lynch Bros., Greensboro	Benzoate	do.
6491	W. P. McLain, Statesville	None found	do.
6492	M. F. Kirby, Charlotte	----do	do.
6493	M. F. Kirby, Charlotte	----do	do.
6494	H. C. Watson, Rockingham	----do	do.
6494a	Lynch Bros., Greensboro	Benzoate	do.
6487	Patterson Bros., Durham	None found	do.

manufacturer of the syrup or flavoring and the labels does not ship the finished product into the State, he cannot be held for misbranding under the National Food Law. For that reason the bottler of a product will have to be held strictly responsible for his products under the State law.

The so-called flavoring extracts from which many such drinks are made are often misrepresented to the bottlers. It is claimed that they are fruit juices, extracts, etc., when they are entirely or partially artificial products. They have often been labeled fruit products, showing on the label an attractive looking picture of the fruit from which the product was supposed to have been made. The rules on labeling require that every bottle must be labeled, and the label must bear the name and address of the bottler.

Eleven samples were examined, four of which were sent to the Department for analysis and only seven were official samples. Of the seven official samples six were not properly labeled. They, however, were taken shortly after the regulations on labeling were issued. In future prosecutions will be made for violations of the regulation.

RESULTS OF EXAMINATIONS OF SODA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6927	Soda-Water Syrup, King Kole.	Madison Grocery Co., Madison, N. C.	Madison Grocery Co., Madison*
6928	----do----------	----do----------	----do*----------
6929	----do----------	----do----------	----do*----------
6591	Soda Water, Artificial Orange Flavor.	Crescent Carbonating Co., Hendersonville, N. C.	J. B. Livingston, Tryon-------
6614	Ginger Extract--------	----------	T. J. Price, Monroe*----------
6447	Soda Water, Coca-Cola --	Coca-Cola Bottling Co., Greensboro, N. C.	J. H. & W. F. Law, Greensboro.
6448	Soda Water, Peach------	Coca-Cola Bottling Co., Asheville, N. C.	W. C. Moore, Hendersonville---
6449	Soda Water, Peach Cream.	Crescent Carbonating Co., Hendersonville, N. C.	----do----------
6450	Soda Water, Strawberry -	Coca-Cola Bottling Co., Asheville, N. C.	D. M. Shepherd, Asheville ----
6451	Soda Water, Lemon Sour.	H. A. Haskill, Asheville, N. C...	----do----------
6452	Soda Water----------	Pepsi-Cola Bottling Co., Asheville, N. C.	Swannanoa Lunch Room, Asheville.

FRUIT JUICES AND IMITATION FRUIT JUICES.

Fruit juices are the clean, unfermented liquid product obtained by the first pressing of fresh, ripe fruit, and corresponds in name to the fruit from which they are obtained. Then, a fruit juice must be made entirely from fruit and sold under the name of the fruit from which it has been made; otherwise it must be labeled and sold as an imitation, artificial or compound fruit juice, as the case may be.

To keep a fruit juice fresh and sweet, it must be sterilized in an air-tight container so as to exclude the air, or it will ferment. Most fruit juices, fresh or fermented, are wholesome beverages, but in

RESULTS OF THE EXAMINATION OF FRUIT

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6472	Grape Juice, Welch's----------	The Welch Grape Juice Co., Westfield, N. J.----------
6473	Grape Juice, Duroy----------	The Duroy & Waynes Co., Sandusky. Ohio ----------
6474	Grape Juice, Williams' ----------	R. C. Williams Co., New York----------
6150	Peach Juice, Fore-To-La---------	Pepsi-Cola Bottling Works, Tarboro, N. C.----------

*Sample sent to the Department for analysis.

WATER AND SODA-WATER SYRUPS.

Laboratory Number.	Contained.	Adulterants.	Remarks and Conclusions.
6927	Caffeine	None found	Soda-water syrup.
6928	do	do	do.
6929	do	do	do.
6591		Extract soap bark	Soda water, artificial flavoring.
6614		None found	Ginger extract.
6447	Caffeine	do	Soda water, not properly labeled; sale illegal.
6448		do	do.
6449		do	do.
6450		do	do.
6451		do	do.
6452		do	do.

our opinion the same cannot be said of the imitation or artificial product, made from chemical or artificial flavors and colors. If the sale of the latter could be suppressed the country would only be the better off, for while they may not be actually poisonous, as the term is ordinarily used, they must be more or less deleterious to health.

Four samples of these products were examined—three grape juices and one imitation peach juice. The latter contained a chemical preservative and was not properly branded. It was represented to be a peach juice when it was only an imitation product.

JUICES AND IMITATION FRUIT JUICES.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Alcohol—Per Cent by Volume.	Chemical Preservatives.	Remarks and Conclusions.
6472	P. H. Johnson, High Point		None found	Grape juice.
6473	M. F. Kirby, Charlotte		do	do.
6474	S. R. Lentz, Charlotte		do	do.
6150	Pepsi-Cola Bottling Works, Tarboro.*	.45	Benzoate	Imitation peach juice; misrepresented.

*Sample sent to the Department for examination.

CIDER.

Cider is the product made by the normal alcoholic fermentation of apple juice, and the usual cellar treatment, and contains not more than seven per cent by volume of alcohol, and in one hundred cubic centimeters of the cider, not less than two grams nor more than twelve grams of solids, not more than eight grams of sugars, in terms of reducing sugars, and not less than twenty centigrams nor more than forty centigrams of cider ash.

Sparkling cider, champagne cider, is cider in which the afterpart of the fermentation is completed in closed containers, with or without the addition of cider or sugar liquor, and contains, in one hundred cubic centimeters, not less than twenty centigrams of cider ash.

Cider, to comply with the North Carolina Food Law, must be made entirely of unadulterated apple juice. A cider made from the juice of any other fruit than apples, if offered for sale, must bear the name of the fruit from which it is made. No color or flavor shall be added unless the fact is stated on the label of the package. If artificially colored or flavored, or both, the product, if offered for sale, must be sold as artificial or imitation, or it will be classed as adulterated or misbranded.

RESULTS OF THE EXAMINATION OF CIDERS

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6144	Cider, Phosphate, Mezzo	Anderson Co., Atlanta, Ga.	T. M. McLauchlin, Raeford
6145	Cider, Imitation	B. McD. Guy, Rocky Mount, N. C.	B. McD. Guy, Rocky Mount*
6179	Cider		J. T. Ginn, Goldsboro
6172	Cider, Hyso	Haynor Mfg. Co., Norfolk, Va	W. E. Springer, Wilmington*
6175	Cider		J. T. Ginn, Goldsboro
6173	Cider, Blackberry		C. C. Stevenson Co., Wilmington.*
6170	Cider, Mezzo	Anderson Co., Atlanta, Ga.	S. L. Baker & Son, Shelby*
6171	----do	----do	----do
6172a	Cider, Apple, Hyso	The Haynor Mfg. Co., Norfolk, Va.	W. E. Springer, Wilmington*
6540	Cider	Laurinburg Bottling Works, Laurinburg, N. C.	M. L. McRae, Maxton
6541	----do		Stradley & Luther, Asheville
6542	----do	Coca-Cola Bottling Works, Asheville, N. C.	J. C. Walters, Asheville
6543	Cider, Champagne, California.		----do
6590	Cider, Imitation		I. N. Glover, Bailey*
6589	----do		----do*

*Sample sent to the Department for analysis

There are a great number of artificial or imitation ciders on the market, presumably made from fruit extracts, but which are really made from chemical flavors. While many of them are not actually poisonous, according to the common acceptation of the term, they certainly are more or less deleterious to health, and the system would be far better off without them. If the sale of these artificial products—products made wholly from chemical or artificial flavors—could be suppressed the public would be greatly benefited thereby.

These products are more adulterated with objectionable coal-tar dyes and chemical preservatives than any other class of products. There is some necessity for the use of a preservative in fruit ciders, for they are of value as a beverage and are difficult to keep without it. A pure fruit juice or cider is a healthy beverage, and is wholesome. They occupy a very different place from the artificial product with which the market is overrun, and which is a curse to the country.

Thirty-eight samples of ciders and imitation ciders have been examined and a chemical preservative was found in sixteen of them. Most of them belong to the artificial or imitation class. They can hardly be regarded as adulterated, for the product itself is, in many cases, as worthless as any material that could be put in them.

AND IMITATION OR ARTIFICIAL CIDERS.

Laboratory Number.	Alcohol—Per Cent by Volume.	Solid Matter in Solution—Per Cent.	Chemical Preservatives	Remarks and Conclusions.
6144	8.72		None found	Imitation phosphate cider.
6145	.45		Benzoates	Imitation cider.
6179	3.95		None found	Cider.
6172	6.30		do	Imitation apple cider.
6175	3.90		do	Cider.
6173	6.50		do	Imitation cider.
6170	8.35		Benzoates	do.
6171	7.30		do	do.
6172a	6.65		None found	Imitation apple cider.
6540		6.95	do	Imitation cider, misbranded.
6541		14.13	do	Cider, not properly labeled.
6542		13.92	Benzoates	Cider.
6513		.88	None found	Imitation cider, misbranded.
6590	5.05		Benzoates	Imitation cider.
6589	3.15		do	do.

