U. S. DEPARTMENT OF AGRICULTURE.
DIVISION OF SOILS.

TOBACCO SOILS OF THE UNITED STATES:

A PRELIMINARY REPORT UPON THE SOILS OF THE PRINCIPAL TOBACCO DISTRICTS.

BY

MILTON WHITNEY,
CHIEF OF DIVISION OF SOILS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF SOILS,
Washington, D. C., November 1, 1897.

SIR: I have the honor to submit herewith and to recommend for publication a preliminary report upon the principal tobacco soils of the United States. It has not been possible, with the time and means at our disposal, to make an exhaustive study and map accurately the areas of the tobacco lands, but trips of reconnoissance have been taken over most of the important tobacco districts and a large amount of material has been examined. The results show a very marked difference in the texture and physical properties of the soils adapted to the different classes, types, and grades of tobacco, and give a basis for the classification of the soils and their mapping upon any desired scale. A recommendation has been made in my annual report that a more detailed study of these soils be undertaken and that reliable maps be prepared showing the area and distribution of the soils.

Respectfully,

MILTON WHITNEY,
Chief of Division.

Hon. JAMES WILSON,
Secretary of Agriculture.

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TOBACCO SOILS OF THE UNITED STATES: A PRELIMINARY REPORT UPON THE SOILS OF THE PRINCIPAL TOBACCO DISTRICTS.

INTRODUCTION.

In 1892, when the tobacco exhibit was being prepared for the Columbian Exposition, it was proposed to make a very comprehensive study of the soils of the principal tobacco areas of the country. This idea could not be carried out in full at the time, but a beginning was made and quite a large collection of typical tobacco soils secured. Since that time much attention has been given to the subject, a large number of samples have been collected by agents of the Department, and quite a large amount of this material has been examined in the laboratory. This publication is a preliminary report upon the work.

In recent years quite a little work has been done upon various lines connected with the production of tobacco, and a number of valuable publications have been issued. The most comprehensive and generally valuable paper was published in the volume of Agriculture of the Tenth Census. This article contains a great amount of exceedingly valuable information in regard to the soils and the influence of the soils on the tobacco crop of the United States.

Prof. O. Comes has published a valuable contribution on the botany of the tobacco plant in a short monograph, entitled Hortus Botanicus Porticensis, in which he attempts to classify botanically the tobaccos of the principal tobacco districts of the world. This was followed by the publication in 1897, by the same author, of the first volume of Del Tabacco—Storia, geografia, statistica, speciografia, agrologia e patologia.

Several valuable papers have been published in the annual reports of the Connecticut Experiment Station upon the progress of an investigation in tobacco culture at Poquonock for the past five years. Several bulletins have been issued from other experiment stations on this subject, notably the following: Bulletin No. 4 of the Colorado Experiment Station, published February, 1888, giving a description of the best tobacco soils, methods of cultivation, curing, and other treatment of the

crop, together with the yield and quality of tobacco from a number of samples of seed sent out by the United States Department of Agriculture. Bulletin No. 20 (second series), of the Louisiana Experiment Station on Tobacco Growing in Louisiana, consists of an essay on the general subject of tobacco growing, together with experiments at the North Louisiana Experiment Station. This was followed the next year by the publication of Bulletin No. 25 (second series), containing the results of experiments made on the cultivation of tobacco in northern Louisiana. Bulletin No. 122, on Types of Tobacco and Their Analyses, published by the North Carolina Experiment Station in 1895, contains the results of the chemical analyses of a number of typical tobaccos from the principal tobacco areas of the country. In 1895 the Florida Experiment Station published a report on the Culture of Tobacco, followed in 1897 by a revised and somewhat enlarged edition. This was published as Bulletin No. 38, and called Tobacco in Florida. In 1896 the Kentucky Experiment Station published Bulletin No. 63 on Tobacco, containing the results of some fertilizer experiments on the yield of tobacco, together with a study of the effects of arsenites on the tobacco plant and its efficiency as an insecticide. Mention should also be made of a number of valuable papers on the cultivation of tobacco by our consular agents in the Consular Report, particularly those relating to the cultivation of tobacco in Sumatra and in Cuba. Another important contribution entitled Tobacco Leaf, by Killebrew and Myrick, published in 1897, covers the general subject of tobacco culture and curing.

STATISTICS OF TOBACCO CULTURE.

In order to study the question intelligently it was necessary carefully to consider the yield of the different States, the counties in each State and district which produced any considerable amount of tobacco, and be largely guided by this in collecting samples of soils for examination. The data for this work were taken mainly from the Tenth Census, on account of the detailed estimates and the very valuable descriptions given there of the tobacco areas, the soils, and the physical conditions in the areas. In order to judge how the conditions had changed in the ten years which had elapsed since the census was taken, the yield from the counties composing the principal districts was compared with the yield of the same counties given in the Eleventh Census, a preliminary bulletin of which, on Tobacco Production, was published shortly after these investigations were undertaken.

As there are no subsequent figures which admit of the detailed study that these census figures allow, they are given here to show the location of the different tobacco areas and incidentally to show the change in acreage and yield in the ten years elapsing between the Tenth and Eleventh Censuses.

TOBACCO PRODUCED IN FOUR CENSUS YEARS.

The table below furnishes a condensed and exact exhibit of the production of the tobacco regions of the United States and the changes that took place from 1859 to 1889.

States producing tobacco in 1889.	1859.	1869.	1879.	1889.
Over 1,000,000 pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1. Kentucky	108,126,840	105,305,869	171,120,784	221,880,303
2. Virginia	121,787,946	37,086,364	79,988,868	48,522,655
3. Ohio	25,092,581	18,741,973	34,735,235	37,853,563
4. North Carolina	32,853,250	11,150,087	26,986,213	36,375,258
5. Tennessee	43,448,097	21,465,452	29,365,052	36,368,395
6. Pennsylvania	3,181,586	3,467,539	36,943,272	28,956,247
7. Wisconsin	87,340	960,813	10,608,423	19,389,166
8. Maryland	38,410,965	15,785,339	26,082,147	12,356,838
9. Missouri	25,086,196	12,320,483	12,015,657	9,424,823
10. New York	5,764,582	2,349,798	6,481,431	9,316,135
11. Connecticut	6,000,133	8,328,798	14,044,652	8,874,924
12. Indiana	7,993,378	9,325,392	8,872,842	7,710,297
13. Illinois	6,885,262	5,249,274	3,935,825	3,042,936
14. Massachusetts	3,233,198	7,312,885	5,369,436	2,794,848
15. West Virginia	2,180,366	2,046,452	2,296,146	2,602,021
Between 100,000 and 1,000,000 pounds.				
16. Arkansas	989,980	594,886	970,220	954,640
17. Florida	828,815	157,405	21,182	470,443
18. Georgia	919,318	288,596	228,590	263,752
19. South Carolina	104,412	34,805	45,678	222,898
20. Texas	97,914	59,706	221,283	175,706
21. Alabama	232,914	152,742	452,426	162,430
Less than 100,000 pounds.				
22. New Hampshire	18,581	155,334	170,843	86,593
23. Iowa	303,168	71,792	420,477	74,396
24. Vermont	12,245	72,671	131,432	70,518
25. Kansas	20,349	33,241	191,669	62,083
26. Mississippi	159,141	61,012	414,663	61,511
27. Louisiana	39,940	15,541	55,954	46,845
28. New Jersey	149,485	40,871	172,315	33,855
29. Delaware	9,699	250	1,278	29,680
30. Minnesota	38,938	8,247	69,922	23,285
31. California	3,150	63,809	73,317	12,907
32. Michigan	121,099	5,385	83,969	11,984
33. Nebraska	3,636	5,988	57,979	11,049
34. Washington	10	1,682	6,930	7,046
35. Oregon	405	3,847	17,325	3,325
36. New Mexico	7,044	8,587	890	1,415
Total	434,291,913	262,732,755	471,655,305	482,244,764

This table gives the yield of States according to the production in 1889, the first group comprising those States in which the production exceeded 1,000,000 pounds, the second group comprising those States in which the production is between 100,000 and 1,000,000 pounds, the third group embracing the States producing less than 100,000 pounds.

ESTIMATES OF TOBACCO PRODUCTION IN 1896.

The following are the final estimates of the Division of Statistics of this Department for the year 1896:

Area, yield, and value of tobacco in 1896.

State.	Area cultivated.	Yield.	Value.
	Acres.	*Pounds.*	
Kentucky	196,745	143,623,850	$6,032,202
North Carolina	134,567	68,629,170	5,490,334
Virginia	92,002	57,961,260	3,013,986
Tennessee	53,351	35,211,660	2,464,816
Ohio	32,012	23,688,880	1,066,000
Maryland	15,995	9,277,100	398,915
Pennsylvania	13,884	16,244,280	1,299,542
Indiana	11,957	8,130,760	365,884
Missouri	10,580	7,406,000	666,540
Connecticut	6,579	10,197,450	1,325,668
West Virginia	5,119	3,685,680	313,283
Wisconsin	3,975	5,088,000	279,840
Illinois	3,902	2,497,280	237,242
New York	3,259	3,389,360	271,149
Arkansas	2,950	1,327,500	146,025
Alabama	2,147	1,009,090	161,454
Massachusetts	1,975	3,199,500	383,940
Other States	3,750	2,437,500	341,250
Total	594,749	403,004,320	24,258,070

PRINCIPAL TOBACCO DISTRICTS.

The Department is constantly in receipt of letters asking for information and advice in regard to the growing of tobacco. The main points of inquiry seem to be in regard to the kind of tobacco which should be grown and the method of curing the product.

Climate and soil conditions should determine the kind of tobacco raised. The tobacco plant readily adapts itself to a great range of climatic conditions, will grow on nearly all kinds of soil, and has a comparatively short season of growth. It can, therefore, as a matter of fact, be grown in nearly all parts of the country, even where wheat and corn can not be economically produced. But while tobacco can be so universally grown, the flavor and quality of the leaf are greatly influenced by the conditions of climate and soil. The industry has been very highly specialized and there is only demand now for tobacco possessing certain qualities, adapted to certain specific purposes. A nondescript tobacco is not worth growing and should not be grown, as it lowers the price of really good types of tobacco, to the detriment alike of the grower and the consumer. It is important, therefore, to understand what kinds of tobacco are in demand and what the climatic and soil conditions are which will most easily produce the qualities desired.

The principal kinds of tobacco grown in this country are the cigar types, for our domestic supply of cigars; the manufacturing types, for smoking and chewing, for our domestic use; the bright yellow tobacco, for cigarettes, smoking, and plug wrappers; White Burley, for smoking and chewing, both for domestic and export trade; and the export types proper, which are not suited to our domestic use, but which are mainly exported to foreign countries to be used both for cigar and

manufacturing purposes. The question is often asked, Which of these classes of tobacco should be grown?

CHANGES IN PRODUCTION OF TOBACCO FROM 1879 TO 1889.

The following table, compiled from the Eleventh Census, shows where these different classes of tobacco are produced, the acreage of the different tobacco districts in 1879 and 1889, together with the increase or decrease in acreage and yield in 1889 as compared with the acreage and yield of 1879. The plus sign in the table indicates an increase; the minus sign indicates a decrease.

Comparison of acreage and yield for 1879 and 1889, by districts.

Districts.	Relation of acreage in each district to total acreage in 1889.	Acreage.		Change in each district.		Change in whole area.	
		1879.	1889.	Acres.	Yield.	Acres.	Yield.
Cigar leaf:	*Per cent.*	*Acres.*	*Acres.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Seed leaf, Ill.	0.3	752	329	— 56.2	— 62.7	— 0.58	— 0.68
Massachusetts	2.2	3,358	2,012	— 40.1	— 92.1	— 1.84	— 2.67
Connecticut	6.9	8,666	6,331	— 26.9	— 36.8	— 3.20	— 4.93
Indiana	9.2	9,859	8,378	— 15.0	— 7.0	— 2.03	— .53
Pennsylvania	29.2	26,347	26,746	+ 1.5	— 19.4	+ .54	— 7.24
Seed leaf, Ohio	23.2	15,017	21,224	+ 41.2	+ 5.9	+ 8.52	+ 1.04
New York	9.1	4,264	8,289	+ 94.3	+ 56.1	+ 5.52	+ 3.33
Wisconsin	18.6	8,509	17,000	+ 99.8	+ 83.3	+11.66	+ 9.05
Florida	.04	35	1,100	+3042.8	+3570.5	+ 1.32	+ .44
Total	98.74	76,807	91,409			+21.91	— 2.19
Manufacturing and export:							
Red and spangled, W. Va	.05	568	187	— 68.0	— 72.3	— .10	— .11
Manufacturing, Mo	.4	2,977	1,205	— 59.5	— 59.4	— .50	— .42
Sun and air cured fillers, Va	.8	6,285	2,616	— 58.3	— 69.9	— 1.05	— 1.29
Maryland	5.4	37,741	17,778	— 52.9	— 52.6	— 5.72	— 5.73
Spangled, Ohio	1.1	7,581	3,604	— 52.4	— 51.6	— 1.14	— 1.41
Green River, Ky.	.9	6,419	3,123	— 51.3	— 51.3	— .91	— .91
Red shipping, Va	1.1	6,516	3,721	— 42.8	— 54.1	— .80	— .91
Heavy tobacco, Mo	2.0	10,018	6,862	— 31.5	— 26.2	— .90	— .98
Cumberland River, Ky.	.8	3,844	2,729	— 29.0	— 27.5	— .31	— .28
Upper Green River, Ky.	4.3	17,676	14,440	— 17.9	— 12.9	— .92	— .65
Ohio River, Ky.	4.2	18,297	14,203	— 2.2	— 26.4	— 1.17	— 1.47
Upper Cumberland River, Tenn	1.6	5,421	5,398	— .4	— 14.2	+ .01	— .27
Paducah, Ky	8.4	28,205	28,188	— .1	— 14.0	.00	— 1.26
Lower Green River, Ky.	14.9	50,313	50,088	.0	+ 1.2	.00	+ .21
Clarksville, Ky.	13.7	45,756	45,753	.0	+ 4.1	.00	+ .55
Export, Ill	.9	2,999	3,029	+ 1.0	+ 9.2	+ .01	+ .07
Benton County, Ark	.3	844	940	+ 11.4	+ 1.1	+ .02	.00
West Tennessee, Tenn.	3.7	10,103	12,432	+ 23.0	+ 13.2	+ .66	+ .41
Clarksville, Tenn	8.8	22,912	29,652	+ 29.4	+ 37.3	+ 1.93	+ 2.53
Dark shipping, W. Va.	.5	1,342	1,819	+ 35.5	+ 30.7	+ .13	+ .18
North Carolina	*a* 22.3	*a* 48,005	*a* 74,848	+ 55.9	+ 24.4	+ 7.69	+ 2.34
Total		348,665	334,941			—13.87	—10.34
Bright yellow:							
Virginia	*b* 40.2	*b* 52,565	*b* 51,281	— 2.4	— 24.1	— 1.26	—13.31
West Virginia	1.1	1,169	1,390	+ 10.3	+ 17.0	+ .21	+ .20
North Carolina	58.8	*b* 48,005	*b* 74,848	+ 55.9	+ 24.4	+30.31	+10.98
Total		101,739	127,519			+29.26	— 2.13
White burley:							
Ohio	15.3	11,258	17,250	+ 53.2	+ 37.4	+ 9.25	+ 7.02
Kentucky	84.7	53,475	95,563	+ 78.7	+ 86.3	+65.01	+69.97
Total		64,733	112,813			+74.26	+76.99

a There is no way of estimating separately the acreage in yellow and in manufacturing in this State. It is generally believed the acreage in manufacturing is greatly decreased and that in yellow has increased. This estimate is but approximate.

b Including also flue-cured fillers.