RESULTS OF THE EXAMINATION OF CIDERS AND

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6575	Cider, Apple, Hyso	The Haynor Mfg. Co., Norfolk, Va.	W. E. Springer, Wilmington*
6580	do	do	do
6581	Cider, Imitation	do	A. Cameron, Vass*
6569	Cider, Grape	do	Biscoe Pittman, Tarboro*
6570	Cider	do	K. B. Burnett, Farmville*
6571	do	do	do*
6572	do	do	do*
6573	do	do	do*
6561	Cider, Apple, Condensed	Edgecombe Bottling Works, Rocky Mount, N. C.*	do
6553	Cider, Imitation Blackberry.	Morgan-Abbott-Barker Co., Louisville, Ky.	J. Britt, Enfield*
6554	Cider, Imitation, Vinola	do	do*
6555	Cider, Apple, Gilt Edge	do	do*
6556	Cider, Imitation	do	The Shuford Co., Gastonia
6915	do	W. R. Saunders, Jr., Reidsville, N. C.	W. R. Saunders, Jr., Reidsville*
6916	do	do	do
6950	Cider, Apple, Cidrola	American Cidrola Co., Roanoke, Va.	C. H. Wilson, Greensboro*
6949	Cider, Tomato	D. P. Vestal, Ore Hill, N. C.	D. P. Vestal, Ore Hill*
7114	Cider, Apple, Carbonated, Cidrola.	American Cidrola Co., Roanoke, Va.	T. J. Wilson, Winston-Salem*
6549	Cider Phosphate, Mezzo	Anderson & Co., Atlanta, Ga.	A. T. Stevens, Walthall
6610	Cider Phosphate, Blackberry.	The Morgan-Abbott-Barker Co., Louisville, Ky.	J. H. Baker, Winfall*
6611	Cider Phosphate, Grape	do	do*
6609	Cider Phosphate, Orange	do	do*
6625	Cider, Imitation, Dixo	Puritan Cider and Vinegar Co., Tarboro, N. C.	B. F. Tyson, Greenville*

*Sample sent to the Department for analysis.

IMITATION OR ARTIFICIAL CIDERS.—CONTINUED.

Laboratory Number.	Alcohol—Per Cent by Volume.	Solid Matter in Solution—Per Cent.	Chemical Preservatives	Remarks and Conclusions.
6575	1.80		None found	Imitation apple cider.
6580	2.10		do	do.
6581	7.85		do	Imitation cider.
6569			Benzoates	Imitation grape cider, misbranded.
6570			None found	Imitation cider, misbranded.
6571			do	do.
6572			do	do.
6573			do	do.
6561			Benzoates	Imitation apple cider.
6553			do	Imitation cider.
6554			do	do.
6555			do	Imitation apple cider.
6556			do	Imitation cider.
6915	.15		None found	do.
6916	3.57		do	do.
6950	.10		do	Cider.
6949	5.35		do	Tomato cider.
7114	.10		do	Cider, carbonated.
6549			Benzoates	Imitation phosphate cider.
6610			do	do.
6611			do	do.
6609			do	do.
6625			None found	Imitation cider.

BEERS AND IMITATION, OR NEAR-BEERS.

Ten samples of beer and thirty of imitation or near-beer were examined, none of which appeared to be adulterated, but samples Nos. 6177, 6178, 6923 and 6924 were not labeled according to requirements, and their sale was therefore a violation of the law.

As standard beers cannot be legally sold in the State, there is quite a demand for a substitute with less alcohol than beer contains.

RESULTS OF THE EXAMINATION OF

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6652	Imitation or Near-beer	
6653	....do	
6654	Imitation or Near-beer, Kola Malt	
6627	Imitation or Near-beer, Star Brew	Home Brewing Co., Richmond, Va.
6628	Imitation or Near-beer, Beerine	Max Stochlin, Brooklyn, N. Y.
6629	....do	....do
6613	Imitation or Near-beer, Wurzburger	Wurzburger Malt Extract Co., Atlanta, Ga.
6588	Imitation or Near-beer, Eaglo	Southern Bottling Co., Baltimore, Md.
6559	Imitation or Near-beer, Reinbrau	Consumers Brewing Co., Norfolk, Va.
6560	Imitation or Near-beer, Beerine	Max Stochlin, Brooklyn, N. Y.
6176	Imitation or Near-beer, Next-to-beer	Frank Fehn Brewing Co., Louisville, Ky.
6177	Imitation or Near-beer	
6178	Imitation or Near-beer, Extra Pale	George Bauemschmidt Brewery, Baltimore, Md.
6174	Imitation or Near-beer, Hop Beverage	Home Brewing Co., Richmond, Va.
6166	Imitation or Near-beer, Water-wagon	Dannenberg Bros., Goldsboro, N. C.
6167	....do	....do
6168	Imitation or Near-beer, Hop Beverage	Home Brewing Co., Richmond, Va.
6169	Imitation or Near-beer, Hop Brew	....do
6165	Imitation or Near-beer, Hop Cheer	Florida Fruit, Oil and Extract Co., St. Louis, Mo.
6164	Imitation or Near-beer, Hop Beverage	Home Brewing Co., Richmond, Va.
6153	Imitation or Near-beer, Dukehart's	Dukehart Mfg. Co., Baltimore, Md.
6152	Imitation or Near-beer, Reinbrau	Consumers Brewing Co., Norfolk, Va.
6151	Imitation or Near-beer, Seaside	....do
6143	Imitation or Near-beer, Hop Beverage	Home Brewing Co., Richmond, Va.
6951	Imitation or Near-beer, Liquid Bread	Rosenegk Brewing Co., Richmond, Va.
6987	....do	....do
6923	Imitation or Near-beer	New South Brewing and Ice Co., Middlesboro, Ky.

*Sample sent to the Department for analysis.

As county and city officials desire to know that the laws are not being violated, and many of the dealers in this class of goods desire to know that they are within the bounds of the law, many samples of near-beer are sent to the Department for the determination of the amount of alcohol present. The Department has no appropriation for this work and only a limited amount of it can be done, as the work for which the appropriation is made and which is required of the Department must be done first.

BEERS AND IMITATION OR NEAR-BEERS.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Alcohol—Per Cent by Volume.	Adulterants.	Remarks and Conclusions.
6652	C. A. Forester, N. Wilkesboro*	1.35	None found	Imitation or near-beer.
6653	A. B. Williams, N. Wilkesboro*	1.55	do	do.
6654	do*	1.95	do	do.
6627	J. P. Frizzell, Snow Hill*	3.80	do	Beer.
6628	D. S. Parker, Henderson*	.39	do	Imitation or near-beer.
6629	do*	.52	do	do.
6613	J. E. Gordon, Morganton*	4.30	do	Malt tonic.
6588	W. D. Edwards, Wake Forest*	1.55	do	Imitation or near-beer.
6559	Winston-Salem Produce Co., Winston-Salem.*	----------	do	do.
6560	W. W. Hampton, Dobson*	----------	do	do.
6176	Holleman & Henning, Winston-Salem.*	1.80	do	do.
6177	T. M. Thompson, Fremont	4.05	do	Beer, not labeled; sale illegal.
6178	W. L. Johnson, Fremont*	4.35	do	Beer, not properly labeled; sale illegal.
6174	O. B. Eaton, Winston-Salem*	1.65	do	Imitation or near-beer.
6166	Hinson Bros., Chadbourn*	.45	do	do.
6167	E. Dannenberg, Wilson*	.48	do	do.
6168	do*	1.65	do	do.
6169	do*	2.00	do	do.
6165	Hinson Bros., Chadbourn*	.30	do	do.
6164	J. Dannenberg, Goldsboro*	1.65	do	do.
6153	McD. Pate, Snow Hill*	1.90	do	do.
6152	Punch-I-Nello Bottling Co., Rocky Mount.*	1.85	do	do.
6151	do*	1.30	do	do.
6143	Biscoe Pittman, Tarboro*	1.85	do	do.
6951	Granite Bottling Works, Granite Falls.*	.45	do	do.
6987	R. C. Mozingo, Goldsboro*	.45	do	do.
6923	W. F. Croft, Asheville*	1.85	do	Imitation or near-beer, not properly labeled; sale illegal.

RESULTS OF THE EXAMINATION OF BEERS

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6924	Imitation or Near-beer	East Tennessee Brewing Co., Knoxville, Tenn.
6925	Imitation or Near-beer, Daisy	New South Brewing and Ice Co., Middlesboro, Ky.
6926	----do	----do
6919	Imitation or Near-beer, Star Brew	E. Dannenberg, Wilson, N. C.
6920	Imitation or Near-beer	Consumers Brewing Co., Norfolk, Va.
6917	Imitation or Near-beer, Rikk	Gottleib-Bauemschmidt-Straus Co., Baltimore, Md.
6655	Imitation or Near-beer, Hop Beverage	Home Brewing Co., Richmond, Va.
6656	Imitation or Near-beer, Bronco Export	Consumers Brewing Co., Norfolk, Va.
6657	Imitation or Near-beer, Crescent Ale	Burr Mfg. Co., Richmond, Va.
6648	Beer	
6649	Imitation or Near-beer	
6650	Beer	
6651	Imitation or Near-beer, Small Brew	Portner Malt Extract Co., Alexandria, Va.

*Sample sent to the Department for analysis.

DISTILLED LIQUORS.

Brandy and whisky are the most important of this class of products, though gin is used extensively.

For information on this subject not found here, the reader is referred to the Food Report of this Department for 1908.

New whisky is the properly distilled spirit from the properly prepared and properly fermented mash of malted grain, or of grain the starch of which has been hydrolyzed by malt; it has an alcoholic strength corresponding to the excise laws of the various countries in which it is produced, and contains in one hundred (100) liters of proof spirit not less than one hundred (100) grams of the various substances other than ethyl alcohol derived from the grain from which it is made, and of those produced during fermentation, the principal part of which consists of higher alcohols estimated as amylic.

Whisky (potable whisky) is new whisky which has been stored in wood not less than four years without any artificial heat save that which may be imparted by warming the storehouse to the usual temperature, and contains in one hundred (100) liters of proof spirit not less than two hundred (200) grams of the substances found in new whisky save as they are changed or eliminated by storage and of those produced as secondary bodies during aging; and, in ad-

AND IMITATION OR NEAR-BEERS.—CONTINUED.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Alcohol—Per Cent by Volume.	Adulterants.	Remarks and Conclusions.
6924	Jas. Sweeney, Asheville*	1.30	None found	Imitation or near-beer, not labeled; sale illegal.
6925	D. K. McKinnon, Asheville*	1.65	do	do.
6926	W. H. Bush, Asheville*	1.75	do	do.
6919	W. B. Windley, Washington*	3.75	do	Beer.
6920	do*	4.27	do	do.
6917	E. Britt, Greensboro, R.F.D.*	1.55	do	Imitation or near-beer.
6655	A. B. Williams, N. Wilkesboro*	1.80	do	do.
6656	J. S. McAlister, Spray*	4.05	do	Beer.
6657	R. L. Holt, Burlington*	4.20	do	do.
6648	A. B. Williams, N. Wilkesboro*	4.80	do	do.
6649	Tom Forester, N. Wilkesboro*	1.95	do	Imitation or near-beer.
6650	C. A. Forester, N. Wilkesboro*	4.75	do	Beer.
6651	N. S. & F. C. Forester, N. Wilkesboro.*	1.75	do	Imitation or near-beer.

dition thereto, the substances extracted from the casks in which it has been stored. It contains, when prepared for consumption as permitted by the regulations of the Bureau of Internal Revenue, not less than forty-five (45) per cent by volume of ethyl alcohol, and, if no statement is made concerning its alcoholic strength, it contains not less than fifty (50) per cent of ethyl alcohol by volume, as prescribed by law.

Rye whisky is whisky in the manufacture of which rye, either in a malted condition or with sufficient barley or rye malt to hydrolyze the starch, is the only grain used.

Bourbon whisky is whisky made in Kentucky from a mash of Indian corn and rye, and barley malt, of which Indian corn forms more than fifty (50) per cent.

Corn whisky is whisky made from malted Indian corn, or of Indian corn, the starch of which has been hydrolyzed by barley malt.

Blended whisky is a mixture of two or more whiskys.

Scotch whisky is a whisky made in Scotland solely from barley malt, in the drying of which peat has been used. It contains in one hundred (100) liters of proof spirit not less than one hundred and fifty (150) grams of the various substances prescribed for whisky exclusive of those extracted from the cask.

Irish whisky is whisky made in Ireland, and conforms in the proportions of its various ingredients to Scotch whisky, save that it may be made of the same materials as prescribed for whisky, and the malt used is not dried over peat.

New rum is properly distilled spirit made from the properly fermented, clean, sound juice of the sugar-cane, the clean, sound massecuite made therefrom, clean, sound molasses from the massecuite, or any sound, clean intermediate product save sugar, and contains in one hundred (100) liters of proof spirit not less than one hundred (100) grams of the volatile flavors, oils, and other substances derived from the materials of which it is made, and of the substances congeneric with the ethyl alcohol produced during fermentation, which are carried over at the ordinary temperatures of distillation, the principal part of which is higher alcohols estimated as amylic.

Rum (potable rum) is new rum stored not less than four years in wood without any artificial heat save that which may be imparted by warming the storehouse to the usual temperature, and contains in one hundred (100) liters of proof spirit not less than one hundred and seventy-five (175) grams of the substances found in new rum save as they are changed or eliminated by storage, and of those produced as secondary bodies during aging; and, in addition thereto, the substances extracted from the casks. It contains, when prepared for consumption as permitted by the regulations of the Bureau of Internal Revenue, not less than forty-five (45) per cent by volume of ethyl alcohol, and, if no statement is made concerning its alcoholic strength, it contains not less than fifty (50) per cent by volume of ethyl alcohol, as prescribed by law.

New brandy is a properly distilled spirit made from wine, and contains in one hundred (100) liters of proof spirit not less than

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6582	Gin, Holland	Straus, Gunst & Co., Richmond, Va.	Union County Medical Depository, Monroe.
6583	Brandy, Apple	do	do
6584	Whisky, Corn, Yellow Tavern.	do	do
6585	Whisky, Corn, Old Nick	N. Glenn Williams, Williams, N. C.	do
6586	Whisky, Rye, Lorrins	Metzger Bros., Norfolk, Va.	
6587	Whisky, Rye, M. B. R.	do	
7188a	Whisky, Rye, Green River	Green River Distilling Co., Owensboro, Ky.	

one hundred (100) grams of the volatile flavors, oils, and other substances derived from the material from which it is made, and of the substances congeneric with ethyl alcohol produced during fermentation and carried over at the ordinary temperatures of distillation, the principal part of which consists of the higher alcohols estimated as amylic.

Brandy (potable brandy) is new brandy stored in wood for not less than four years without any artificial heat save that which may be imparted by warming the storehouse to the usual temperature, and contains in one hundred (100) liters of proof spirit not less than one hundred and fifty (150) grams of the substances found in new brandy save as they are changed or eliminated by storage, and of those produced as secondary bodies during aging; and, in addition thereto, the substances extracted from the casks in which it has been stored. It contains, when prepared for consumption as permitted by the regulations of the Bureau of Internal Revenue, not less than forty-five (45) per cent by volume of ethyl alcohol, and, if no statement is made concerning its alcoholic strength, it contains not less than fifty (50) per cent by volume of ethyl alcohol, as prescribed by law.

Cognac, cognac brandy, is brandy produced in the departments of the Charente and Charente Inferieure, France, from wine produced in those departments.

Under this head samples were examined as follows: Whisky, 5; brandy, 1; gin, 1.

In these samples the amount of alcohol, solid matter in solution, total acidity, esters and fusel oil present was determined. Qualitative tests for tannin, coloring matter, etc., were made. The results of the examination are printed in the table below.

TION OF DISTILLED LIQUORS.

Laboratory Number.	Alcohol—Per Cent by Volume.	Proof.	Grams in 100 C.C.				Tannin.	Coloring Matter.	Remarks and Conclusions.
			Solid Matter in Solution.	Total Acidity—Acetic.	Esters.	Fusel Oil—Per Cent by Volume.			
6582	48.43	96.86	.215	.0016	.020	.021	None	None	Gin prepared from neutral spirits.
6583	50.10	120.00	.544	.0840	.0750	.1798	Present	Natural	Apple brandy, partly aged, containing small amount of sugar.
6584	49.75	99.50	.318	.740	.0508	.1970	do	Natural and artificial.	Corn whisky, partly aged, containing small amount of sugar.
6585	47.85	95.70	.0920	.806	.0750	.2024	do	Natural	Corn whisky, straight, properly aged.
6586	43.65	87.30	.0799	.0823	.0702	.2468	do	Natural and caramel.	Rye whisky, straight.
6587	43.60	87.20	.0805	.0838	.0720	.2440	do	do	do.
7188a	50.45	100.90	.2836	.0085	.0202	.2610	do	Natural	Rye whisky, straight, properly aged.

RICE.

Previous examinations of rice by this and other Food Departments show that a large percentage of the rice on the market is coated or polished with glucose and talc.

Under the National Food Law, and the regulations of the United States Department of Agriculture, the use of talc and glucose as a preservative for food in interstate commerce is permitted, provided that each package be plainly labeled with the name of the preservative and the proper directions for its removal.

RESULTS OF EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6453	Rice, Carolina	Carolina Rice Mills, Goldsboro, N. C.
6454	Rice	The James G. Gill Co., Norfolk, Va.
6455	---do	---do
6456	---do	Sladen, Fakes & Co., Hendersonville, N. C.

MOLASSES AND SYRUPS.

Molasses is the product after separating the sugar from massecuite, melada, mush sugar, or concrete, and contains not more than 25 per cent of water and not more than 5 per cent of ash.

Molasses that is compounded or mixed with glucose, sugar syrup, or anything else, to cheapen or lower its quality, must not be labeled "molasses," but must be labeled "molasses compound," or "imitation molasses," or it must name the ingredients in the compound, as "glucose," "cane syrup," "molasses," etc.

As Cuba, Porto Rico, Mayaguez, Antigua, Barbadoes, St. Kitts, etc., are names of either West India Islands or towns and cities on those islands, molasses must not be branded any of these or any other distinctive name of a place unless it is actually produced from the place named.

As it appears that the word "style" used in connection with the brand name of molasses, as "Barbadoes Style," etc., is misleading and deceptive, it must not be used with the brand name of molasses.

Sugar-cane syrup is syrup made by the evaporation of the juice of the sugar-cane or by the solution of sugar-cane concrete, and contains not more than thirty (30) per cent of water and not more than two and five-tenths (2.5) per cent of ash.

Sorghum syrup is syrup made by the evaporation of sorghum juice or by the solution of sorghum concrete, and contains not more than

If rice is coated with glucose and talc, the label of the package must bear the following statement:

"Coated with glucose and talc. Remove by washing."

Five samples of rice were examined, three of which were polished with glucose and talc and the fact was not stated on the label or made known to the purchaser. The sale in each case was a violation of the law.