A glance at the table shows that in this period of ten years the acreage and yield of the cigar tobaccos have been very considerably increased. The manufacturing and export districts can not be sharply separated, as both kinds of tobacco are frequently grown in the same district and the same kind is frequently used for both purposes. It will be seen that on the whole there has been a considerable decrease in the acreage and yield. With the bright yellow and burley tobaccos there has been a large increase in both acreage and yield. This table gives an idea where the different kinds of tobacco are raised in such quantities and of such commercial importance as to constitute a district. Since 1889 there has been considerable change in many of these districts, while other new districts, notably Texas and California, are coming into considerable prominence both as to the area under cultivation and the excellent quality of the product raised. The acreage in Florida has also been very greatly increased since 1889, but there are no reliable statistics to show the extent of the changes in the counties making up the tobacco districts.

COUNTIES CONSTITUTING THE TOBACCO DISTRICTS OF THE UNITED STATES.

The following are the counties in each State making up the different tobacco districts of the country. This gives only a very approximate idea of the area of the districts, as the boundaries follow geological and soil formations rather than county lines, and consequently only small portions of some of the counties are included in the districts. The counties are given in the order of their acreage in 1889, those having the largest acreage being given first. The numerals immediately after the names of the States show the percentage of the total tobacco acreage of the State in 1889 included in the counties named. Only those counties producing notable quantities of tobacco are here mentioned.

District of cigar types.

States and varieties.	Product of State.	Counties.
	Per cent.	
Illinois:		
Seed leaf	7.9	Jo Daviess, Stephenson, Carroll.
Massachusetts	100	Hampshire, Hampden, Franklin, Berkshire.
Connecticut	100	Hartford, Litchfield, Fairfield, Tolland, Middlesex, New Haven.
Indiana	89.4	Switzerland, Spencer, Warrick, Jefferson, Dubois, Ohio, Pike.
Pennsylvania	99.2	Lancaster, York, Chester, Bradford, Clinton, Tioga, Bucks, Lebanon, Northumberland, Lycoming, Dauphin, Cumberland.
Ohio:		
Seed leaf	47.8	Montgomery, Darke, Preble, Warren, Miami, Butler, Clinton, Clark, Shelby, Champaign, Greene.
New York	96	Onondaga, Cayuga, Chemung, Oswego, Steuben, Wayne, Tompkins, Tioga.
Wisconsin	98.6	Dane, Rock, Jefferson, Columbia, Vernon, Green.
Florida	92.4	Gadsden, Walton, Madison, Columbia, Leon.

District of manufacturing and export types.

States and varieties.	Product of State.	Counties.
West Virginia:	*Per cent.*	
Red spangled	4	Lewis, Wirt, Calhoun, Ritchie, Roane, Wetzel.
Dark shipping	38.9	Putnam, Cabell, Wayne, Kanawha, Jackson, Mason, Wood.
Missouri:		
Manufacturing	10.6	Callaway, Montgomery, Pike, Lincoln, Warren, Osage, Franklin.
Heavy	60.5	Chariton, Howard, Carroll, Saline, Macon, Linn, Randolph, Livingston, Monroe, Boone, Shelby.
Virginia:		
Sun and air cured	2.4	Louisa, Caroline, Hanover, Spottsylvania.
Red shipping	3.4	Dinwiddie, Fluvanna, Goochland, Rockbridge, Chesterfield.
Flue-cured fillers	11.1	H- ury, Franklin, Patrick. (See also Bright yellow.)
Maryland	99	Prince George, St. Mary, Anne Arundel, Charles, Calvert, Montgomery, Harford, Frederick.
Kentucky:		
Green River	1.1	Ohio, Butler.
Cumberland River	1	Metcalfe, Adair, Cumberland, Monroe, Pulaski, Russell, Casey, Wayne, Clinton.
Upper Green River	5.2	Hart, Barren, Warren, Green, Marion, Allen, Taylor, Grayson, Larue, Hardin, Edmonson.
Ohio River	5.1	Caldwell, Breckinridge, Crittenden, Lyon, Hancock, Livingston, Meade.
Paducah	10.2	Graves, Calloway, Ballard, McCracken, Marshall, Fulton, Hickman.
Lower Green River	18.2	Henderson, Daviess, Webster, Hopkins, Union, McLean, Muhlenberg.
Clarksville	16.6	Christian, Logan, Todd, Trigg, Simpson.
Ohio:		
Spangled	8.1	Washington, Noble, Monroe, Belmont, Morgan, Guernsey, Gallia, Athens, Harrison.
Tennessee:		
Upper Cumberland River.	10.5	Sumner, Smith, Macon, Trousdale, Jackson, Wilson, Putnam, Clay.
Clarksville	57.6	Montgomery, Robertson, Cheatham, Stewart, Dickson, Houston, Humphreys.
West Tennessee	24.1	Weakley, Henry, Obion, Benton, Dyer, Carroll, Gibson, Henderson, Hardeman, Decatur.
Illinois:		
Export	72.9	Saline, Williamson, Franklin, Hamilton.
Arkansas	50.1	Benton, Washington, Boone, Madison, Carroll, Newton, Izard, Randolph.
North Carolina	77.1	Rockingham, Granville, Stokes, Caswell, Person, Madison, Vance, Forsyth, Buncombe, Surry, Durham, Guilford, Alamance. (Including also Bright yellow.)

District of bright yellow type.

State.	Product of State.	Counties.
	Per cent.	
Virginia	46.3	Pittsylvania, Halifax, Henry, Franklin, Patrick.
West Virginia	29.9	Fayette, Mercer, Summers, Monroe, Raleigh.
North Carolina	.....	(See counties under export tobacco.)

District of whit burley type.

State.	Product of State.	Counties.
	Per cent.	
Ohio	38.9	Brown, Clermont, Adams.
Kentucky	34.8	Mason, Owen, Bracken, Henry, Bourbon, Scott, Pendleton, Grant, Fleming, Harrison, Shelby, Boone, Nicholas, Carroll, Woodford, Montgomery, Franklin, Kenton, Lewis, Trimble, Robertson, Campbell, Gallatin, Oldham.

INFLUENCE OF CLIMATE ON THE DISTRIBUTION OF THE DIFFERENT CLASSES OF TOBACCO.

It is a curious and interesting fact that tobacco suitable for our domestic cigars is raised in the latitude of Sumatra, Cuba, and Florida, and then passing over our middle tobacco States, the cigar type is found again in Massachusetts, Connecticut, Pennsylvania, Ohio, Indiana, Illinois, and Wisconsin. The tobacco which we use only for chewing and smoking and which we send abroad is raised in the intervening States, the very best locality lying just below the latitude of southern Ohio. This is undoubtedly a matter of climate, although the ordinary meteorological statistics do not show any good reason for the facts. (See Plates I and II.)

METEOROLOGICAL CONDITIONS IN THE GREAT TOBACCO REGIONS.

The following table gives a summary of the meteorological conditions in a number of the tobacco districts of our own country, and from an eight years' record in Habana and from several years' record in the Island of Sumatra and the adjacent coast:

Mean monthly temperatures.

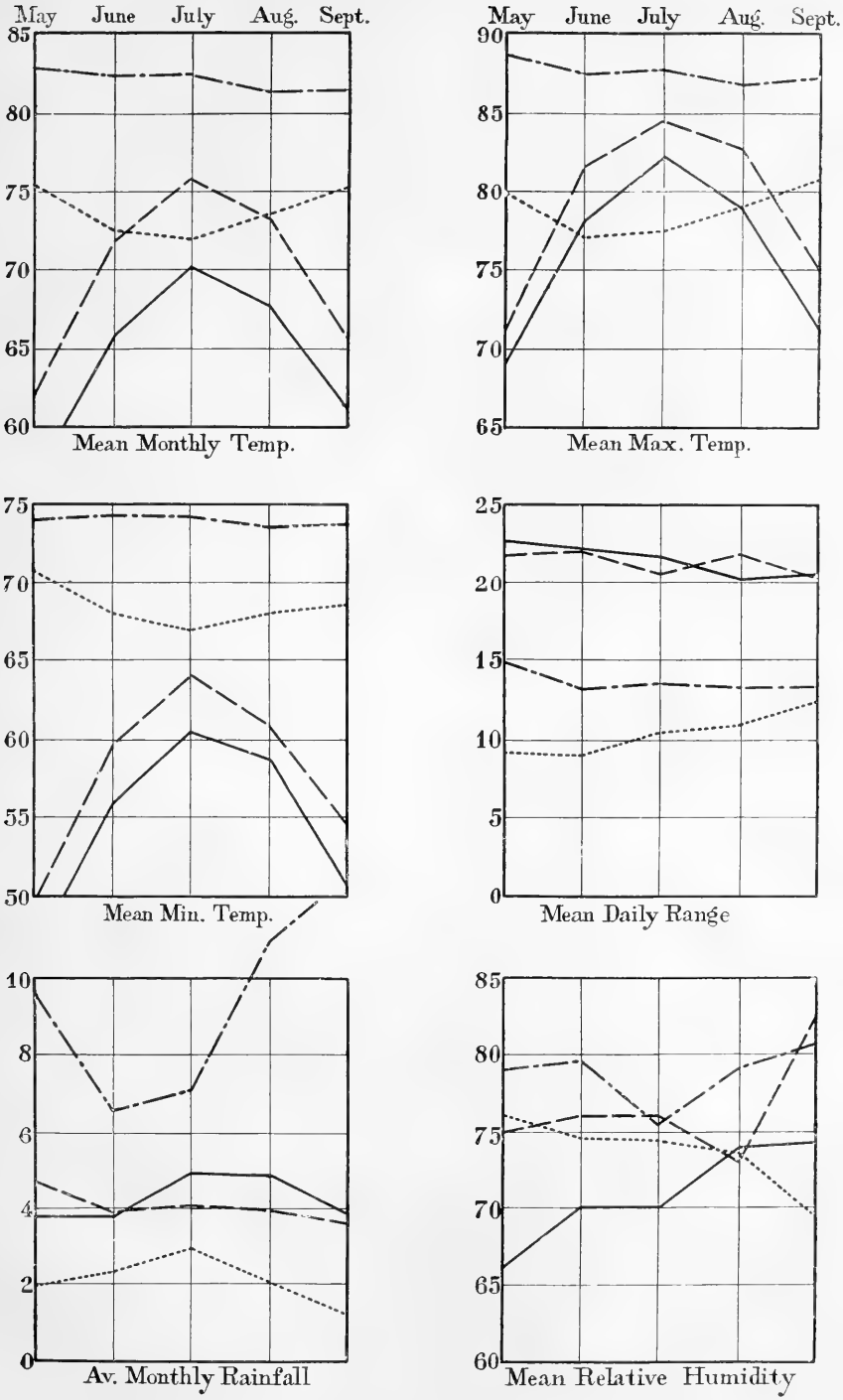
District.	Apr.	May.	June.	July.	Aug.	Sept.
	° F.	° F.	° F.	° F.	° F.	° F.
Connecticut Valley	44.80	56.50	65.90	70.20	67.70	61.11
Pennsylvania	49.90	62.00	71.80	75.90	73.30	65.63
Kentucky	57.50	65.00	75.30	77.20	75.30	69.63
Tennessee	60.60	68.10	77.00	79.50	77.93	70.53
Virginia	56.00	65.80	74.00	77.80	75.40	69.00
North Carolina	58.20	67.00	75.80	78.70	76.00	70.10
Sumatra	83.05	82.90	82.35	82.45	81.35	81.45

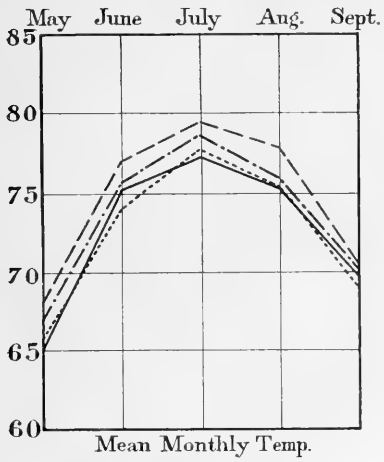
District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	78.60	75.40	72.50	72.00	73.60	75.20

Mean maximum temperatures.

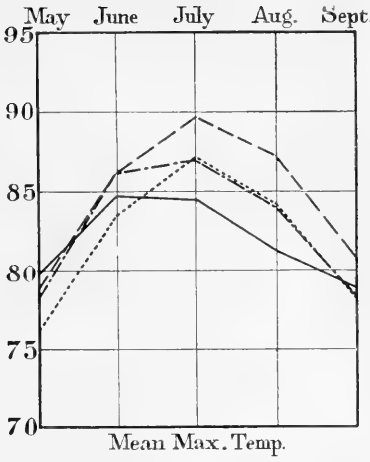
District.	Apr.	May.	June.	July.	Aug.	Sept.
	° F.	° F.	° F.	° F.	° F.	° F.
Connecticut Valley	56.70	69.00	78.00	82.10	78.90	71.23
Pennsylvania	60.90	71.20	81.60	84.50	82.80	74.98
Kentucky	70.40	79.80	84.80	84.50	81.30	78.90
Tennessee	70.50	78.80	86.10	89.60	87.20	80.75
Virginia	66.60	76.20	83.60	87.20	84.20	78.20
North Carolina	69.80	78.30	86.10	87.00	84.00	78.30
Sumatra	89.35	88.80	87.50	87.80	86.90	87.15

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	82.40	79.90	77.00	77.40	79.00	80.80

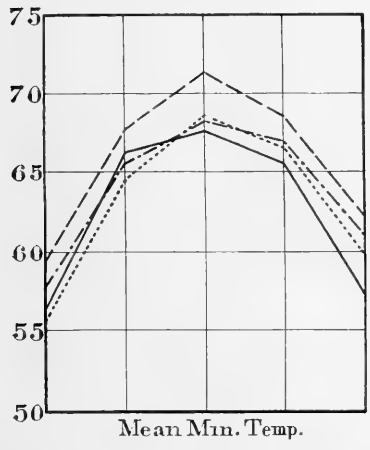

May June July Aug. Sept.
85
80
75
70
65
60
Mean Monthly Temp.
May June July Aug. Sept.
90
85
80
75
70
65
Mean Max. Temp.
75
70
65
60
55
50
Mean Min. Temp.
25
20
15
10
5
0
Mean Daily Range
10
8
6
4
2
0
Av. Monthly Rainfall
85
80
75
70
65
60
Mean Relative Humidity
Conn. Valley
Penn.
Habana
Sumatra



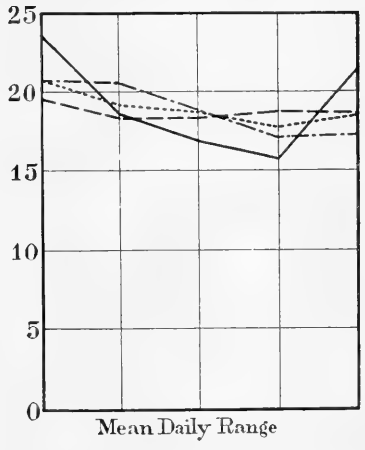
Mean Monthly Temp.