INATIONS OF RICE.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Adulterants.	Remarks and Conclusions.
6453	Patterson Bros. Co., Durham	Glucose and talc	Rice polished and the fact not made known to purchaser.
6454	J. F. Powers & Son, Fayetteville	do	do.
6455	Dixie Club Grocery Co., Statesville	do	do.
6456	D. M. Wells, Hendersonville	None found	Rice.

thirty (30) per cent of water and not more than two and five-tenths (2.5) per cent of ash.

Maple syrup is syrup made by the evaporation of maple sap or by the solution of maple concrete, and contains not more than thirty-two (32) per cent of water and not less than forty-five hundredths (0.45) per cent of maple syrup ash.

Molasses, molasses compounds, syrups, compound syrups, etc., must be labeled what they are.

Whatever is required on the principal label of a package of molasses, molasses compound, syrup, or compound syrup, must appear on one end or head of the barrel or cask; and if the principal label, or any part of it, appears on both ends of barrel or cask, they shall be identical, one to the other. Retail dealers, while offering molasses for sale, must keep the labeled end of cask or barrel up, so that the label may be seen by purchaser or inspector, and the label must be so kept that it will remain legible.

It has been the custom to sell molasses, syrups, etc., and their compounds unlabeled. That being the case, it was an easy matter for the dealer to make all kinds of misrepresentations in regard to the product. Under these conditions it was next to impossible to enforce the law and to prevent a great deal of fraud in their sale. For this reason, it became necessary to require these products to be properly labeled, so that retail dealers and consumers may know what they

are purchasing, if they so desire. This requirement simplifies the enforcement of the law. If by examination a product proves to be otherwise than as represented by the label, the law has been violated, and it is at once a subject for prosecution. Molasses and syrups are adulterated by the addition of cheaper syrups and an excess of water, as well as by bleaching to improve the appearance without improving the quality of the product.

Fifty-one samples of molasses and syrups have been examined, 39 of which proved to be below standard, owing to an excessive amount

RESULTS OF THE EXAMINATION OF MOLAS

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
6988	Molasses	Robert Carey & Co., New Orleans, La.
6989	Molasses, Fancy	C. C. Covington Co., Wilmington, N. C.
6990	Molasses, Porto Rico Flavor	Bently Shriver & Co., Baltimore, Md.
6991	Molasses, Compound, Iberville	John B. Meyers, New Orleans, La.
7212	Syrup, Extra Fancy	Blair & Healy, Wilmington, N. C.
6993	Syrup, Porto Rico	Davis & Atkins, Richmond, Va.
6994	Syrup, Homemade	Morris & Co., Statesville, N. C.
7214	Molasses, Sugar House	Blair & Healy, Wilmington, N. C.
6996	Molasses, Porto Rico	C. C. Covington Co., Wilmington, N. C.
6997	Molasses, New Orleans	Blackburn-Morris Co., New Orleans, La.
6998	Molasses, Santa Rosa	C. W. Antrim & Son, Richmond, Va.
6999	Molasses, Homemade	
7000	----do	C. W. Surratt, Granite Quarry, N. C.
7001	Molasses, Sugar House	Kluttz Grocery Co., Salisbury, N. C.
7002	Molasses, Ponce, Porto Rico	Harroldson & Crump, Richmond, Va.
7003	Molasses, Homemade	
7004	Molasses, Ponce, Porto Rico	E. A. Saunders & Sons, Richmond, Va.
7005	Molasses, Louisiana	Louisiana Molasses Co., New Orleans, La.
7006	Molasses, D. B. S.	C. C. Covington Co., Wilmington, N. C.
7007	Molasses, W. F.	----do
7008	Molasses	
7009	----do	F. Allen, Durham, N. C.
7010	----do	
7011	Molasses, Planters Sugar House	Thomas White & Co., Durham, N. C.
7012	----do	----do
7013	Molasses, Santa Rosa	C. W. Antrim & Son, Richmond, Va.
7014	Molasses, P. R. No. 6, Compound	E. A. Saunders & Co., Richmond, Va.

of water present. None of them contained a very great excess, and the excess in some of them was very slight indeed, as will be seen by reference to the results in the table below. However, others did contain an excess of water of 4 or 5 per cent, which is, of course, a loss to the consumer equal to 4 or 5 gallons of the product in each hundred gallons of it.

For lack of time these samples were examined for an excess of water only, but examination will be made for other adulterations as early as possible.

SES, COMPOUND MOLASSES AND SYRUPS.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Water—Per Cent.	Remarks and Conclusions.
6988	S. H. Youngblood, Charlotte	28.40	Molasses, excess of water.
6989	----do	25.62	Molasses, slight excess of water.
6990	Bridgers & Co., Charlotte	29.96	Molasses, excess of water.
6991	Davis & Byerly, Charlotte	27.43	do.
7212	J. G. Ball & Co., Raleigh	30.27	Syrup, slight excess of water.
6993	J. F. Jamison & Co., Charlotte	28.44	Molasses, excess of water.
6994	----do	27.73	do.
7214	J. G. Ball & Co., Raleigh	24.93	Molasses, standard.
6996	L. L. Sarratt, Charlotte	25.90	Molasses, slight excess of water.
6997	----do	25.87	do.
6998	W. R. Woodson, Salisbury	25.97	do.
6999	----do	31.56	Molasses, excess of water.
7000	H. Z. White, Salisbury	23.15	Molasses, standard.
7001	----do	26.90	Molasses, slight excess of water.
7002	D. M. Miller, Salisbury	28.23	Molasses, excess of water.
7003	Theodore Atwell, Salisbury	28.00	do.
7004	C. Scott & Co., Greensboro	22.35	Molasses, standard.
7005	----do	27.24	Molasses, excess of water.
7006	Patterson Bros., Greensboro	25.65	Molasses, slight excess of water.
7007	----do	24.72	Molasses, standard.
7008	Sockwell Bros., Greensboro	25.00	Molasses, standard.
7009	Bullock Grocery Co., Durham	28.72	Molasses, excess of water.
7010	W. E. Couch, Durham	28.04	do.
7011	J. D. Edwards, Durham	25 72	Molasses, slight excess of water.
7012	T. M. Stephens & Co., Durham	25.97	do.
7013	----do	26.50	do.
7014	Carpenter Bros., Durham	26.10	do.

RESULTS OF THE EXAMINATION OF MOLASSES,

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.
7213	Molasses, 4X, Compound	Blair & Healy, Wilmington, N. C.
7016	Molasses	C. W. Antrim & Son, Richmond, Va.
7017	....do	Thomas White & Co., Durham, N. C.
7121	Syrup, Compound, White Clover	H. L. Hobart & Co., Baltimore, Md.
7122	Molasses, Compound	....do
7123	Molasses, Extra Fancy, Compound	....do
7124	Molasses, Fancy, Ponce, Compound	....do
7125	Molasses, Extra Fancy, Compound	....do
7126	Syrup, Refiners, Mayfield	C. W. Antrim & Son, Richmond, Va.
7127	Syrup, Refiners, Johnson Special	Cobb & Johnson, Kinston, N. C.
7128	Molasses, P. R.	C. Woodard Grocery Co., Wilson, N. C.
7129	Molasses	Wells Grocery Co., Wilson, N. C.
7130	....do	
7131	Molasses, Grade, Common	
7132	Molasses, Porto Rico	Wilson Grocery Co., Wilson, N. C.
7133	Molasses	Boykin Grocery Co., Wilson, N. C.
7134	....do	Blackburn-Morris Co., New Orleans, La.
7135	....do	The Hicks Co., Wilmington, N. C.
7136	....do	Dixie Molasses Co., New Orleans, La.
7138	Molasses, English Island	H. M. Jenkins & Co., Washington, N. C.
7139	Molasses	H. L. Hobart & Co., New York, N. Y.
7140	Molasses, No. 206, New Orleans	C. W. Antrim & Son, Richmond, Va.
7141	Molasses, Mixed St. C.	H. L. Hobart & Co., New York, N. Y.
6576	Molasses	Blair & Healy, Wilmington, N. C.

CORN MEAL.

Corn meal, Indian corn meal, maize meal, is meal made from sound maize grain and contains not more than fourteen (14) per cent of moisture, not less than one and twelve-hundredths (1.12) per cent of nitrogen, and not more than one and six-tenths (1.6) per cent of ash.

Considering the nutritive value of corn meal, it is the cheapest food available. That being the case, there is very little inducement for

COMPOUND MOLASSES AND SYRUPS.—CONTINUED.

Laboratory Number.	Retail Dealer or Party Who Sent Sample for Analysis.	Water—Per Cent.	Remarks and Conclusions.
7213	J. G. Ball & Co., Raleigh	26.65	Molasses, slight excess of water.
7016	C. E. Jourdan, Durham	27.08	Molasses, excess of water.
7017	Patterson Bros. Co., Greensboro	27.10	do.
7121	Kinston Peanut Co., Kinston	21.34	Molasses, standard.
7122	----do	23.61	do.
7123	----do	26.78	Molasses, slight excess of water.
7124	Henry French, Kinston	23.82	Molasses, standard.
7125	----do	25.55	Molasses, slight excess of water.
7126	L. J. Moore, Kinston	23.59	Molasses, standard.
7127	Myers Midyette, Kinston	24.93	do.
7128	C. P. Farmer, Wilson	28.01	Molasses, excess of water.
7129	J. H. Reiley, Wilson	28.29	do.
7130	J. D. Lee, Wilson	27.16	do.
7131	----do	25.59	Molasses, slight excess of water.
7132	Strickland & Lewis, Wilson	26.47	do.
7133	Braswell-Webb Grocery Co., Wilson	25.32	do.
7134	D. C. Braswell, Wilson	23.55	Molasses, standard.
7135	J. H. Gill, Wilson	27.77	Molasses, slight exeess of water.
7136	Liles-Ruffin Co., Tarboro	23.90	Molasses, standard.
7138	J. B. Cummings & Son, Tarboro	27.04	Molasses, slight excess of water.
7139	Robinson Supply Co., Tarboro	27.83	do.
7140	Tarboro Supply Co., Tarboro	28.19	Molasses, exeess of water.
7141	E. Lichenstein, Tarboro	29.63	do.
6576	E. D. Nall, Sanford	27.28	do.

manufacturers to adulterate it, so it is very rarely or never adulterated.

Twenty-three samples were examined, and no adulteration was found. They contained no odor or taste that indicated that they were stale or damaged in any way.

The sale of damaged meal or meal made from damaged grain is a violation of the law, and will be prosecuted if detected.

RESULTS OF THE EXAM

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
7189a	Corn Meal	W. E. Morrison, Statesville, N. C.	J. B. Phifer, Statesville
7190	----do	Taylorsville Milling Co., Taylorsville, N. C.	Star Canning Co., Taylorsville
7191	Corn Meal, Peerless	J. Allen Smith, Knoxville, Tenn.	Shell-Flagler Co., Hickory
7192	Corn Meal	Hickory Milling Co., Hickory, N. C.	Burns & Martin, Hickory
7193	----do	T. J. Lentz & Son, Lenoir, N. C.	H. T. Newland, Lenoir
7194	----do	P. E. Burke, Winston-Salem, N. C.	Farmers Trade House Co., Winston-Salem.
7195	----do	Wachovia Mills, Winston-Salem, N. C.	J. J. Adams, Winston-Salem
7196	----do	Young & Anderson, Asheville, N. C.	S. A. Tingle, Asheville
7197	----do	Leicester Roller Mills, Leicester, N. C.	----do
7198	----do	Statesville Flour Mill Co., Statesville, N. C.	Asheville Grocery Co., Asheville.
7199	----do	Young & Anderson, Asheville, N. C.	C. Sawyer, Asheville
7200	----do	Hazel-Green Mills, Asheville, N. C.	Smathers & Young, Asheville
7201	----do	W. E. Thompson, Flat Rock, N. C.	----do
7202	Corn Meal, Satinette	Tennessee Mill Co., Estill Springs, Tenn.	John E. Fain, Murphy
7203	Corn Meal, Pearl	Vonore Flour Mills, Vonore, Tenn.	R. H. Hyatt, Murphy
7204	----do	Mountain City Mill Co., Chattanooga, Tenn.	Haywood Grocery Co., Waynesville.
7205	Corn Meal, Sale Creek	----do	----do
7205a	Corn Meal, Red Thread	Waynesville Milling Co., Waynesville, N. C.	J. C. Bennett Co., Waynesville
7206	Corn Meal	Newport Mill Co., Newport, Tenn.	Jeffress & Co., Canton
7207	----do	Marshall Milling Co., Marshall, N. C.	
7208	----do	Salisbury Milling Co., Salisbury, N. C.	Overmann & Co., Salisbury
7209	Corn Meal, Peerless	J. Allen Smith Co., Knoxville, Tenn.	----do
7210	Corn Meal	Grimes Milling Co., Salisbury, N. C.	H. Z. White, Salisbury

FLOUR.

Flour is the fine, clean, sound product made by bolting wheat meal and contains not more than thirteen and one-half (13.5) per cent of moisture, not less than one and twenty-five hundredths (1.25) per cent of nitrogen, not more than one (1) per cent of ash, and not more than fifty hundredths (0.50) per cent of fiber.

Flour is composed principally of two important classes of substances—carbohydrates and nitrogenous compounds; the former produces heat and force in the body, and the latter the muscular tissues of it. Bread made from pure wheat flour is far more nutritious and much more nearly a perfect food than is generally supposed by the average person.

INATION OF CORN MEAL.

Laboratory Number.	Ash—Per Cent.	Microscopic Examination.	Adulterants.	Remarks and Conclusions.
7189a	1.19	Corn product	None found	Corn meal.
7190	1.15	---do	---do	do.
7191	1.10	---do	---do	do.
7192	1.29	---do	---do	do.
7193	1.27	---do	---do	do.
7194	1.33	---do	---do	do.
7195	1.35	---do	---do	do.
7196	1.21	---do	---do	do.
7197	1.23	---do	---do	do.
7198	1.23	---do	---do	do.
7199	1.38	---do	---do	do.
7200	1.29	---do	---do	do.
7201	1.26	---do	---do	do.
7202	1.24	---do	---do	do.
7203	1.27	---do	---do	do.
7204	1.27	---do	---do	do.
7205	1.47	---do	---do	do.
7205a	1.36	---do	---do	do.
7206	1.29	---do	---do	do.
7207	1.24	---do	---do	do.
7208	1.23	---do	---do	do.
7209	1.09	---do	---do	do.
7210	1.20	---do	---do	do.

Very little adulteration in flour has been found recently, except the bleaching of it by the use of oxide of nitrogen. Investigations have shown that oxides of nitrogen when taken with food into the body are deleterious to health, and that the bleaching of flour with nitrogen peroxide not only improves its appearance without improving the quality, but actually more or less injures the product. So the sale of flour so bleached is a violation of subsections 4 and 5 of section 6 of the State Food Law.

In December, 1908, the Secretary of Agriculture of the United States issued a decision regarding the bleaching of flour, which is in part as follows:

Flour bleached with nitrogen peroxide, as affected by the Food and Drugs Act of June 30, 1906, has been made the subject of a careful investigation extending over several months.

A public hearing on this subject was held by the Secretary of Agriculture and the Board of Food and Drug Inspection, beginning November 18, 1908, and continuing five days. At this hearing those who favored the bleaching process and those who opposed it were given equal opportunities to be heard.

It is my opinion, based upon all the testimony given at the hearing, upon the reports of those who have investigated the subject, upon the literature, and upon the unanimous opinion of the Board of Food and Drug Inspection, that flour bleached by nitrogen peroxide is an adulterated product under the Food and Drugs Act of June 30, 1906; that the character of the adulteration is such that no statement upon the label will bring bleached flour within the law, and that such flour cannot legally be made or sold in the District of Columbia or in the Territories, or be transported or sold in interstate commerce.

In view of the extent of the bleaching process and of the immense quantity of bleached flour now on hand or in process of manufacture, no prosecutions

RESULTS OF THE EX

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6658	Flour, Cream of the Valley.	Mitchell & Shank, Timberville, Va.	Best & Thompson, Goldsboro.
6663	Flour, Columbia	Dan Valley Mills, Danville, Va.	L. M. Michaux Co., Goldsboro.
6664	Flour, Table Belle	Osvill Milling Co., Osvill, O.	L. Harvey & Sons Co., Kinston
6665	Flour, Mollie King	Tennessee Mill Co., Estill Springs, Tenn.	R. T. Willis, Morehead City
6667	Flour, Blue Ribbon	Heck-Jones-Jewell Milling Co., New York.	The Worth Co., Wilmington
6670	Flour, Tar Heel	Piedmont Milling Co., Lynchburg, Va.	Holmes Grocery Co., Wilmington.
6671	Flour, Point Lace	do	do
6672	Flour, Zenith	The Dunlop Mills, Richmond, Va.	Whitfield & French, Lumberton
6673	Flour, Forest King	do	do
6674	Flour, Lily White	do	do
6675	Flour, Irondale	McNair & Pearsall, Wilmington, N. C.	J. F. McNair, Laurinburg
6676	Flour, Purity	Wallace Milling Co., Dale, Ind.	do
6677	Flour, Big Four	Cairo Milling Co., Cairo, Ill.	The Covington-Hammond Co., Laurinburg.
6678	Flour, Harter's A. No. 1	The Isaac Harter Milling Co., Toledo, O.	J. W. Carter, Maxton
6679	Flour, Wedding Cake		do
6681	Flour, Driven Snow	Tennessee Mill Co., Estill Springs, Tenn.	Mt. Airy Feed Store, Mt. Airy
6682	Flour, Pillsbury's Best	Pillsbury-Washburn-Crosby Co., Minneapolis, Minn.	do
6684	Flour, Pond Lily	Wachovia Mills, Winston-Salem, N. C.	West-Hill Co., Mt. Airy
6685	Flour, Pride of Salem	do	do
6686	Flour, Honest	J. I. Triplett, Woodstock, Va.	C. L. Marshall, Mt. Airy
6687	do	do	W. B. Haymore, Mt. Airy
6688	Flour, Pond Lily	Wachovia Mills, Winston-Salem, N. C.	do
6689	Flour, Pride of the Shenandoah.	Strasburg Mills, Strasburg, Va.	A. G. Bowman, Mt. Airy
6690	Flour, Climax	Strasburg Steam Flour Mills, Strasburg, Va.	G. C. Welch, Mt. Airy

will be recommended by this Department for manufacture and sale thereof in the District of Columbia or the Territories or for transportation or sale in interstate or foreign commerce for a period of six months from the date hereof.

Immediately after the decision of the Secretary of Agriculture this Department issued the following statement:

The sale of flour bleached by the use of nitrogen peroxide is regarded as a violation of the State Food Law, and after June 1, 1909, the sale in North Carolina of flour so bleached will be prosecuted.

The examination of 222 samples of flour has been completed, and the results show that 12 of them had been bleached, and were therefore sold in violation of the law. The results are published in the table below.