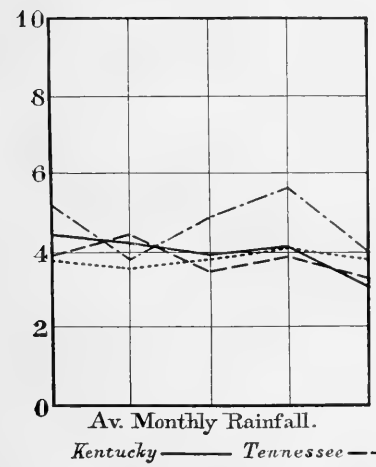
Mean Max. Temp.



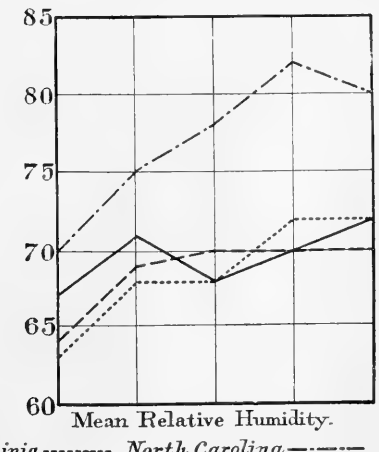
Mean Min. Temp.



Mean Daily Range



Av. Monthly Rainfall.



Mean Relative Humidity.

Kentucky ——— *Tennessee* – – – *Virginia* ····· *North Carolina* —·—·—

E. E. Flournoy del.

Mean minimum temperatures.

District.	Apr.	May.	June.	July.	Aug.	Sept.
	°F.	°F.	°F.	°F.	°F.	°F.
Connecticut Valley	35.40	46.50	55.90	60.50	58.80	50.87
Pennsylvania	39.50	49.40	59.70	64.00	61.00	54.68
Kentucky	47.90	56.20	66.20	67.60	65.60	57.35
Tennessee	51.50	59.30	67.80	71.30	68.50	62.25
Virginia	45.40	55.50	64.50	68.50	66.50	59.90
North Carolina	47.90	57.60	65.60	68.20	66.90	61.10
Sumatra	74.40	74.00	74.25	74.15	73.60	73.70

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	74.10	70.70	68.00	66.90	68.00	68.40

Mean daily ranges of temperature.

District.	Apr.	May.	June.	July.	Aug.	Sept.
	°F.	°F.	°F.	°F.	°F.	°F.
Connecticut Valley	21.3	22.5	22.1	21.6	20.1	20.4
Pennsylvania	21.4	21.8	21.9	20.5	21.8	20.3
Kentucky	22.5	23.6	18.6	16.9	15.7	21.6
Tennessee	19.0	19.5	18.3	18.3	18.7	18.5
Virginia	21.2	20.7	19.1	18.7	17.7	18.3
North Carolina	21.9	20.7	20.5	18.8	17.1	17.2
Sumatra	14.9	14.8	13.2	13.6	13.3	13.4

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	8.3	9.2	9.0	10.5	11.0	12.4

Records of rainfall.

District.	Averages for months.						Totals.	
	Apr.	May.	June.	July.	Aug.	Sept.	6 months.	Year.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Connecticut Valley	3.33	3.78	3.79	4.90	4.86	3.85	24.24	49.23
Pennsylvania	3.61	4.70	3.91	4.06	3.96	3.68	23.92	43.74
Kentucky	4.98	4.46	4.25	3.97	4.12	3.06	24.86	51.70
Tennessee	5.21	3.92	4.44	3.45	3.89	3.28	24.19	52.10
Virginia	3.30	3.80	3.60	3.80	4.10	3.80	22.40	44.50
North Carolina	3.21	5.21	3.80	4.89	5.64	4.00	26.75	45.25
Sumatra	5.93	9.61	6.59	7.07	10.99	12.71	52.90	.....

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	6 months.	
Habana	6.57	1.94	2.27	2.95	2.06	1.21	17.00	49.83

Mean relative humidity.

District.	Apr.	May.	June.	July.	Aug.	Sept.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Connecticut Valley	63.00	66.00	70.00	70.00	74.00	74.33
Pennsylvania	70.00	75.00	76.00	76.00	73.00	82.33
Kentucky	64.00	67.00	71.00	68.00	70.00	72.00
Tennessee	61.00	64.00	69.00	70.00	70.00	70.00
Virginia	59.00	63.00	68.00	68.00	72.00	72.00
North Carolina	67.00	70.00	75.00	78.00	82.00	80.00
Sumatra	76.50	79.00	79.50	75.50	79.00	80.50

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	76.90	76.10	74.60	74.40	73.60	68.30

Average number of rainy days.

District.	Apr.	May.	June.	July.	Aug.	Sept.
Connecticut Valley	8	11	9	10	9	8
Pennsylvania	10	13	10	9	9	8
Kentucky	10	12	12	8	8	7
Tennessee	11	11	11	10	8	7
Virginia	11	12	12	11	12	9
North Carolina	9	13	11	14	13	10
Sumatra	13	14	12	11	14	15

District.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Habana	15	10	9	8	6	6

The Sumatra tobacco imported into this country is used only for a wrapper for our domestic cigars; it is not suitable for fillers nor for any other purpose in the market. The Habana tobacco is suitable both for cigar wrapper and filler. The Connecticut tobacco which is grown at present is valued mainly as a wrapper and binder leaf; the Pennsylvania tobacco is used mainly as a filler, the cigars being wrapped with a leaf from other localities. The same is true of the Ohio tobacco. The principal tobacco season in Cuba is about the opposite of our own. Several crops of tobacco can be grown there each season, but the main planting season is in November and December, while with us it is in May and June. It is surprising to find so little difference in the mean meteorological records for these several places during the crop season. There does not seem to be sufficient difference to explain the distribution of the different classes of tobacco, and yet this distribution is probably due mainly to climatic conditions.

EXPERIENCE THE ONLY SAFE TEST OF CLIMATE FOR TOBACCO.

One must still judge, so far as the climate is concerned, mainly from the experience of others as to the class of tobacco to be raised, as the ordinary meteorological record will be of very little value in determining this point. The plant is far more sensitive to these meteorological conditions than are our instruments. Even in such a famous tobacco region as Cuba tobacco of good quality can not be grown in the immediate vicinity of the ocean or in certain parts of the island, even on what would otherwise be considered good tobacco lands. This has been the experience also in Sumatra and in our own country, but the influences are too subtle to be detected by our meteorological instruments.

Little, therefore, can be said at the present time in regard to the suitable climatic condition for tobacco of any particular type or quality

SOILS OF THE TOBACCO DISTRICTS.

Under given climatic conditions the class and type of tobacco depend upon the character of the soil, especially on the physical character of the soil upon which it is grown, while the grade is dependent largely

upon the cultivation and curing of the crop. The different types of tobacco are grown on a wide range of soils all the way from the coarse, sandy lands of the pine barrens to the heavy clay, limestone, grass, and wheat lands. The best soil for one kind of tobacco, therefore, will be almost worthless for the staple agricultural crops, while the best for another type of tobacco will be the richest and most productive soil of any that we have. It is particularly true of tobacco, to a greater extent, perhaps, than of any other crop, that the texture and physical properties of the soil influence the physiology of the plant to such an extent as to determine and control the distribution of the different widely distinct types of tobacco. Soils producing a heavy shipping tobacco will not produce fine tobacco of any variety. Soils containing a large proportion of clay, or which for other reasons are very retentive of moisture, tend to produce large, heavy plants which cure to a dark brown or red. A lighter, sandy soil produces a plant having a thinner and more delicate leaf, which by proper treatment can be cured to a bright red, mahogany, or fine yellow color. So marked is this influence of soil upon the quality of the tobacco that a fine, bright tobacco land may be separated by only a few feet from a heavier clay soil which will produce only a heavy manufacturing or export leaf.

Manures and fertilizers tend always to increase the yield per acre, but where large quantities of nitrogen are added to the soil there is a tendency for the leaf to become thicker, heavier, and more gummy. In the case of the fine, bright tobaccos or naturally thin-textured leaves this is apt to cause a marked deterioration in the character of the leaf; but with the heavier varieties this result is far from undesirable, because it merely increases the normal influences of the soil in making the leaf heavier, richer, and of more body. Considerable control can therefore be exercised upon the quality or grade of the leaf, not only by judicious cultivation, but by proper fertilization.

A person well acquainted with the practical work of growing tobacco can readily tell from a simple inspection of the soil what special kind of tobacco the soil will grow and in what condition the soil is for tobacco cultivation. There is some physical, tangible evidence that indicates to the experienced eye whether the conditions are favorable for tobacco growing, whether the land would produce a given type, or whether a nondescript tobacco would be produced. The evidence upon which this judgment is based appears to be the texture or coarseness of the soil grains and the water content. The present investigation is based upon this.

THE TEXTURE OF TOBACCO SOIL.

The texture of a soil can be determined very satisfactorily by the method of mechanical analysis which has been described in Bulletin No. 4 of this division. The method consists of separating the particles of soil into grades of different sizes, which are especially distinguished

as sand, silt, and clay, and weighing the quantity of each grade. The texture of a soil controls to a large extent its relation to water and the relative amount of water that it will contain. As a rule, the more clay a soil contains the more water it will hold; for the spaces in the clay soil are so exceedingly small that the water moves very slowly and a relatively large proportion of the rainfall is retained for the use of plants. The texture of the soil, however, does not altogether determine the relative amount of water which the soil will contain, for the arrangement of the soil grains also has a very important influence upon the water content. If the grains are evenly distributed, as in a puddled soil, the soil is much more retentive of moisture than where they are gathered together in flocks or segregated into masses, as in a loamy soil; for when the spaces in the soil between the grains are of nearly uniform size, as they are in a puddled soil, the movement of the water is very much slower than where the spaces are of various sizes, as in a loamy soil. Therefore, while the texture of a soil is a very important factor in the classification of the tobacco lands, the structure, or the arrangement of the soil grains, is also an important factor which must be considered at the same time. The arrangement of the soil grains is not an easy matter to determine, and there is no satisfactory way of expressing the difference in the structure of two soils. It is therefore necessary to determine the texture and to rely upon actual moisture determinations in the soil to determine the structure and the actual relation of the soil to water.

A great many samples of soil and subsoil have been collected from most of the important tobacco districts, and enough of these have been analyzed to enable generalizations to be made as to the character of the soils. Continuous records have been kept for several years of the moisture content of the soils in one or two localities only, in some of the principal tobacco districts. This work should be extended and continuous records kept of the soil condition in a number of places in each district.

SOILS OF THE NORTHERN CIGAR TOBACCO DISTRICTS.

The grade of tobacco used to wrap a cigar for domestic purposes is quite different from that suitable for the filler. Theoretically the wrapper leaves are the best on the plant, the binders are second quality, while all the other leaves are used for filler purposes. The one plant, therefore, is supposed to produce the filler, binder, and wrapper for the complete cigar. As a matter of fact, this is seldom satisfactorily accomplished with the same plant except in Cuba and our Southern States. In the Northern tobacco States a plant which will produce a good wrapper leaf does not, as a rule, make a very good filler. Good domestic wrapper leaf is worth anywhere from four to twenty times as much per pound as a filler leaf, but as the filler leaf is grown on heavier soil, with closer planting, the yield per acre is much larger and, as the cul-

tivation and treatment of the tobacco is less expensive, the return per acre, even at the low price per pound at which it is sold, can be made as profitable as the wrapper.

The Pennsylvania filler is seldom wrapped now with its own leaf. It is wrapped with either a Cuban, Sumatra, Connecticut Valley, or Wisconsin wrapper. A Connecticut wrapper seldom wraps its own leaves, but is used on a Cuban, Pennsylvania, Ohio, or Wisconsin filler. The present prevailing grade in the Connecticut Valley is a wrapper leaf, the second quality being used as binder. In Pennsylvania at the present time the quality is a filler leaf, except on the river lands, where a light, thin-textured leaf is produced, which makes wrappers of a superior quality. The New York lands produce a good type of wrapper, and the crop at present is mainly a wrapper and binder grade. The Ohio tobacco is essentially a filler, and is covered with a Cuban, Sumatra, Connecticut Valley, or Wisconsin wrapper. The tobacco lands of Wisconsin appear to be nearly an average of the other States, and to produce in nearly equal excellence a wrapper and a filler leaf. It is commonly called a binder State.

THE CONNECTICUT VALLEY SOILS.

The tobacco soils of the Connecticut Valley are confined at present to the light, alluvial, sandy terraces and plains bordering the Connecticut River from northern Massachusetts down to within a few miles of the Sound. (See Plates III and IV.) These soils are the general type of the early truck soils of the Atlantic Coast. As a rule the lighter the texture—that is, the less clay they contain—the thinner the texture of the tobacco leaf and the more elastic, pliable and better the wrapper it will make. The yield per acre, however, on these very light soils is very small, and the care necessary to keep the plant growing and to protect it from the occasional drought is expensive; so that there is a limit of profitable production. On these light soils the plant must be kept growing at all hazards, for if the growth is retarded by too great a deficiency of water at any time, the plant will be small and the leaves thick and harsh. With continuous and rapid growth, such as is secured on these soils in favorable seasons, the leaf is of very thin texture, silky, pliable, light-colored, and admirably adapted for a cigar wrapper. Unquestionably some form of irrigation could be profitably adopted on these soils. It is the experience in Florida that if the plant can be kept growing by frequent rains or by judicious irrigation, the maturity of the crop can be greatly hastened; so that the growing season is only about half as long as it would be under unfavorable weather conditions. Every possible means should be taken to secure a continuous growth, and any check, however slight it may seem, must be regarded as a positive injury to the quality of the product if it is to be used as a wrapper leaf. The wrapper should have little body and but little flavor.

The binder is a low-grade wrapper which, from its quality or appearance or both, is not suitable for the outside covering of the cigar.

The filler leaf, being worth much less per pound than the wrapper, is too often neglected in this country, and when cured is but little better than dried leaves or has a very rank, strong flavor. This is a very great mistake, as the filler, forming the main bulk of the cigar, should give it character and flavor. Too much care and attention could not be given to the growing and fermenting of the filler leaf, were it not for the fact that the market demands a good-looking cigar above all else. The quality is a very much smaller factor in determining the market value. The filler should always be a leaf of good body and much stronger and richer in its flavor than the present type of wrapper. The rich, heavy clay soils of Pennsylvania and Ohio are admirably adapted to produce a rich, heavy filler leaf. Unfortunately, the methods of curing and fermentation are not so controlled as to develop the best quality of the leaf, as is done in Cuba.