AMINATION OF FLOUR.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6658	Wheat product	None found	None found	Flour.
6663	do	do	do	do.
6664	do	do	do	do.
6665	do	do	do	do.
6667	do	do	do	do.
6670	do	do	do	do.
6671	do	do	do	do.
6672	do	do	do	do.
6673	do	do	do	do.
6674	do	do	do	do.
6675	do	do	do	do.
6676	do	do	do	do.
6677	do	do	do	do.
6678	do	do	do	do.
6679	do	do	do	do.
6681	do	do	do	do.
6682	do	do	do	do.
6684	do	do	do	do.
6685	do	do	do	do.
6686	do	do	do	do.
6687	do	do	do	do.
6688	do	do	do	do.
6689	do	do	do	do.
6690	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6691	Flour, Rising Sun	Forsyth Roller Mills, Winston-Salem, N. C.	The Farmers Trade House, Winston-Salem.
6692	Flour, Purity Patent	----do	----do
6693	Flour, Our Best Patent	Grimes Bros., Lexington, N. C.	P. H. Johnson, High Point
6694	Flour, Bob White	Dixie Milling Co., High Point, N. C.	C. E. Siceloff, High Point
6695	Flour, White Rose	----do	----do
6696	Flour, Breakfast Loaf	F. H. Barker, High Point, N. C.	----do
6697	Flour, Luxury	High Point Milling Co., High Point, N. C.	----do
6698	Flour, Snow Flake	Archdale Roller Mills, Archdale, N. C.	J. S. Kenly, High Point
6699	Flour, Piedmont	Piedmont Mills, Inc., Lynchburg, Va.	----do
6700	Flour, Monarch	Model Mills, Lexington, N. C.	R. L. Leonard, Lexington
6703	Flour, Baker's Straight	Salisbury Milling Co., Salisbury, N. C.	Overman & Co., Salisbury
6704	Flour, Purity	----do	----do
6707	Flour, Pride of Jersey	J. N. Permunger, R. F. D. 2, Linwood, N. C.	Kluttz & Rendleman, Salisbury.
6709	Flour, White Rose	Concord Milling Co., Concord, N. C.	H. M. Blackwelder, Concord
6710	Flour, Red Cross	E. F. Spears & Sons, Paris, Ky.	Patterson Grocery Co., Kings Mountain.
6711	Flour, Imperial	Jefferson Milling Co., Charleston, W. Va.	----do
6712	Flour, Capitola	Atlanta Milling Co., Atlanta, Ga.	F. D. Barkley & Co., Gastonia
6713	Flour, Neda	Smith Mill Co., Circleville, O.	----do
6714	Flour, Tellico	Atlanta Milling Co., Atlanta, Ga.	----do
6715	Flour, Quart	Standard Cereal Co., Chillicothe, O.	J. Flem. Johnson, Gastonia
6716	Flour, Royal	The Dunlop Milling Co., Clarksville, Tenn.	----do
6717	Flour, Columbia	Dan Valley Mills, Danville, Va.	High Shoals Co., High Shoals
6718	Flour, Snow	J. Allen Smith & Co., Knoxville, Tenn.	The Love-Thomson Co., Lincolnton.
6719	Flour, Queen of Dixie	Banner Roller Mills, Inc., Lincolnton, N. C.	----do
6722	Flour, Dunlop's Best	The Dunlop Milling Co., Clarksville, Tenn.	Wampum Dept. Store, Lincolnton.
6723	Flour, White Lily	Harmond & de Rundeau, Crimora, Va.	----do
6724	Flour, Roller King	The Front Royal Milling Co., Front Royal, Va.	W. B. Palmer & Son, Shelby
6725	Flour, Potapsco	C. A. Gambrill Mfg. Co., Baltimore, Md.	----do
6726	Flour, White Rose	Front Royal Milling Co., Front Royal, Va	----do
6727	Flour, Avalanche	Crown Bros., North River, Va.	----do
6730	Flour, Snow Flake	Broadway Milling Co., Broadway, Va.	Major Hopper, Shelby
6731	Flour, Nordyke	Liberty Mills, Nashville, Tenn.	J. D. Blanton, Marion
6732	Flour, Leonte	----do	----do
6734	Flour, Forest King	Acme Milling Co., Talbot, Tenn.	Gaston & Tate, Marion
6736	Flour, Daisy	Glen Alpine Milling Co., Glen Alpine, N. C.	Green & Kincaid, Morganton
6737	Flour, American Beauty	Mountain City Mills, Chattanooga, Tenn.	J. H. Pearson, Morganton

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6691	Wheat product	None found	None found	Flour.
6692	do	do	do	do.
6693	do	do	do	do.
6694	do	do	do	do.
6695	do	do	do	do.
6696	do	do	do	do.
6697	do	do	do	do.
6698	do	do	do	do.
6699	do	do	do	do.
6700	do	do	do	do.
6703	do	2.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6704	do	3.00	do	do.
6707	do	None found	None found	Flour.
6709	do	do	do	do.
6710	do	do	do	do.
6711	do	do	do	do.
6712	do	do	do	do.
6713	do	do	do	do.
6714	do	do	do	do.
6715	do	2.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6716	do	None found	None found	Flour.
6717	do	do	do	do.
6718	do	do	do	do.
6719	do	do	do	do.
6722	do	do	do	do.
6723	do	do	do	do.
6724	do	do	do	do.
6725	do	1.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6726	do	None found	None found	Flour.
6727	do	do	do	do.
6730	do	do	do	do.
6731	do	do	do	do
6732	do	do	do	do.
6734	do	do	do	do.
6736	do	do	do	do.
6737	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6738	Flour, Indian Head	Mountain City Mills, Chattanooga, Tenn.	J. H. Pearson, Morganton
6742	Flour, Pillsbury's Best	Pillsbury-Washburn-Crosby Co., Minneapolis, Minn.	Piedmont Grain and Provision Co., Hickory.
6743	Flour, Phoenix	E. G. Peder, Hickory, N. C.	----do----
6744	Flour, Majestic	Mountain City Mills, Knoxville, Tenn.	----do----
6745	Flour, Nellie King	Tennessee Mill Co., Estill Springs, Tenn.	Carolina Flour and Feed Co., Statesville.
6746	Flour, Piedmont	Piedmont Mills, Inc., Lynchburg, Va.	Statesville Grocery Co., Statesville.
6747	Flour, Temple Garden	Portland Milling Co., Portland, Mich.	A. F. Merrick, Charlotte
6748	Flour, Pride of Charlotte	J. Lee Koiner, Richmond, Va.	Irwin-Graham Co., Charlotte
6749	Flour, White Satin	Mountain City Mills, Chattanooga, Tenn.	Brinkman Co., Charlotte
6750	Flour, Carnation	Piedmont Mills, Lynchburg, Va.	----do----
6752	Flour, Diamond Patent	----do----	----do----
6753	Flour, Daisy	M. E. Bishop & Son, Thomasville, N. C.	Johnson Bros., Charlotte
6754	Flour, Gold Star	A. H. Randall Mill Co., Tekonsha, Mich.	----do----
6755	Flour, Nellie King	Tennessee Mill Co., Estill Springs, Tenn.	Henry & Thompson Co., North Wilkesboro.
6756	Flour, Pond Lily	Wachovia Mills, Winston-Salem, N. C	----do----
6757	Flour, Dew	Tennessee Mill Co., Estill Springs, Tenn.	A. M. Church & Sons Co., North Wilkesboro.
6758	Flour, Rainbow	----do----	----do----
6759	Flour, Jack Frost	Banguss & Pordue, R. F. D. 2, North Wilkesboro, N. C.	C. Call, North Wilkesboro
6760	Flour, Jack Frost, No. 2	----do----	----do----
6761	Flour, Oak Ridge	Dan Valley Mills, Danville, Va.	Vaughan-Hemphill Co., North Wilkesboro.
6762	Flour, White Rose	----do----	----do----
6763	Flour, Dan Valley	----do----	----do----
6764	Flour, Forest King	The Dunlop Mills, Richmond, Va.	F. D. Forrester & Co., North Wilkesboro.
6765	Flour, Superlative	----do----	----do----
6766	Flour, Red Seal	----do----	----do----
6767	Flour, Banner	J. Allen Smith & Co., Knoxville, Tenn.	----do----
6768	Flour, Pride of Salem	Wachovia Mills, Winston-Salem, N. C.	Blair & Co., North Wilkesboro
6769	Flour, Split Silk	Tennessee Mill Co., Estill Springs, Tenn.	----do----
6770	Flour, Pond Lily	Wachovia Mills, Winston-Salem, N. C.	----do----
6771	Flour, White Cream	J. Allen Smith & Co., Knoxville, Tenn.	A. P. Gaut, North Wilkesboro
6773	Flour, Rising Sun	Forsyth Roller Mills, Winston-Salem, N. C.	S. W. Cockerham & Son, Elkin
6774	Flour, St. Elmo	Mountain City Mills, Chattanooga, Tenn.	C. C. Gentry & Co., Elkin
6775	Flour, Gold Medal	----do----	----do----
6776	Flour, Piedmont	Piedmont Mills, Lynchburg, Va.	The Atkinson Co., Elkin
6777	Flour, Golden Rod	S. W. Vestal & C. F. Reese, Yadkinville, N. C.	----do----
6778	Flour, Snowflake	Hiatt, Gordon & Stone, Pilot Mountain, N. C.	O. N. Swanson, Pilot Mountain.

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6738	Wheat product	None found	None found	Flour.
6742	do	do	do	do.
6743	do	do	do	do.
6744	do	do	do	do.
6745	do	do	do	do.
6746	do	do	do	do.
6747	do	do	do	do.
6748	do	do	do	do.
6749	do	do	do	do.
6750	do	do	do	do.
6752	do	do	do	do.
6753	do	do	do	do.
6754	do	do	do	do.
6755	do	do	do	do.
6756	do	do	do	do.
6757	do	do	do	do.
6758	do	do	do	do.
6759	do	do	do	do.
6760	do	do	do	do.
6761	do	do	do	do.
6762	do	do	do	do.
6763	do	do	do	do.
6764	do	do	do	do.
6765	do	do	do	do.
6766	do	do	do	do.
6767	do	do	do	do.
6768	do	do	do	do.
6769	do	do	do	do.
6770	do	do	do	do.
6771	do	do	do	do.
6773	do	do	do	do.
6774	do	do	do	do.
6775	do	do	do	do.
6776	do	do	do	do.
6777	do	do	do	do.
6778	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler	Retail Dealer or Party Who Sent Sample for Analysis.
6779	Flour, Clover Leaf	J. Allen Smith & Co., Knoxville, Tenn.	Jacob Fulton, Walnut Cove
6780	Flour, Hiki	John R. Lackey, Walnut Cove, N. C.	do
6781	Flour, White Swan	Port Republic Milling Co., Port Republic, Va.	T. D. Meador, Madison
6782	Flour, Royal Patent	do	do
6783	Flour, Purity Patent	do	do
6784	Flour, Cream of Wheat	The Page Milling Co., Luray, Va.	Madison Grocery Co., Madison
6785	Flour, Cherokee	J. Allen Smith & Co., Knoxville, Tenn.	do
6786	Flour, Majestic	Knoxville City Mills, Knoxville, Tenn.	do
6787	Flour, Daily Bread	Stone Grocery and Milling Co., Stoneville, N. C.	L. W. Matthews, Stoneville
6788	Flour, Queen of the Valley.	J. L. Cosby, Grottoes, Va.	T. P. Poole & Co., Stoneville
6789	Flour, Pride of Virginia	Piedmont Mills, Lynchburg, Va.	do
6790	Flour, Magnolia	The Page Milling Co., Luray, Va.	Lewis & Thomas, Stoneville
6792	Flour, Oregon	Eagle Milling Co., Siler City, N. C.	J. H. Monger, Sanford
6793	Flour, Our Favorite	J. M. McIver, Gulf, N. C.	do
6795	Flour, Snowbird	Statesville Flour Mills, Statesville, N. C.	do
6797	Flour, White Rock	Piedmont Milling Co., Lynchburg, Va.	Sanford Grocery Co., Sanford
6800	Flour, Lily White	The Dunlop Mills, Richmond, Va.	W. T. Buchans, Sanford
6802	Flour, Sea Foam	do	do
6803	Flour, Pansy	Harman & de Rundeau, Crimora, Va.	W. T. Tyson, Sanford
6804	Flour, Superlative	The Dunlop Mills, Richmond, Va.	do
6805	Flour, Acme	Harman & de Rundeau, Crimora, Va.	do
6806	Flour, Pearl	Eldred Mill Co., Jackson, Mich.	Adams Grain and Provision Co., Fayetteville.
6807	Flour, Brown's Hungarian.	The Hicks-Brown Milling Co., Mansfield, O.	do
6808	Flour, Nellie King	Tennessee Mill Co., Estill Springs, Tenn.	do
6809	Flour, Ann Arbor	Michigan Milling Co., Ann Arbor, Mich.	J. H. Culbreth & Co., Fayetteville.
6810	Flour, Gold Medal	Washburn-Crosby Milling Co., Minneapolis, Minn.	do
6812	Flour, Rob Roy	W. A. Coombs Milling Co., Cold Water, Mich.	do
6813	Flour, Superlative	The Dunlop Mills, Richmond, Va.	do
6814	Flour, Lily White	do	do
6815	Flour, Seal of Ohio	Gwinn Milling Co., Columbus, O.	The Armfield Co., Fayetteville
6816	Flour, Pride of Richmond	J. Lee Koiner, Richmond, Va.	A. E. Rankin Co., Fayetteville
6817	Flour, Puritan	Eldred Mill Co., Jackson, Mich.	do
6818	Flour, Gold Medal	Washburn-Crosby Milling Co., Louisville, Ky.	J. A. Taylor, Wilmington
6819	Flour, Gold Hunter	Model Mills, Nashville, Tenn.	do
6820	Flour, Silver King	do	do
6821	Flour, Heyer Bros.	Heyer Bros., Wilmington, N. C.	Heyer Bros., Wilmington

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6779	Wheat product	None found	None found	Flour.
6780	do	do	do	do.
6781	do	do	do	do.
6782	do	do	do	do.
6783	do	do	do	do.
6784	do	do	do	do.
6785	do	do	do	do.
6786	do	do	do	do.
6787	do	do	do	do.
6788	do	do	do	do.
6789	do	do	do	do.
6790	do	do	do	do.
6792	do	do	do	do.
6793	do	do	do	do.
6795	do	do	do	do.
6797	do	do	do	do.
6800	do	do	do	do.
6802	do	do	do	do.
6803	do	do	do	do.
6804	do	do	do	do.
6805	do	do	do	do.
6806	do	do	do	do.
6807	do	do	do	do.
6808	do	do	do	do.
6809	do	do	do	do.
6810	do	do	do	do.
6812	do	do	do	do.
6813	do	do	do	do.
6814	do	do	do	do.
6815	do	do	do	do.
6816	do	do	do	do.
6817	do	do	do	do.
6818	do	do	do	do.
6819	do	do	do	do.
6820	do	do	do	do.
6821	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6822	Flour, Fancy Patent	McNair & Pearsall, Wilmington, N. C.	McNair & Pearsall, Wilmington.
6823	Flour, William Tell	Austed & Buck Co., Springfield, O.	D. L. Gore & Co., Wilmington.
6824	Flour, Snow Flake	do	do
6825	Flour, Columbia	David Scott Flouring Mill, Detroit, Mich.	F. E. Hashagen Co., Wilmington.
6826	Flour, Best Patent	Amendt Milling Co., Monroe, Mich.	H. Weil & Bros., Goldsboro.
6827	Flour, Ideal	J. W. Kauffman, St. Louis, Mo.	do
6828	Flour, Regal	Amendt Milling Co., Monroe, Mich.	do
6829	Flour, Voight Patent	Voight Milling Co., Grand Rapids, Mich.	Best & Thompson, Goldsboro.
6830	Flour, Southern Beauty	Mutual Milling and Supply Co., Harrisonburg, Va.	J. T. Ginn, Goldsboro.
6831	Flour, Piedmont Patent	Piedmont Mills, Inc., Lynchburg, Va.	do
6832	Flour, Carnation	do	do
6833	Flour, Roman	The Standard Cereal Co., Chillicothe, O.	C. D. Taylor & Co., Goldsboro.
6834	Flour, Adena	do	do
6835	Flour, Jay Bird	C. N. Whiting, Shepherdstown, W. Va.	Irwin-Graham Co., Charlotte.
6836	Flour, Porcelain	Andrew Bowling, Staunton, Va.	do
6838	Flour, Swans Down	Rockingham Milling Co., McGaheysville, Va.	Wolf Davidson, Charlotte.
6839	Flour, The Chief	Equality Mills, Martinsburg, W. Va.	do
6840	Flour, Golden Eagle	S. S. Shaver, Lucy Springs, Va.	do
6841	Flour, Dove	J. W. Stonebraker, Funkstown, Md.	Chambers & Moody Co., Charlotte.
6842	Flour, Magnolia	Anchor Mills, Hagerstown, Md.	do
6845	Flour, Imperial	Jefferson Milling Co., Charlestown, W. Va.	Adams Grain and Provision Co., Charlotte.
6846	Flour, Superlative	The Dunlop Mills, Richmond, Va.	do
6847	Flour, Forest King	do	do
6848	Flour, Choctaw	Mill and Elevator Co., Oklahoma City, Okla.	do
6849	Flour, Morning Star	J. L. Triplett, Mt. Jackson, Va.	Sterling Cotton Mills, Franklinton.
6850	Flour, White Violet	do	do
6851	Flour, Climax	Carrolina Mills Co., Durham, N. C.	C. S. Williams, Franklinton.
6852	Flour, Standard	Stephen City Mill Co., Stephen City, Va.	Whedbee & Morris, Franklinton.
6853	Flour, Leesburg's Best	W. S. Jenkins & Co., Leesburg, Va.	P. A. Revis, Louisburg.
6854	Flour, Lexington Cream	The Cockley Milling Co., Lexington, O.	do
6855	Flour, Clover Leaf	J. Allen Smith & Co., Knoxville, Tenn.	do
6856	Flour, White Lily	J. Lee Koiner, Richmond, Va.	do
6857	Flour, Peerless	Carrolina Mills Co., Durham, N. C.	Beacom Supply Co., Henderson.
6858	Flour, Choice Family	McAllister & Bell, Inc., Covington, Va.	do
6859	Flour, Primrose	The Front Royal Milling Co., Front Royal, Va.	do
6860	Flour, Mountain Gem	McAllister & Bell, Inc., Covington, Va.	George A. Rose Co., Henderson.