The accompanying table gives the average results of the mechanical analyses, showing the texture of a number of subsoils of the Northern cigar tobacco lands:

Mechanical analyses of subsoils.

No. of samples.	District.	Principal grade of leaf produced at the present time.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
9	Connecticut ...	Wrapper and binder.	0.76	2.53	1.03	3.26	9.92	22.62	45.47	10.41	1.36	2.32
5	Massachusetts.	.....do	.61	2.20	.00	.04	.71	10.09	49.26	30.89	2.71	3.31
10	New York	.....do	1.06	2.82	1.94	2.80	9.02	24.47	32.52	15.09	3.09	7.43
5	Pennsylvania,*a*	.....do	2.03	3.23	.67	1.23	5.87	6.62	37.18	23.41	5.21	13.80
10	Wisconsin.....	Binder.....	4.70	2.93	.59	1.09	4.98	10.34	15.68	31.04	6.01	22.76
4	Ohio	Filler.....	3.05	2.67	.39	.76	2.25	5.04	15.36	37.60	6.41	27.52
6	Pennsylvania *b*	.....do	3.61	4.47	.68	.78	.91	2.47	13.89	34.23	9.79	29.27

a River land and shaly limestone.
b Trenton limestone.

It will be seen from the table that the tobacco soils of the Connecticut Valley, both in Massachusetts and in Connecticut, contain on the average considerably less than 5 per cent of clay. These soils are too light in texture for any of the staple farm crops. They are adapted to the quick-growing spring vegetables, but are not used to any great extent for these crops, except immediately around the cities and larger towns. The conditions seem to be peculiarly adapted to this particular grade of wrapper leaf tobacco.

FASHION AS A FACTOR IN THE VALUE OF TOBACCO SOILS.

It must not be forgotten, however, that fashion has much to do in the consumption of cigars. Just at present the demand is for light wrappers and mild-smoking cigars. A few years ago the demand was for heavier cigars, and these light soils of Connecticut had little or no

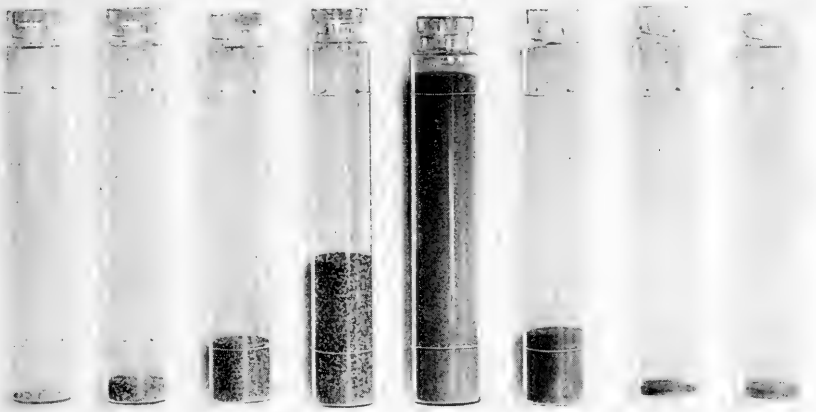
UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF CONNECTICUT.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
1.03	3.26	9.92	22.62	45.47	10.41	1.36	2.32



2-1 1-.5 .5-.25 .25-.1 .1-.05 .05-.01 .01-.005 .005-.0[illegible]

DIAMETER OF THE GRAINS IN MILLIMETERS.

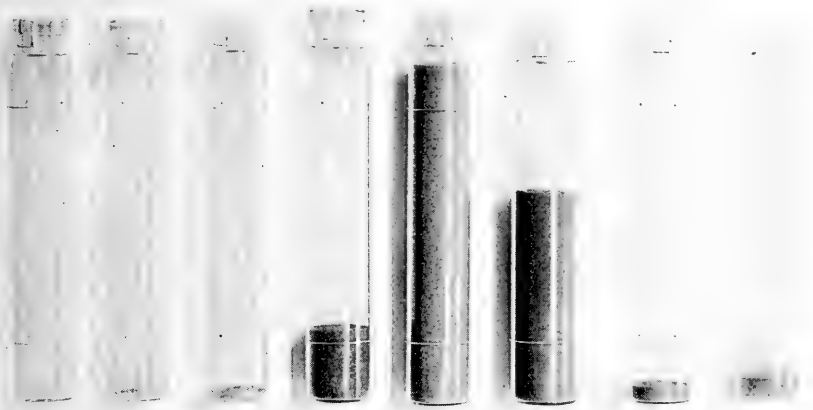
UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF MASSACHUSETTS.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
0.00	0.04	0.71	10.09	49.26	30.89	2.71	6.31



2-1	1-.5	.5-.25	.25-.1	.1-.05	.05-.01	.01-.005	.005-.0001

DIAMETER OF THE GRAINS IN MILLIMETERS.

value then for tobacco and were lying out as waste land. At that time the tobacco was grown mainly on the heavier soils and on the "meadow lands" of the Connecticut Valley. Strangely enough, there is little or no difference in the texture of these meadow soils compared with the light, sandy soils now used for tobacco, except that they usually contain a larger proportion of silt.

They are, however, probably by reason of their structure, very retentive of moisture and contain upwards of from 23 to 27 per cent of moisture, while the finest types of tobacco land in the Connecticut Valley contain only about 7 per cent. These meadow soils are therefore not used for tobacco at present, but if in the course of events the style should change and dark wrappers come into vogue, these lands will again be taken up and the present tobacco lands will have to be abandoned or used for other crops.

PENNSYLVANIA CIGAR TOBACCO LANDS.

The tobacco soils of Pennsylvania are confined mainly to the comparatively narrow belt bordering the Susquehanna River and to the broad expanse of limestone soils typically developed in York and Lancaster counties.

The better class of tobacco lands in Pennsylvania, and those which produce by far the finest wrapper leaf, are the light, alluvial soils along the river, many of them similar in texture to the tobacco soils of the Connecticut Valley. The main crop, however, of the Pennsylvania tobacco has been grown on the limestone soils of York and Lancaster counties. This is a continuation of the great limestone valley extending down through Maryland and Virginia and to the great area of the Trenton limestone formation in Ohio and Kentucky, forming the great blue grass region of these States upon which the white burley tobacco is at present grown.

This limestone soil, as it is exposed in the tobacco districts of Pennsylvania, is a strong clay soil, well adapted to grass, wheat, and corn. It forms one of the most productive areas in the State of Pennsylvania, and in this respect it is markedly different from the tobacco lands of the Connecticut Valley. There is considerable variety in the texture of the soils, as the limestone itself is not pure, but is mixed with shale. The amount of clay, therefore, in these Pennsylvania lands varies from about 13.8 per cent in the river soils and in the very shaly limestone soils to 29.27 per cent on the average in the pure limestone soils. (See Plate V.) The former grade of soils is preferred just at present to the very heavy ones, as they produce a better grade of wrapper leaf. By proper cultivation, close planting, and especially by proper fermentation and grading of the leaf, the quality of the filler grown on the heavy limestone soils could unquestionably be greatly improved.

It has not been feasible for agents of this division personally to examine the soils of the tobacco districts of New York. (See Plate VI.) A large number of soil samples were collected, however, through rep-

resentative growers, whose names were furnished by the Tobacco Growers' Association. The samples were accompanied by full notes upon the character of the soil, the native vegetation, and the quality of the tobacco grown. A number of these soils have been analyzed, and the results show on the average that the soils contain rather more clay than the soils of the Connecticut Valley. They are much lighter in texture than the Pennsylvania tobacco soils.

OHIO CIGAR TOBACCO LANDS.

The cigar tobacco district of Ohio is situated in the southwestern part of the State and includes the country bordering the Miami River, Montgomery, Darke, and Preble counties forming the center of the district. The Miami Valley, in the tobacco area, is from 2 to 5 miles wide, level, and extremely fertile. Bordering the valley are upland rolling hills. Broad terraces extend back from the river in a number of places, giving second bottoms, beyond which come the great rolling red lands upon which tobacco is raised with great success. These soils are well drained, with numerous streams flowing out from between hills. Farther back on the level prairies the land is inclined to be wet and needs thorough underdrainage to be profitably cropped. Throughout the whole tobacco area, underdrainage is practiced to a large extent.

The soil is derived from drift material which has been worked over and modified by subsequent action of water. (See Plate VII.) The underlying rock is the Lower Silurian limestone shale, but it forms no feature of the surface, as it is covered by the drift material. There is quite a variety in the character of the soil, owing to the heterogeneous nature of the material from which it has been derived. The bottom soils are, as a rule, much lighter in character than the upland soils. The second and third bottoms, in cases where they occur, are level terraces. The soils vary much, the black prairie soil and the red silty soil predominating. The soils of the rolling uplands are more uniform in character. The timber is mainly sugar tree, and on this sugar-tree land the finest type of tobacco is produced. The sugar-tree soil is a thin, uniform, silty soil, with red clay or silty subsoil. The lower levels of this upland contain considerable areas of black land, which is considered the best land in the district for general agricultural purposes, but which produce too heavy a leaf and one of poor flavor, so that it is not desirable for tobacco culture. Wheat, corn, hay, and tobacco constitute the staple crops of the district, although on the sandy river lands truck and fruit growing are carried on to a large extent.

Three types of cigar leaf are raised in this district. The most popular at present is the Zimmer Spanish. This has small leaves about 12 inches long, of very fine texture and flavor. It produces about 1,000 pounds per acre. The old Ohio seed leaf is a very large, heavy leaf, 20 inches or more in length, and produces from 1,500 to 2,000 pounds per acre. This is little grown in the district at the present time. The

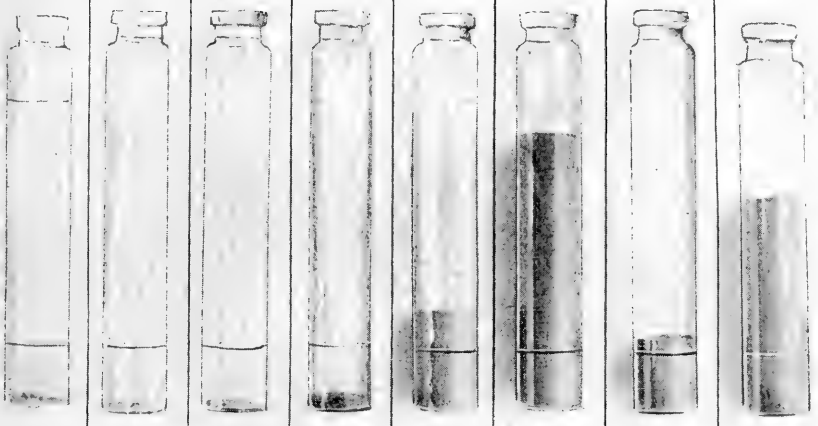
UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF PENNSYLVANIA.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand*	*Very fine sand.*	*Silt*	*Fine silt*	*Clay*
0.68	0.78	0.91	2.47	13.89	34.20	9.79	2.27



2-1 mm.	1-.5 mm.	.5-.25 mm.	.25-.1 mm.	.1-.05 mm.	.05-.01 mm.	.01-.005 mm.	.005-.000 mm.

DIAMETER OF THE GRAINS IN MILLIMETERS.

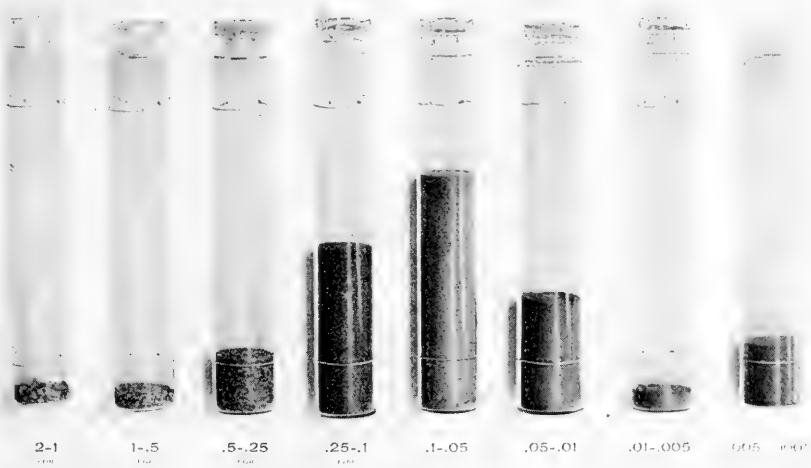
UNITED STATES DEPARTMENT OF AGRICULTURE.

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF NEW YORK.

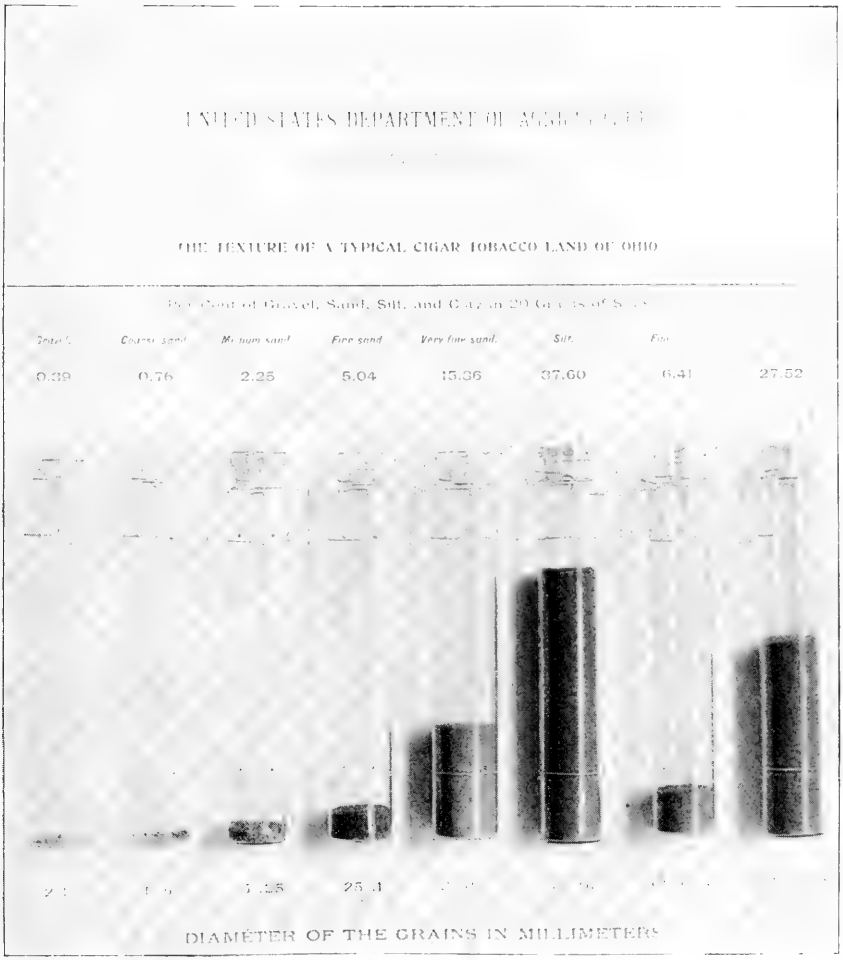
Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
1.94	2.80	9.02	24.47	32.52	15 09	3.09	7.43



2–1 mm.	1–.5 mm.	.5–.25 mm.	.25–.1 mm.	.1–.05 mm.	.05–.01 mm.	.01–.005 mm.	.005 .00? mm.

DIAMETER OF THE GRAINS IN MILLIMETERS.


UNITED STATES DEPARTMENT OF AGRICULTURE
THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF OHIO
Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Soil
Coarse sand
Medium sand
Fine sand
Very fine sand.
Silt.
0.39
0.76
2.25
5.04
15.36
37.60
6.41
27.52
DIAMETER OF THE GRAINS IN MILLIMETERS

Little Dutch has a thick, short, narrow leaf which produces about 1,200 pounds per acre and was at one time very extensively grown. These tobaccos are grown almost exclusively for filler purposes.

It will be seen from the table already given that these soils have a large percentage of clay.

WISCONSIN TOBACCO SOILS.

The Wisconsin tobacco is used both as a wrapper and filler leaf to some extent, but it is known in the markets as a binder State. The character of the leaf is midway between the Connecticut wrapper and the Pennsylvania filler.

The tobacco is grown in the southern part of the State on the prairies and oak openings. The prairies are a dark, rich loam, resting on a rather heavy silt or clay. The oak openings have a loam lighter in color but about the same in texture. Both are gently rolling and, as a rule, have good surface and under drainage. In texture the Wisconsin lands come between the Connecticut and the heavier limestone soils of Pennsylvania. (See Plate VIII.)

SOILS OF THE SOUTHERN CIGAR TOBACCO DISTRICTS.

Tobacco has been grown for many years in Florida, especially in the western part of the State. The tobacco grown there is mainly the Cuban type of cigar wrapper and filler, with some Sumatra lately introduced. The recent scarcity of Habana tobacco has given a great impetus to the cultivation of the crop in Florida, and very extensive arrangements have been made to introduce it to a large extent in the central part of the peninsula.

The accompanying table gives the average texture of the cigar tobacco soils of the Southern States:

Mechanical analyses of subsoils.

Number of samples.	Locality.	Grade of leaf.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)	Silt (0.05–0.01 mm.)	Fine silt (0.01–0.005 mm.)	Clay (0.005–0.0001 mm.)
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
29	Florida, peninsula	Main-crop wrapper, binder filler. Sucker-crop filler.	0.62	1.73	0.26	2.60	18.94	51.53	18.95	1.33	0.59	3.21
4	Florida, Gadsden County.	Same grades[a]	.58	2.68	.68	4.85	20.03	45.53	14.93	4.15	.80	5.15
4	.....do.....	Same grades, subsoil.	1.18	5.69	.54	1.94	8.81	35.15	13.39	3.37	1.07	29.30
3	Texas.....	Same grades....	.23	.46	1.63	6.58	24.55	37.05	14.16	8.90	1.59	4.70
1	California	Wrapper and filler.	1.28	3.91	2.94	5.49	19.44	27.33	12.85	13.37	2.18	10.77
8	Sumatra	Wrapper	7.48	15.41	1.41	4.39	9.95	16.15	17.17	19.11	4.35	5.00
6	Cuba (Vuelta Abajo).	Wrapper and filler.	.74	3.80	4.06	4.62	8.28	21.67	43.09	6.53	1.82	5.69
4	Cuba (Remedios).	Same, heavier...	5.17	10.01	1.31	.36	.52	4.51	14.97	21.24	9.37	32.32

[a] A light loam, averaging 12 to 18 inches deep, overlying the red clay.

CIGAR TOBACCO SOILS OF WESTERN FLORIDA.

The soils of the older Gadsden County district in the western part of the State are very different from any others which occur in Florida. They are the characteristic "red-land" soil of the Lafayette formation, similar to those found at Wedgefield and Aiken, S. C., which extend south through Georgia and form some of the western counties of Florida, with Quincy as a center. The soil is a light loam resting on a very strong red clay. The clay is exposed in all cuts and in the washings of the land, and is usually found from 8 to 18 inches below the surface. The country is quite rolling, well wooded with hard-wood trees, and in the early spring it has the fresh green appearance of the country in the Valley of Virginia and in the tobacco area of Pennsylvania.

Both the Cuban and Sumatra types of tobacco are grown here, and both are used for wrappers as well as fillers. Unlike the imported Sumatra tobacco, the tobacco grown in Florida from Sumatra seed loses much of its bitter taste, while the sucker crop and inferior leaves are cured up with more body and are much better adapted to filler purposes.

A single plantation in Gadsden County had last year 900 acres in tobacco and, with the crops bought of the farmers in the surrounding country, the company owning the plantation cured and packed upward of 2,500 bales. The season is so long that two crops of tobacco can be produced in the same year, or two or three sucker crops can be grown after the main cutting has been taken. The sucker crop is stronger, heavier, and darker, and is used only as a filler.

It will be seen from the table that these red subsoils contain about 30 per cent of clay, and therefore compare in texture with the soils of the Ohio seed leaf district and with the stronger soils of Pennsylvania. The top soil, however, is quite a light loam, and the character of the land as a tobacco soil depends largely upon the depth and character of the red-clay subsoil. These lands are notable in another respect, which seems to be characteristic of this formation generally, namely, they maintain on an average only about 8 or 10 per cent of moisture against 20 to 22 per cent maintained by the Pennsylvania and the Ohio lands.

CIGAR TOBACCO SOILS OF THE FLORIDA PENINSULA.

Outside of this area in western Florida most important developments have recently been made around Ocala, Bartow, and Fort Meade. At Fort Meade particularly there is a well-organized company, managed by Cubans, with a large area in tobacco. The first crop was made last year. This was cured and fermented according to the Cuban processes, and without waiting to mellow with age, as is necessary to bring out the finest qualities of a tobacco, the crop was sold at Tampa for a very satisfactory price.

Tobacco growing on the peninsula is essentially a new industry, and comparatively little experience has been available except what has

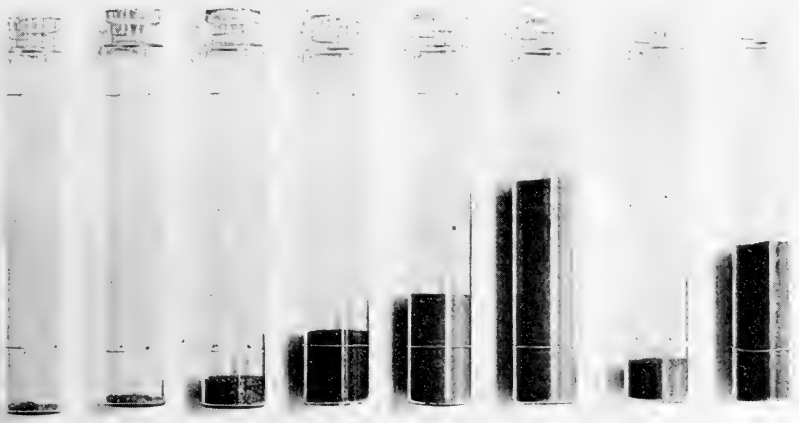
UNITED STATES DEPARTMENT OF AGRICULTURE.

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL CIGAR TOBACCO LAND OF WISCONSIN.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
0.59	1.09	4.98	10.34	15.68	31.04	6.01	22.76



2-1 mm.	1-.5 mm.	.5-.25 mm.	.25-.1 mm.	.1-.05 mm.	.05-.01 mm.	.01-.005 mm.	.005-.0001 mm.

DIAMETER OF THE GRAINS IN MILLIMETERS.

been collected during the past year. The industry has been developed upon the post-oak lands around Ocala, which are considered the best type of tobacco lands in that locality, and upon the hammock lands at Bartow and Fort Meade. There are large areas of these soils in the State which can be developed through the tobacco interest, and there is every reason to believe that the venture will be very successful. There is no reason to doubt that many of the pine lands are well suited to tobacco.

There is very little difference in the texture of the post-oak lands, the hammock lands at Fort Meade, and the pine lands. The difference in the soil which causes the distribution in the forest growth appears to be mainly due to the difference in the water content of the soils, as will be explained in another place. The soils are all very light and sandy. It will be seen from the table that they contain on an average less than 4 per cent of clay and less than 6 per cent of silt, fine silt, and clay. They contain over 50 per cent of "fine sand," so that they are relatively rather coarse and open. Notwithstanding this open texture, the hammock soil at Fort Meade contains on an average about 8 per cent of water throughout the season, which is about as much as the tobacco lands of the Connecticut Valley contain. This water content, moreover, is for some reason more uniform, and the land can go for some time without rain with no serious injury to the crops. Nevertheless, the planters have been greatly benefited by judicious systems of irrigation through overhead sprays. By thus keeping the plants continually and rapidly growing the crop will mature in forty-five days from the time the plants are set out. On account of the length of the season tobacco can be grown almost continually through the year, and crops can be set out almost every month in the year. Usually two or three crops are made and two or three sucker crops are produced. There is undoubtedly a vast area of land in Florida suited to tobacco, and the climate is unquestionably favorable for the production of a very fine quality of leaf. A very intelligent method of growing and fermenting is being practiced, and there is no reason why the industry should not be successful.

For a great commercial success there must be a large quantity of tobacco for the manufacturers to depend on in maintaining particular brands of cigars. The method of curing and sweating can be more economically and successfully done in large bulk than in small quantities. The experience of the growers in Cuba and Sumatra, that the tobacco grown near the water has an inferior burn, must be given due consideration in extending the industry toward the coast and developing it in the lake regions of the State.

It has not been feasible for agents of the Department to make a personal investigation of the soils of the new tobacco districts which are being developed in Texas and in southern California. A number of samples of soil have been received from prominent growers from both

States and have been analyzed in the Division. The results as given in the table show that the soils agree very well with the finer grade of cigar tobacco lands. The general climatic conditions, however, are different, and great care and judgment should be used in selecting suitable locations for the industry.

BRIGHT TOBACCO LANDS.

The bright yellow tobacco used for cigarettes, plug wrappers, fillers, and cutting is grown mainly in Virginia, North Carolina, South Carolina, and East Tennessee. (See Plate IX.) It is, however, produced in smaller quantities in several of the other Southern States. Wherever it is grown the industry is confined to a certain type of soil. The conditions in Granville and Buncombe counties, N. C., and around Danville, Va., are typical of the conditions upon which the industry is based.

The typical bright tobacco land consists of a loose, porous sand, containing not more than 8 or 10 per cent of clay. This sand must be at least 12 inches deep. Many areas are cultivated in which the sand extends to a depth of 5 or 10 feet or more, and a very fine quality of tobacco is produced. As a general rule the less clay the soil contains and the deeper the sand the finer the quality of the tobacco, providing it keeps growing continuously. The trouble with such very light soils is that they produce but a small yield per acre and there is danger of drought, which would check the growth of the plant and cause the leaves to thicken. It is for this reason, therefore, that it is preferred to have the sand underlaid at a depth of 18 to 22 inches by a heavier clay, which tends to conserve the moisture supply of the soil and renders the plant less subject to the injurious effects of what would otherwise prove a severe drought.

The clay which underlies the bright tobacco lands of Virginia and North Carolina is the same as that upon which the heavy manufacturing and export tobacco is grown. Where this clay is exposed to the surface the heavy type of tobacco is produced; where it is covered from 12 to 20 inches with fine-grained sand the bright tobacco is produced the most profitably.

The country throughout these regions is generally quite rolling, with numerous "draws," or natural ditches, and streams, so that the land is well drained. The sandy covering is usually found on the ridges or slightly elevated plateaus, while the heavy clay may be exposed within a few feet, and the two types of tobacco successfully grown upon the same farm. For this reason it has never been easy to define the areas of the two types of tobacco, for they are both grown in the same counties and frequently on the same farm.

The accompanying table shows an average of 44 samples of the subsoils of the bright tobacco lands which have been examined, and they contain about 8 per cent of clay. This is quite uniform, the extreme range for profitable tobacco culture being probably between 6 and 12

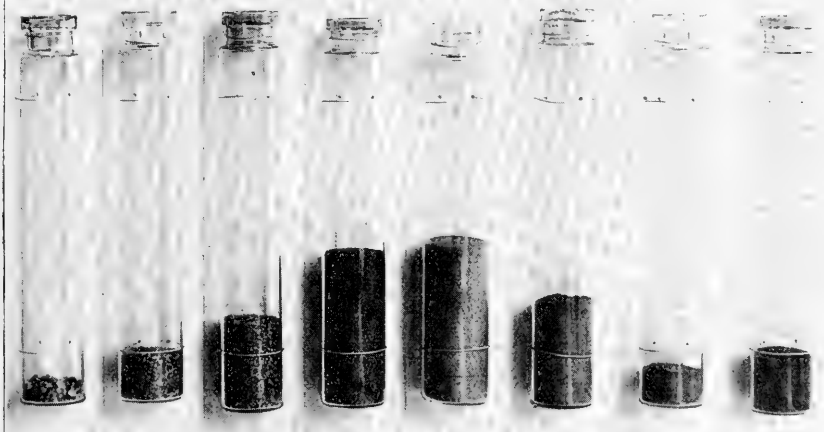
UNITED STATES DEPARTMENT OF AGRICULTURE.

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL BRIGHT TOBACCO LAND OF VIRGINIA AND NORTH CAROLINA.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
2.57	6.39	13.67	22.02	23.45	14.08	5.43	8.23



2-1 mm.	1-.5 mm.	.5-.25 mm.	.25-.1 mm.	.1-.05 mm.	.05-.01 mm.	.01-.005 mm.	.005-.0001 mm.

DIAMETER OF THE GRAINS IN MILLIMETERS.

per cent. The character of the red clay subsoil is also shown for the manufacturing tobacco district of Virginia:

Mechanical analyses of subsoils.

Number of samples.	Locality.	Description.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
44	Virginia and North Carolina.	Bright yellow...	1.10	2.24	2.57	6.39	13.67	22.02	23.45	14.08	5.43	8.23
55	Kentucky and Tennessee.	Export	2.23	3.00	.39	.56	.73	1.93	9.50	52.50	6.28	22.59
30	Kentucky and Ohio.	White burley...	3.48	4.42	.64	1.63	1.44	1.22	7.04	39.77	9.36	31.62
21	Virginia.....	Manufacturing .	5.55	7.87	1.22	2.05	3.47	6.94	9.45	11.29	7.67	44.38

As the relation of the physical properties of the soil is not thoroughly understood or practically recognized by the growers, a large amount of land is now cultivated in bright tobacco which is not suited to this plant and which does not produce a good grade. On the other hand, there are large areas not at present under cultivation which could be developed into very fine tobacco lands. The typical bright tobacco soil is of little value for any of the staple farm crops, although, when suitably located near transportation lines, it is admirably adapted to the production of early vegetables, watermelons, and sweet potatoes.

MANUFACTURING TOBACCO LANDS OF VIRGINIA AND NORTH CAROLINA.