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams..	Adulterants.	Remarks and Conclusions.
6822	Wheat product	None found	None found	Flour.
6823	do	do	do	do.
6824	do	do	do	do.
6825	do	do	do	do.
6826	do	do	do	do.
6827	do	1.40	Nitrogen peroxide	Flour, bleached; sale illegal.
6828	do	None found	None found	Flour.
6829	do	do	do	do.
6830	do	do	do	do.
6831	do	do	do	do.
6832	do	3.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6833	do	3.00	do	do.
6834	do	None found	None found	Flour.
6835	do	do	do	do.
6836	do	do	do	do.
6838	do	do	do	do.
6839	do	do	do	do.
6840	do	do	do	do.
6841	do	do	do	do.
6842	do	do	do	do.
6845	do	do	do	do.
6846	do	do	do	do.
6847	do	do	do	do.
6848	do	do	do	do.
6849	do	do	do	do.
6850	do	do	do	do.
6851	do	do	do	do.
6852	do	do	do	do.
6853	do	do	do	do.
6854	do	3.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6855	do	None found	None found	Flour.
6856	do	do	do	do.
6857	do	do	do	do.
6858	do	do	do	do.
6859	do	do	do	do.
6860	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6861	Flour, New Method	W. B. Baker's Sons, Winchester, Va.	Parham Bros. Supply Co., Henderson.
6862	Flour, White Satin	Dan Valley Mills, Danville, Va.	H. O. Falkner, Henderson
6863	Flour, Silver Leaf	Strasburg Steam Flour Mills, Strasburg, Va.	Burrus-Alston Co., Henderson
6864	Flour, Bakers' Choice	Augusta Mercantile and Mill Co., Mossy Creek, Va.	Henderson Grocery Co., Henderson.
6865	Flour, E. Z. Bake	George L. Evans & Son, Indianapolis, Ind.	Littleton Feed and Grocery Co., Littleton.
6866	Flour, Lexington Cream	The Cockley Milling Co., Lexington, N. C.	do
6867	Flour, Acme White Rose	Acme Milling Co., Indianapolis, Ind.	do
6868	Flour, White Lily	Koiner Flour Mills, Richmond, Va.	do
6869	Flour, Pride of Richmond	J. Lee Koiner, Richmond, Va.	Eastern Grocery Co., Littleton.
6870	Flour, Columbia Acme	Acme Evans Co., Indianapolis, Ind.	S. J. Stallings, Littleton
6871	Flour, Honest	J. I. Triplett, Woodstock, Va.	Eugene Johnson, Littleton
6872	Flour, Peerless	National Mills (Roper & Co.), Petersburg, Va.	J. A. Austin, Weldon
6873	Flour, Zenith	The Dunlop Mills, Richmond, Va.	Weldon Grocery Co., Weldon
6875	Flour, Best	Hough & Herbert Co., Norfolk, Va.	W. G. Hedgepeth, Hobgood
6876	Flour, Mt. Vernon	The Northwestern Mill Co., Mt. Vernon, O.	Greenville Supply Co., Greenville.
6877	Flour, Family	Anderson, Crawford & Co., Williamston, N. C.	Anderson, Crawford & Co., Williamston.
6878	Flour, Zenith	The Dunlop Mills, Richmond, Va.	do
6879	Flour, Patapsco	C. A. Gambrill Mfg. Co., Baltimore, Md.	W. C. Ayers, Plymouth
6880	Flour, Ideal	Detroit Milling Co., Detroit, Mich.	J. H. Skittlethorpe & Co., Plymouth.
6881	Flour, Stock's	F. W. Stock, Hillsdale, Mich.	do
6882	Flour, Mt. Vernon	The Northwestern Mill Co., Mt. Vernon, O.	J. A. Woodard & Co., Edenton.
6883	Flour, Taylor's Southern Belle.	do	do
6884	Flour, Voight's Royal	Voight Milling Co., Grand Rapids, Mich.	Albemarle Grocery Co., Edenton.
6886	Flour, Stock's	F. W. Stock, Hillsdale, Mich.	Aydlett Bros., Elizabeth City
6887	Flour, O. M.	Orrville Milling Co., Orrville, O.	J. B. Flora & Co., Elizabeth City.
6889	Flour, Millbourne	Millbourne Mills, Philadelphia, Pa.	C. W. Stevens Co., Elizabeth City.
6890	Flour, Rob Roy	W. A. Coombs, Cold Water, Mich.	do
6891	Flour, Voight's Royal	Voight Milling Co., Grand Rapids, Mich.	E. Peterson Co., Washington
6893	Flour, Pinnacle	Garland Milling Co., Greensburg, Ind	F. G. Paul & Bros., Washington
6894	Flour, Mt. Vernon	Northwestern Mill Co., Mt. Vernon, O.	do
6895	Flour, Zenith	The Dunlop Mills, Richmond, Va.	do
6896	Flour, Garland	Garland Milling Co., Greensburg, Ind.	E. R. Mixon & Co., Washington
6897	Flour, Sea Foam	F. Thomas Milling Co., Lansing, Mich.	do
6898	Flour, Royal	Voight Milling Co., Grand Rapids, Mich.	Hales & Edwards, Rocky Mount.
6899	Flour, William Tell	Armstead & Buck Co., Springfield, O.	do
6900	Flour, A. No. 1	Isaac Hasten Milling Co., Toledo, O.	do

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6861	Wheat product	None found	None found	Flour.
6862	do	do	do	do.
6863	do	do	do	do.
6864	do	do	do	do.
6865	do	do	do	do.
6866	do	3.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6867	do	None found	None found	Flour.
6868	do	do	do	do.
6869	do	do	do	do.
6870	do	do	do	do.
6871	do	do	do	do.
6872	do	do	do	do.
6873	do	do	do	do.
6875	do	do	do	do.
6876	do	2.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6877	do	None found	None found	Flour.
6878	do	do	do	do.
6879	do	do	do	do.
6880	do	2.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6881	do	None found	None found	Flour.
6882	do	do	do	do.
6883	do	do	do	do.
6884	do	do	do	do.
6886	do	do	do	do.
6887	do	do	do	do.
6889	do	do	do	do.
6890	do	do	do	do.
6891	do	do	do	do.
6893	do	do	do	do.
6894	do	do	do	do.
6895	do	do	do	do.
6896	do	do	do	do.
6897	do	3.00	Nitrogen peroxide	Flour, bleached; sale illegal.
6898	do	None found	None found	Flour.
6899	do	do	do	do.
6900	do	do	do	do.

RESULTS OF THE EXAMINA

Laboratory Number.	Material and Brand from Label.	Manufacturer or Wholesaler.	Retail Dealer or Party Who Sent Sample for Analysis.
6901	Flour, Lotus	Amendt Milling Co., Monroe, Mich.	Hales & Edwards, Rocky Mount.
6902	Flour, Gold Medal	Washburn-Crosby Co., Minneapolis, Minn.	----do----
6903	Flour, Purity	Wallace Milling Co., Dale, Ind.	----do----
6904	Flour, Rob Roy	W. A. Coombs Milling Co., Cold Water, Mich.	Matthews, Weeks & Co., Rocky Mount.
6905	Flour, White Swan	Peninsular Milling Co., Flint, Mich.	----do----
6906	Flour, Dunlop	The Dunlop Milling Co., Richmond, Va.	----do----
6907	Flour, Champion	Valley City Milling Co., Grand Rapids, Mich.	The Boykin Grocery Co., Wilson.
6908	Flour, Jefferson	Gwinn's Milling Co., Columbus, Ohio.	----do----
6909	Flour, Guiding Star	Rockland Milling Co., Weyer's Cave, Va.	C. Woodard Co., Wilson
6910	Flour, Gilt Edge	Voight Milling Co., Grand Rapids, Mich.	----do----
6911	Flour, Royal	The Dunlop Milling Co., Clarksville, Tenn.	----do----
6912	Flour, Blue Ribbon	Peninsular Milling Co., Flint, Mich.	----do----
7021	Flour, Pride of Virginia	Piedmont Mills, Lynchburg, Va.	The Patterson Co., Greensboro.
6914	Flour, Faultless	Lynchburg Milling Co., Lynchburg, Va.	Wells Grocery Co., Wilson
7022	Flour, Morning Star	Holt-Granite Flouring Mills, Haw River, N. C.	J. T. McLamb, Greensboro
7023	Flour, Pick of the Harvest.	----do----	----do----
7019	Flour, Clover Leaf	J. Allen Smith & Co., Knoxville, Tenn.	The Patterson Co., Greensboro.
7020	Flour, Piedmont	Piedmont Mills, Lynchburg, Va.	----do----

TION OF FLOUR.—CONTINUED.

Laboratory Number.	Microscopic Examination.	Nitrite Nitrogen Per Kilo of Flour—Milligrams.	Adulterants.	Remarks and Conclusions.
6901	Wheat product	None found	None found	Flour.
6902	do	do	do	do.
6903	do	do	do	do.
6904	do	do	do	do.
6905	do	do	do	do.
6906	do	do	do	do.
6907	do	do	do	do.
6908	do	do	do	do.
6909	do	do	do	do.
6910	do	do	do	do.
6911	do	do	do	do.
6912	do	do	do	do.
7021	do	do	do	do.
6914	do	do	do	do.
7022	do	do	do	do.
7023	do	do	do	do.
7019	do	do	do	do.
7020	do	do	do	do.

LEAF TOBACCO SALES FOR NOVEMBER, 1909.

Pounds sold for producers, first hand	30,657,304
Pounds sold for dealers	942,509
Pounds resold for warehouses	1,856,682
Total	33,456,495

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