Before the development of the white burley industry the strong red-clay soils around Charlottesville, Lynchburg, and Danville, Va., and in Granville and neighboring counties of North Carolina were extensively used for the production of the typical Virginia manufacturing and export tobacco. These areas are located mainly on the gabbro, gneiss, and Lafayette clays. The material is quite uniform, the subsoils containing from 30 to 50 per cent of clay. (See Plate X.) They are very productive and are well suited to the staple farm crops, such as grass, wheat, and corn. Since the introduction of the White Burley tobacco, however, there has been a very noticeable decrease in the acreage in Virginia, especially of the soil adapted to the heavier types of tobacco, and the cultivation of tobacco on these lands has been almost abandoned. The industry is confined now principally to small areas along rivers, streams, or creeks and upon recent deposits which can not well be referred to any of the older geological formations and which can not well be examined without a detailed examination of the larger part of the State.

The same remark holds true in regard to the tobacco industry in North Carolina. A great change has taken place very recently, and the acreage devoted to the heavier type of tobacco has been considerably reduced. These heavy clay lands are being used for other crops,

and the tobacco is grown upon limited areas in certain districts where the quality of the tobacco produced is such as to make it reasonably profitable. Here, again, it is impossible to make any statement in regard to the tobacco district without making a detailed study of the soils of the State. There seems to be no general type of soil. The tobacco grown upon the soil which was formerly cultivated most extensively is no longer profitable.

The table shows that these soils, which a very few years ago would have been considered the typical manufacturing tobacco land, contain on an average over 40 per cent of clay and have thus a larger content of clay than the soils of any other tobacco district.

THE WHITE BURLEY TOBACCO LANDS OF KENTUCKY AND OHIO.

The white burley tobacco is confined to the well-marked type of soil of the Lower Silurian limestone in central and north central Kentucky and the adjacent counties of Ohio. This embraces the blue grass region of Kentucky, and it is upon these fine, fertile, blue grass soils that the white burley is grown. (See Plate XI.)

The country has the general appearance of an old limestone region, generally rolling and with frequent depressions, sinks, and caves. The hills, 400 to 500 feet high, bordering the Ohio River and extending from 6 to 10 miles back, are generally steep, and fields are often cultivated in tobacco with slopes as great as 45 degrees. The valleys are narrow, winding, and V-shaped, and no bottom lands are found excepting along the larger rivers and streams. The country back from the hills on the Ohio side is generally rolling. The drainage is excellent.

The tobacco lands on the Ohio side are all within the hills on the Ohio River and confined to two kinds of soil, popularly known as the "sugar-tree land" and "beech land." The beech lands lie low in the valley and are inclined to be wet, and do not produce the finest quality of leaf. The sugar-tree lands lie well up in the valleys and are considered the typical white burley soil. Back from the hills, in Ohio, the soil becomes white, wet, and "crawfishy" and does not produce a fine quality of burley. These flat lands are of drift origin, timbered with white oak, and usually need to be underdrained in order to produce well.

In Kentucky the tobacco area is confined to the Trenton and Hudson River limestones. Phosphatic limestone is frequently met with, while chert occurs only sparingly through the area.

The soils are all heavy clay of a uniform deep red color. The depth of the soil varies considerably, the rocks outcropping in many places, especially on the hillsides. Around Lexington the rock is on the average about 6 feet below the surface, while in the northern counties it is at a greater depth than this. The top soil is of light, loamy character, not inclined to form into clods when properly cultivated. The soil is adapted to grass, wheat, and corn, and has made famous the world over the blue grass region of Kentucky. It is seen from the table (page 25) that the subsoil contains on an average about 30 per cent of clay.

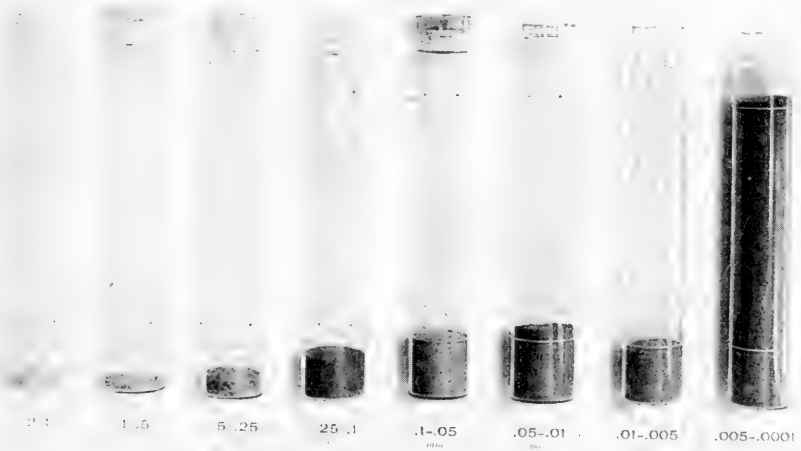
UNITED STATES DEPARTMENT OF AGRICULTURE.

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL MANUFACTURING TOBACCO LAND OF VIRGINIA.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	Coarse sand.	Medium sand	Fine sand	Very fine sand.	Silt.	Fine silt.	Clay
1.22	2.05	3.74	6.94	9.45	11.29	7.67	44.38



DIAMETER OF THE GRAINS IN MILLIMETERS.

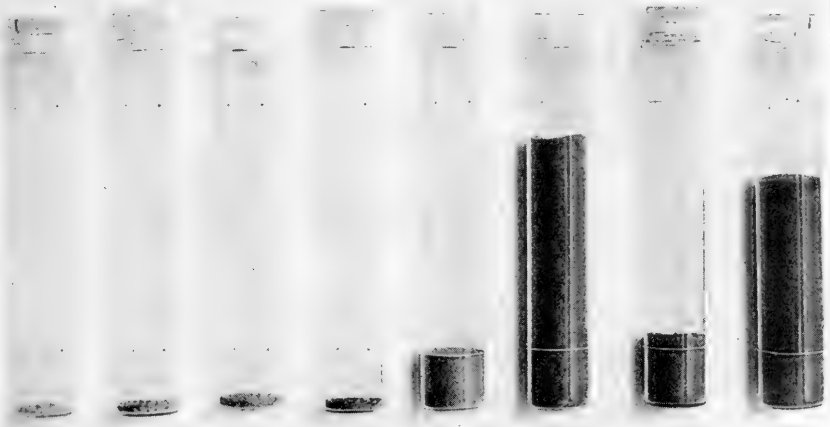
UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL BURLEY TOBACCO LAND OF KENTUCKY AND OHIO.

Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay.*
0.64	1.63	1.44	1.22	7.04	39.77	9.36	31.62



2-1	1-.5	.5-.25	.25-.1	.1-.05	.05-.01	.01-.005	.005-.0001

DIAMETER OF THE GRAINS IN MILLIMETERS.

EXPORT TOBACCO LANDS OF KENTUCKY AND TENNESSEE.

The dark, heavy varieties of tobacco adapted to the export trade are extensively grown in western Kentucky and Tennessee on silty soils which are quite fertile in character. The whole area is divided into a number of districts, such as Clarksville, Hopkinsville, Jackson's Purchase, and the Green River district, but the character of the soil is quite uniform in all of these; the class of tobacco grown is generally the same. In each district the types of tobacco adapted to the foreign markets are grown, the types appearing to depend less upon the character of the soil than upon the character of the season, the cultivation, and curing of the crop.

The general character of the country is level or gently rolling, with broken and hilly country along the large water courses. Much of this land was formerly devoid of forest growth and called barrens. It was a prairie region, with trees only along the water courses, and prairie fires are supposed to have annually swept over the country. Since the country has become settled and the large fires prevented, a luxuriant forest growth of hickory and oak has covered the land. The soils are classed by Safford as "rich barrens." The term "barrens" is not to be taken literally to mean poor soil.

The counties of Kentucky bordering the Tennessee line are generally level, with occasional stretches of rugged country along the water courses, but with a soil of quite uniform texture. The southern boundary of the tobacco area is the Cumberland River, while the northern boundary is the carboniferous hills of Kentucky. The tobacco district stretches around these hills, following the subcarboniferous strata as far as the Ohio River on either side.

SOILS ARE HALF SILT.

The soils are mainly derived from the St. Louis group of the subcarboniferous, which are mainly limestone. (See Plate XII.) The disintegrated material is so thick that the rock is seldom exposed, except where the material has been recently eroded. The drainage is excellent, and numerous sinks and caves are found through the country. The soil, whether upland or bottom, level or hilly, is usually of a decided silty character, closely approaching loess in texture. The subsoil has a typical bright red color, which extends to a considerable depth. Where this red color changes to a pale yellow or white, the land becomes crawfishy and can only be profitably cultivated after underdrainage. The lack of color indicates a deficient drainage within recent times and is due to the deoxidation of the iron compound in the decay of organic matters and the absence of sufficient oxygen from other sources to provide for the proper oxidation of the organic matter.

It will be seen from the table that these soils contain on an average about 50 per cent of silt. It ranges from about 40 to 60 per cent, some samples exceeding even this latter figure. With all such silty soils great care has to be taken in their cultivation. They are naturally

quite fertile, but deteriorate very rapidly and excessively unless the fertility is maintained by judicious methods of cultivation and of cropping. Many of these tobacco soils have been run down with constant cropping in tobacco, but some of the worst cases have recently been brought up by rotation with wheat, corn, and clover, together with a judicious application of fertilizers, especially phosphatic manures. The value of careful tillage is becoming more apparent in the whole area, and it is generally recognized now that the quality of the tobacco and the price it brings on the market can be very materially influenced by the kind and condition of the cultivation.

The soils of the Lower Green River district lie within the carboniferous strata along the Green River, and, although these are underlaid with sandstone, the soil proper presents the uniform silty character of the other export tobacco districts.

The Jackson's Purchase region, lying between the Tennessee and Mississippi rivers, is made up mainly of loess and loam, and has the same silty character as the other districts and produces essentially the same type of tobacco.

The accompanying diagram (Plate XIII) illustrates graphically the relative proportion of the sand, silt, and clay in the soil adapted to different classes and types of tobacco, and shows, upon careful study, a marked relation between the texture of the soil and the grade of tobacco produced. A detailed statement of the analyses upon which these summaries are based is given in the table at the end of the bulletin.

THE RELATIVE WATER CONTENT OF TOBACCO SOILS.

It has been stated that a classification can be made of the tobacco soils in accordance with their texture, as this determines to a large extent the water content of the soils and the amount of water at the disposal of the crop. The texture is not the sole factor, however, which determines the water content; so it has been necessary to keep actual records of the water content of some of the principal tobacco soils. Only preliminary work has been started in this, as a satisfactory method for the ready determination of the water content of the soils has only just been completed. So far as these records have been taken they show a very great difference in the soils adapted to the different classes of tobacco, and in a general way agree with the texture of the land.

The earlier records were made by taking a sample of soil in a brass tube, driven from the surface of the ground to a depth of 12 inches. The sample was transported to the laboratory without any evaporation and there dried at a temperature of 110° C. and the amount of water determined by the loss in weight. The investigations this year have been made by the electrical method described in Bulletin No. 6.

These records must be maintained through a number of years before reliable data can be established to show the average water content of the soils, as well as to show the normal variations which may occur in

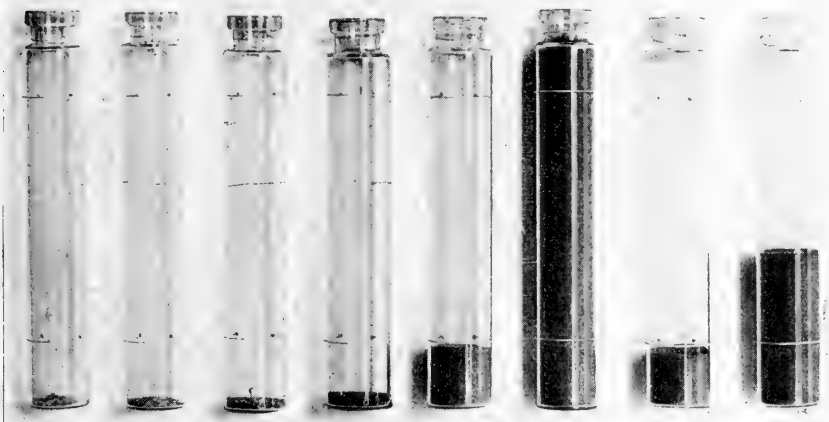
UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF SOILS.

THE TEXTURE OF A TYPICAL EXPORT TOBACCO LAND OF KENTUCKY AND TENNESSEE.

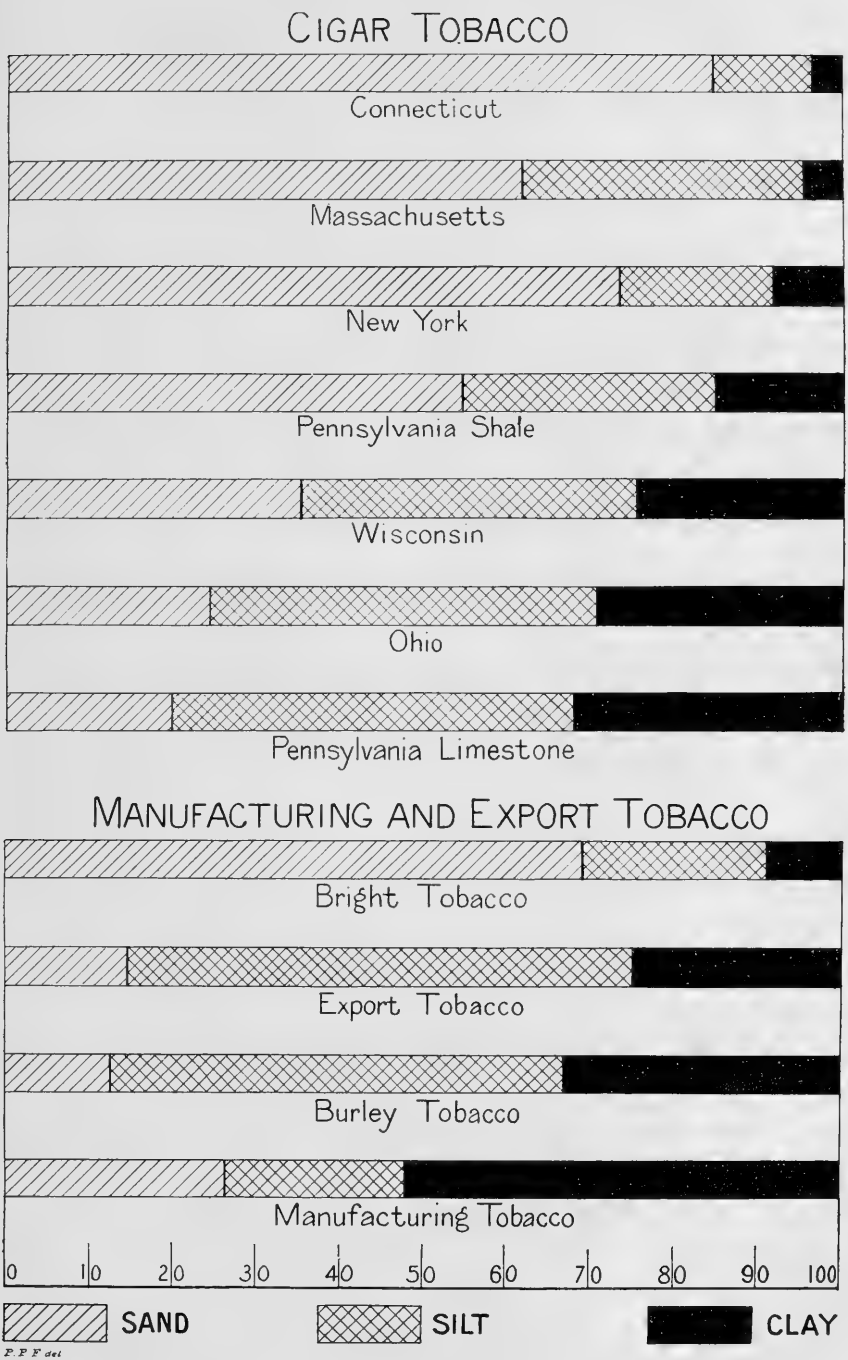
Per Cent of Gravel, Sand, Silt, and Clay in 20 Grams of Subsoil.

Gravel.	*Coarse sand.*	*Medium sand.*	*Fine sand.*	*Very fine sand.*	*Silt.*	*Fine silt.*	*Clay*
0.39	0.56	0.73	1.93	9.50	52.50	6.28	22.59



2–1 mm. | 1–.5 mm. | .5–.25 mm. | .25–.1 mm. | .1–.05 mm. | .05–.01 mm. | .01–.005 mm. | .005–.001 mm.

DIAMETER OF THE GRAINS IN MILLIMETERS.


CIGAR TOBACCO
Connecticut
Massachusetts
New York
Pennsylvania Shale
Wisconsin
Ohio
Pennsylvania Limestone
MANUFACTURING AND EXPORT TOBACCO
Bright Tobacco
Export Tobacco
Burley Tobacco
Manufacturing Tobacco
0
10
20
30
40
50
60
70
80
90
100
SAND
SILT
CLAY
P. P. F. del.

the water content without danger to the plant. At the same time sufficient work has been done to give an idea of the mean relative water content of these different soils, under the meteorological conditions which have existed. This water content is sensibly the same for several of the soils in any one season.

The amount of water a soil contains depends largely, as has been stated, upon the texture and structure and is influenced of course by the character of the season. It varies from day to day, and these variations are exceedingly important in their effects upon the crop. The term "mean water content," therefore is only to be used as a measure of the relative water-holding capacity of the soil under similar meteorological conditions.

MEAN WATER CONTENT OF THE NORTHERN CIGAR TOBACCO SOILS.

Tobacco soils of the best grade in the Connecticut Valley maintain on an average about 7 per cent of water throughout the season. There are many soils cultivated in tobacco which average 10 or 12 per cent, but these do not produce a tobacco leaf of the finest texture and most desirable quality for the present market. On the other hand, there are soils cultivated in tobacco which maintain less water than this, and while in favorable seasons, when the tobacco is kept constantly growing, they produce a very fine and delicate leaf, it is not on the whole a safe or economical condition under which to grow the plant on account of the small yield per acre and the injury liable to occur in dry seasons. The meadow lands of the Connecticut Valley, which were formerly cultivated in tobacco when a dark, heavy leaf was in demand, contain on an average from 20 to 28 per cent of water. As already stated, these soils are entirely unfit for the production of the grade of tobacco necessary to meet the present market demands.

The tobacco soils of Pennsylvania, as already explained, are heavier than those of the Connecticut Valley and maintain on an average about 18 per cent of water. The present season has been unusually wet, and the average this year has been 4 to 5 per cent higher, but as a result of three years' observations 18 per cent can safely be taken as the mean water content of the average tobacco soil of the limestone area of the Pennsylvania district.

Soils which produce the best wrapper leaf in Pennsylvania are those which have the lightest texture and contain the smallest water content, while the heaviest limestone soils maintain on an average 22 to 23 per cent of water and produce mainly a heavy, strong filler leaf.

The soils of the tobacco district of Ohio are as heavy in texture as the limestone tobacco lands of Pennsylvania. They have maintained on an average the present season rather more than 27 per cent of water. It is probable that the mean water content of these soils in an average season would amount to about 23 to 24 per cent of water. The tobacco grown under these conditions is used almost exclusively as a filler leaf.

No records have been kept of the water content of the tobacco soils of New York or Wisconsin.

It is unquestionably true that the texture of the soil and the meteorological conditions, with the resultant water content, determine to a marked extent the character and grade of leaf which can be produced. In this, as in all other agricultural lines, the aim should be to recognize the conditions and adopt the crop, the method of cultivation or fermentation, and the grade of leaf which those conditions are best adapted to produce. If the general character of the soil in a locality is adapted to the wrapper leaf, use only such soils as may be reasonably expected to give the best wrapper leaf. If, on the contrary, the soils of the district are adapted only to filler leaf, use only such of the soils as are best adapted to this grade and plant, cultivate, manure, and ferment the crop for the specific purpose of producing a filler leaf of superior quality. Most of the tobacco soils of the Northern States will not produce equally good fillers and wrappers.

WATER CONTENT OF THE FLORIDA TOBACCO SOILS.

Records have been kept during the present season of the moisture conditions in the soils of the Gadsden County district of West Florida and of the newer tobacco district of Fort Meade, in the peninsula. The mechanical analyses showed that the tobacco land in western Florida consisted of a light loam about 12 inches deep resting on a heavy red clay which is naturally well drained. The hammock soil of Fort Meade is, on the other hand, a very light sandy soil, extending down to a very considerable depth. Both soils produce a hard wood growth. Strange to say, in spite of the great difference in the texture of the subsoil, the soils of these two localities have maintained during the present season almost identically the same amount of moisture. The average water content of the soil at Fort Meade, for a period of four months, was 8.6 per cent, while the mean water content of the soil at Quincy for the same time was 8.26 per cent. It is a surprising thing to find that these soils maintain about the same amount of water, but this is in line with the general facts that the hammock soils of Florida maintain very much more water than would be expected from their texture, or than is maintained by soils of similar texture further north along the Atlantic Coast. This matter of the relatively large amount of the water content of the hammock soils of Florida will be discussed in a separate bulletin.

No records have been kept of the moisture conditions in the tobacco soils of Texas or of California, and unfortunately none have been kept in the tobacco soils of Sumatra and Cuba.

WATER CONTENT OF THE SOILS OF THE MANUFACTURING AND EXPORT TOBACCO DISTRICTS.

As in the northern cigar tobacco districts, it will be seen that the texture of the soil and the water content appear to determine the type

of tobacco produced. The typical soils for the bright yellow tobacco of Virginia, North Carolina, and East Tennessee maintain on an average about 7 per cent of water. Where the soils contain less than this the leaf is inclined to be thinner in texture and to have a better color, but the yield per acre is small, and the most economical conditions on the whole are maintained by these soils having from 7 to 8 per cent of clay and maintaining on an average about 7 or 8 per cent of water. As the soil becomes heavier in texture and the amount of water increases, other grades and types of tobacco are produced.

The export tobacco lands of Kentucky and Tennessee contain about 22 or 23 per cent of clay, and as a characteristic feature they contain from 40 to 60 per cent of silt. These soils contain on an average about 15 per cent of water, although the soil at Hopkinsville, Ky., this year, which had an unusually wet growing season, maintained on an average about 3 per cent more than this.

The characteristic soil of the limestone area of Kentucky, adapted to the white burley tobacco, as the result of several years' investigation, may be said to maintain on an average about 20 per cent of water. The present season being unusually wet, the water content in the soil at Lexington, Ky., was about 3 per cent above the normal.

Records have not been kept in the manufacturing tobacco soils of Virginia, but from investigations which have been made on adjacent lands it is probable that the mean water content of these soils, having as much as 40 per cent of clay, will not be far from 20 or 22 per cent of moisture.

RECORDS AS A BASIS FOR IRRIGATION.

The object of the daily record of moisture in the soil is not only to determine the average amount soils contain, but to determine the normal as well as the extreme variation. It is known, for example, that in the white burley limestone soil at Lexington, Ky., if the water content is maintained for any length of time above 25 per cent the land will be too wet for crops, while, on the other hand, if it falls to 15 per cent it will be too dry, and anything less than this will constitute a drought. The extent and duration of the drought will be apparent if the results are plotted on cross-section paper. It is possible from such records, therefore, to show the character of a season. The methods of cultivation should have for their prime object the maintenance of the water supply above the line of drought, so that the growth of the plant shall receive no check. If this can not be done by the ordinary method of cultivation, irrigation must be resorted to upon such occasions, if the crop is to be maintained in its best condition.

It will require years to establish satisfactory normals for any soil, but the normal variation which may occur without detriment to the crop can probably be approximately established in a very much shorter time. This line of work is being vigorously pushed now.

TABLES OF THE WATER CONTENT OF TOBACCO SOILS.

Following are the tables showing the records of the water content of tobacco soils so far obtained.

Cigar tobacco land.

POQUONOCK, CONN.

Day.	July, 1895. Moisture. *a*	Day.	July, 1895. Moisture. *a*	Day.	July, 1895. Moisture. *a*	Day.	July, 1895. Moisture. *a*
	Per cent.		*Per cent.*		*Per cent.*		*Per cent.*
1	8.8	9	12.6	17	8.8	25	8.2
2	8.7	10	12.4	18	8.9	26	9.2
3	9.0	11	11.4	19	8.6	27	10.1
4	9.6	12	11.4	20	8.5	28	10.4
5	10.5	13	13.4	21	8.9	29	9.5
6	11.1	14	14.4	22	9.4	30	8.9
7	11.2	15	13.1	23	9.6	31	8.7
8	11.4	16	11.1	24	8.5		

a At depth 0–12 inches.

WINDSOR, CONN.

Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*		Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.		Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per ct.	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*		*Per ct.*	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*
1	.....	.....	12.1	Trace	13.3	.....	17	14.4	.....	10.3	.....	10.2	.....
2	.....	.....	11.6	.....	12.5	Trace	18	14.3	.....	10.7	0.13	9.9	.....
3	.....	.....	11.1	.....	12.4	0.01	19	14.2	.....	10.6	.....	10.1	0.10
4	.....	.....	11.1	Trace	12.3	.....	20	14.1	.....	11.6	.33	10.1	.....
5	.....	.....	11.0	0.03	12.0	.....	21	16.5	0.32	11.0	.....	11.1	.36
6	.....	.....	11.0	.....	11.9	.....	22	15.4	.....	10.8	.....	13.3	1.70
7	.....	.....	10.8	.....	11.8	.01	23	14.8	.....	10.8	.....	13.1	.42
8	.....	.....	10.8	.....	.....	Trace	24	15.6	.25	10.7	.....	10.5	Trace
9	.....	.....	15.3	2.35	.....	.....	25	14.9	.92	10.8	.....	10.2	.11
10	.....	0.12	10.8	.08	.....	.....	26	13.1	.....	10.7	.....	.....	.12
11	.....	.07	10.3	.....	.....	.....	27	12.2	.....	10.7	.....	10.0	.01
12	.....	.42	10.1	.....	.....	.....	28	12.4	.21	.....	.....	10.3	.18
13	.....	2.17	10.1	.....	13.7	6.27	29	12.3	.....	10.6	Trace	10.6	3.02
14	14.7	.15	10.2	.15	11.0	2.57	30	12.2	.....	14.9	.99	10.2	.04
15	14.5	.....	10.1	.04	10.4	.05	31	13.5	.53	.....	.....	10.0	.18
16	14.4	.....	10.3	.....	10.1	.....							

a Determined by the electrical method at depth 3 to 6 inches.

EAST HARTFORD, CONN.

[Light wrappers and binders.]

Day.	May, 1895. Moisture. *a*	June, 1895. Moisture. *a*	July, 1895. Moisture. *a*	August, 1895. Moisture. *a*	Day.	May, 1895. Moisture. *a*	June, 1895 Moisture. *a*	July, 1895. Moisture. *a*	August, 1895. Moisture. *a*
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	.....	16.6	15.9	13.2	17	13.9	15.8	13.8	15.3
2	.....	17.5	14.9	12.3	18	13.2	15.6	13.5	17.3
3	.....	16.2	15.4	11.4	19	16.1	15.4	13.1	16.2
4	.....	14.8	17.3	10.9	20	16.0	15.2	12.9	15.3
5	.....	15.2	16.4	10.7	21	15.7	15.1	12.9	14.8
6	.....	16.4	15.6	10.9	22	15.3	14.9	12.9	14.2
7	.....	16.8	15.2	16.8	23	15.0	14.7	13.2	13.9
8	16.4	15.2	15.4	14.4	24	15.2	14.0	12.2	13.6
9	17.9	15.3	15.6	13.0	25	16.0	13.4	11.9	13.4
10	17.7	16.2	15.7	13.0	26	19.4	13.0	12.3	13.2
11	17.1	16.6	15.9	13.4	27	16.8	14.9	14.3	13.1
12	16.6	15.7	15.7	13.8	28	15.9	16.3	13.4	13.1
13	15.8	15.3	15.0	13.4	29	15.7	17.3	11.0	13.0
14	15.4	14.9	15.5	12.8	30	.....	16.7	16.2	12.9
15	14.9	15.0	14.9	12.2	31	.....	.....	14.2	12.9
16	16.6	15.6	14.4	13.3					

a At depth 0–12 inches.

EAST HARTFORD, CONN.

[Dark wrappers and binders.]

Day.	May, 1895.	June, 1895.	July, 1895.	August 1895.	Day.	May, 1895.	June, 1895.	July, 1895.	August, 1895.
	Moisture. *a*	Moisture. *a*	Moisture. *a*	Moisture. *a*		Moisture. *a*	Moisture. *a*	Moisture. *a*	Moisture. *a*
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	.....	22.0	26.5	23.0	17	19.7	15.6	24.5	29.0
2	.....	20.5	26.2	24.1	18	19.3	15.3	23.8	29.7
3	.....	19.3	25.7	23.0	19	18.6	15.0	23.4	28.0
4	.....	19.2	25.0	22.9	20	19.7	14.9	22.8	26.7
5	.....	20.7	24.7	22.4	21	20.2	14.7	22.2	25.3
6	.....	20.2	24.3	21.5	22	20.5	14.5	21.4	24.9
7	.....	19.3	23.8	29.0	23	20.2	14.3	20.5	24.5
8	20.8	18.3	23.6	26.8	24	19.7	14.6	20.0	24.2
9	20.7	17.7	24.5	25.0	25	20.0	15.1	19.4	23.7
10	19.9	17.2	24.6	24.7	26	20.3	15.7	19.2	23.3
11	19.7	16.8	24.6	24.9	27	21.9	15.4	19.3	22.7
12	19.4	16.6	24.8	25.9	28	20.6	15.0	19.8	22.3
13	19.7	16.4	25.4	25.5	29	20.1	15.1	23.7	21.9
14	19.9	16.2	25.4	25.0	30	22.7	15.3	26.8	21.5
15	20.1	16.0	25.2	25.5	31	26.1	.....	24.3	.....
16	20.1	15.8	25.0	24.6					

a At depth 0–12 inches.

LITITZ, PA.

[Fillers.]

Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*		August, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Inch.*	*Per cent.*	*Inch.*	*Per cent*	*Inch.*	*Per cent.*	*Inch.*
1	25.3	.....	17.5	.....	11.2	.....	32.0	.....
2	34.0	1.20	24.3	0.06	11.3	0.21	23.0	.....
3	33.7	.04	22.8	.....	11.2	.....	22.6	.....
4	34.0	.73	22.4	.03	11.3	.....	22.3	.....
5	33.7	.03	36.1	2.25	11.2	.....	24.3	0.59
6	33.1	.....	34.0	.....	11.2	.....	23.8	.01
7	31.5	.....	32.6	.....	11.2	.....	23.0	.....
8	29.8	.....	31.2	.03	11.2	.....	22.3	.....
9	29.4	.....	33.4	.15	10.2	.....	22.3	.01
10	28.6	.....	36.5	.....	10.2	.....	22.6	.05
11	29.2	.22	30.0	.....	9.6	.....	25.3	.81
12	28.8	.16	29.6	.18	9.5	.28	24.3	.....
13	36.1	1.30	28.4	.....	29.2	1.90	22.8	.....
14	33.7	.76	28.1	.03	25.8	.03	21.9	.....
15	35.0	.28	27.0	.....	22.5	.....	21.3	.....
16	33.4	.....	26.3	.03	19.6	.....	25.0	1.34
17	31.7	.....	24.8	.....	15.7	.04	23.4	.....
18	29.6	.....	24.8	.10	15.1	.11	22.4	.....
19	29.4	.....	22.1	.....	28.4	.72	21.9	.....
20	29.4	.....	20.9	.09	31.3	.....	21.7	.11
21	28.6	.....	17.6	.....	31.5	.....	21.4	.....
22	30.5	.42	13.4	.....	31.0	.....	21.2	.11
23	29.2	.....	17.9	.....	30.5	.....	21.1	.....
24	28.4	.27	15.0	.....	25.2	.....	31.0	1.79
25	32.0	.32	13.6	.....	20.8	.....	29.2	.10
26	30.7	.....	13.3	.13	17.5	.....	27.4	.01
27	28.2	.....	11.9	.....	22.6	.24	25.0	.....
28	28.5	.....	11.2	.....	.....	1.81	24.0	.....
29	.....	.....	11.2	.....	.....	.30	22.6	.....
30	.....	.....	11.2	.....	.....	.....	21.9	.....
31	26.4	.24	.....	.....	.....	.....	21.4	.....

a Determined by the electrical method at depth 3 to 6 inches.

GERMANTOWN, OHIO.

Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*		August, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1	.....	.....	26.4	.....	.....	.....	24.6	0.10
2	.....	.....	.....	.....	18.2	.....	28.7	.62
3	.....	.....	24.7	0.19	18.3	.....	29.0	.....
4	.....	.....	25.2	.....	.....	.....	27.0	.....
5	.....	.....	24.4	.....	.....	Rain.	26.4	.....
6	37.4	.....	23.2	.....	23.4	1.10	25.8	.....
7	36.3	.....	.....	.....	22.9	.....	25.5	.....
8	33.5	.....	31.9	.43	22.4	.....	25.1	.....
9	.....	0.60	30.0	.....	21.6	.....	.....	.....
10	31.9	.....	28.5	.....	.....	.....	.....	.....
11	.....	.70	28.3	.....	.....	.20	.....	.....
12	31.6	.....	.....	.....	20.3	.....	.....	.....
13	29.6	.....	30.8	.45	.....	.....	.....	.....
14	29.6	.....	30.6	.....	.....	.....	.....	.....
15	31.6	.08	.....	.....	.....	.19	.....	.....
16	29.9	.....	.....	.....	.....	.56	.....	.....
17	28.5	.....	.....	.37	.....	.25	.....	.....
18	27.1	.....	.....	.....	30.5	.....	.....	.....
19	25.0	.....	.....	1.02	29.0	.....	.....	.....
20	.....	.....	.....	.....	26.5	.....	.....	.....
21	32.4	.50	.....	.....	34.9	.....	.....	.....
22	33.4	.....	.....	.....	27.7	.86	.....	.....
23	33.6	.40	.....	.....	27.7	.....	.....	.....
24	37.4	.62	18.5	.....	27.7	.21	.....	.....
25	34.5	.....	18.5	.....	27.7	.80	.....	.....
26	32.9	.....	18.5	.....	30.0	.....	.....	.....
27	31.9	.....	18.4	.....	28.4	.....	.....	.....
28	33.0	.....	18.4	.....	28.9	.....	.....	.....
29	31.3	.....	18.3	.....	26.1	.....	.....	.....
30	31.1	.....	18.9	.....	25.4	.....	.....	.....
31	27.0	.....	.....	.....	25.2	.....	.....	.....

a Determined by the electrical method at depth 3 to 6 inches.

FORT MEADE, FLA.

Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*		Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.		Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per ct.	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*		*Per ct.*	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*
1	10.2	0.12	.....	.....	7.9	.....	17	.....	.....	8.8	.....	8.1	.....
2	10.3	.....	.....	.....	7.5	0.28	18	.....	.....	7.8	.....	8.7	0.19
3	8.3	.....	.....	.....	10.5	1.32	19	° 2	.....	8.2	0.17	8.5	.....
4	7.8	.....	.....	.....	8.9	.....	20	8.0	.....	8.6	.19	8.1	.....
5	7.6	.....	.....	.....	10.7	.41	21	7.9	.....	8.8	.47	7.9	.....
6	7.3	.....	.....	.....	9.3	.04	22	7.9	.....	8.5	.....	9.1	.24
7	7.0	.....	7.5	0.13	9.2	.....	23	7.8	.....	9.0	.....	8.7	.....
8	7.1	.....	7.4	.....	9.2	.15	24	.....	.....	8.7	.....	8.4	.....
9	7.0	.....	8.0	.55	10.7	.11	25	.....	.....	8.8	.41	10.6	.82
10	6.8	.....	9.0	.....	9.2	.07	26	.....	.....	9.0	.....	10.7	.....
11	6.8	.....	7.9	.....	10.5	.47	27	.....	.....	8.9	.36	8.7	.....
12	13.6	1.30	8.1	.....	11.0	1.96	28	.....	.....	8.7	.....	8.8	.....
13	11.4	1.90	8.0	.....	10.8	1.89	29	.....	.....	7.4	.....	8.1	.....
14	9.2	.30	10.8	.59	9.7	.14	30	.....	.....	7.9	.....	8.8	.32
15	11.0	1.05	8.6	.67	8.5	.....	31	.....	.....	.....	.....	9.0	.18
16	9.7	.....	9.0	.03	9.4	.08							

a Determined by the electrical method at depth 3 to 6 inches.

Bright tobacco land.

OXFORD, N. C.

Day.	May, 1895. *a*	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*	June, 1896. *a*		July, 1896. *a*	
	Moisture.	Moisture.	Moisture.	Moisture.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1	.....	11.9	13.9	11.0	.....	.....	10.0	.....
2	.....	11.4	14.3	10.7	.....	.....	9.6	.....
3	.....	10.9	13.1	10.4	.....	.....	9.5	0.30
4	.....	10.4	12.1	9.7	.....	.....	9.6	.....
5	.....	10.1	11.0	9.2	.....	.....	10.4	.....
6	.....	10.6	9.9	8.7	.....	.....	12.0	.....
7	.....	10.2	8.9	8.6	.....	.....	15.3	.30
8	.....	9.6	8.1	8.1	.....	.....	17.0	.....
9	18.3	8.8	7.4	6.8	.....	.....	17.6	.09
10	16.7	8.2	6.9	5.7	.....	.....	18.1	.....
11	15.4	8.6	6.6	5.1	.....	.....	18.2	.....
12	14.4	9.2	6.4	4.6	12.9	.....	17.6	.....
13	13.5	8.7	6.0	4.4	12.8	0.60	16.5	.....
14	12.7	8.0	5.7	4.0	12.7	.....	15.4	.....
15	12.2	7.4	5.5	3.7	12.6	.....	14.4	.....
16	11.7	7.3	5.2	3.4	13.0	.....	13.5	.....
17	11.3	7.3	5.0	6.7	13.2	.....	13.1	.42
18	11.1	7.3	4.6	6.9	13.3	.....	13.2	.42
19	11.0	7.2	4.4	6.2	13.1	.....	13.2	.....
20	13.4	6.8	4.2	5.6	11.6	.....	12.8	.09
21	12.9	5.8	4.1	8.1	10.3	.....	11.5	.12
22	12.7	4.7	4.2	7.4	10.3	.....	10.2	.02
23	12.8	4.4	5.3	6.6	11.2	.55	9.0	.....
24	12.9	4.4	8.1	5.7	11.9	.20	8.5	.....
25	17.0	4.4	11.2	5.4	11.8	.....	8.0	.....
26	16.4	4.3	12.1	5.0	11.7	.....	7.8	.....
27	15.6	4.3	12.3	4.8	11.6	.....	7.5	.....
28	14.8	4.3	11.7	4.5	11.2	.....	7.2	.....
29	14.2	4.2	11.1	4.4	10.9	.....	7.0	.....
30	13.3	4.2	10.6	4.3	10.7	.....	6.8	.....
31	11.8	.....	.....	4.2	.....	.....	6.5	.....

Day.	August, 1896. *a*		May, 1897. *a*		June, 1897. *a*		July, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1	6.1	.....	9.77	.....	10.4	.....	7.5	0.32
2	5.7	Trace.	10.07	0.56	9.8	.....	7.4	.05
3	5.3	.....	9.49	.20	9.0	.....	7.3	.....
4	4.8	.....	10.18	.....	9.0	0.55	7.2	.25
5	4.9	.....	10.18	.....	9.8	.....	7.2	.....
6	5.2	.....	9.77	.10	9.0	.....	7.0	.....
7	5.4	.....	9.59	.....	9.0	.....	7.0	.08
8	5.6	.....	9.01	.....	9.0	.07	7.1	.....
9	5.7	.....	9.01	.....	9.0	.....	7.1	.02
10	5.7	.....	8.28	.....	9.0	.....	7.1	.....
11	12.9	1.50	8.86	.05	9.0	.....	7.2	.....
12	12.1	1.12	10.10	.27	7.8	.....	7.2	2.01
13	11.0	.....	10.72	.52	7.9	.....	8.9	.....
14	10.0	.....	11.04	.85	7.4	.06	8.6	.....
15	9.0	.....	10.52	.....	7.4	.....	8.9	.....
16	8.1	.....	10.07	.....	7.4	.....	9.0	.....
17	7.3	.....	9.77	.05	7.3	.....	9.0	.52
18	6.8	.....	9.50	.....	7.2	.....	10.4	.....
19	6.6	.....	9.33	.....	10.5	.55	10.6	.40
20	6.3	.....	.....	.....	10.8	.80	10.7	.70
21	6.2	Trace.	.....	.....	10.4	.....	10.8	.10
22	6.0	.....	.....	.....	9.7	.....	11.0	.06
23	5.9	.....	.....	.....	9.0	.....	9.9	.....
24	5.4	Trace.	9.01	.11	8.9	.....	9.9	.20
25	5.0	.....	9.01	.07	9.0	.....	9.5	.....
26	4.6	.....	9.01	.....	7.8	.....	9.4	.05
27	4.2	.....	8.94	.02	7.9	.27	9.2	.03
28	4.1	.....	8.86	.....	7.8	.....	9.1	.10
29	4.0	.....	9.01	.....	7.8	.....	9.1	.....
30	4.1	.....	8.66	.....	7.6	.....	9.5	.....
31	4.3	.....	10.64	.85	.....	.....	11.0	.....

a At depth 0–12 inches.

Bright tobacco land.

WILSON, N. C.

Day.	June, 1897.*a*		July, 1897.*a*		August, 1897.*a*		Day.	June, 1897.*a*		July, 1897.*a*		August, 1897.*a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.		Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per ct.	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*		*Per ct.*	*Inch.*	*Per ct.*	*Inch.*	*Per ct.*	*Inch.*
1	.....	.....	6.7	0.04	5.8	.....	17	13.0	.....	8.3	.....	3.3	.....
2	.....	.....	6.5	.....	5.9	.....	18	11.5	.....	7.9	0.06	3.1	.....
3	.....	.....	6.4	.55	5.8	.....	19	11.2	0.26	7.6	.....	3.0	.....
4	8.5	.....	7.0	.....	5.6	.....	20	10.6	.09	8.9	Rain.	3.0	0.16
5	9.3	0.32	6.9	.....	5.5	.....	21	9.6	.....	8.8	1.40	2.9	.....
6	9.5	.14	6.6	.....	5.3	.....	22	8.8	.....	9.1	.38	5.8	1.62
7	9.5	.....	6.3	.09	5.2	0.37	23	8.2	.....	8.8	.....	5.6	.....
8	9.0	.01	6.1	.60	5.3	.....	24	8.0	.22	8.2	.....	5.4	.05
9	8.9	.....	6.6	.....	5.1	.....	25	7.9	.20	7.8	.46	5.3	.....
10	8.6	.....	6.4	.....	4.9	.....	26	7.2	.....	7.2	.....	5.2	.....
11	8.3	.....	6.2	.01	4.8	.....	27	7.1	.....	7.1	.26	5.0	.....
12	8.0	.....	6.0	3.73	4.6	.....	28	6.9	.....	7.0	.11	5.0	.....
13	7.8	.....	11.3	.....	4.5	.....	29	6.9	.04	6.8	.04	4.8	.....
14	7.4	.....	10.6	.....	4.1	.....	30	6.8	.02	6.5	.....	4.5	.....
15	7.4	.....	9.8	.....	3.7	.....	31	.....	.....	6.2	.....	4.3	.....
16	15.1	2.21	9.0	.....	3.5	.....							

a Determined by the electrical method at depth of 3 to 6 inches.

DANVILLE, VA.

Day.	July, 1895.*a*	August, 1895.*a*	Day.	July, 1895.*a*	August, 1895.*a*	Day.	July, 1895.*a*	August, 1895.*a*
	Moisture.	Moisture.		Moisture.	Moisture.		Moisture.	Moisture.
	Per cent.	*Per cent.*		*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*
1	17.0	11.0	12	16.7	8.8	23	13.0	12.0
2	15.5	10.4	13	13.5	8.3	24	17.7	10.1
3	13.6	9.7	14	12.1	7.7	25	16.8	8.7
4	12.6	9.7	15	17.2	7.6	26	15.2	7.6
5	12.0	9.9	16	16.0	11.9	27	14.8	6.8
6	12.0	10.5	17	13.7	14.0	28	12.8	6.3
7	13.0	11.5	18	12.8	12.2	29	12.0	5.9
8	13.2	12.5	19	12.5	8.5	30	11.7	5.8
9	10.6	11.7	20	12.5	8.1	31	11.5	5.7
10	10.6	10.5	21	14.2	15.4			
11	16.8	9.7	22	13.5	14.2			

a At depth 0–12 inches.

HANOVER, VA.

Day.	June, 1895.*a*	July, 1895.*a*	August, 1895.*a*	Day.	June, 1895.*a*	July, 1895.*a*	August, 1895.*a*
	Moisture.	Moisture.	Moisture.		Moisture.	Moisture.	Moisture.
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
1	9.7	10.0	7.8	17	7.7	11.5	5.0
2	9.0	10.8	7.6	18	7.3	10.2	5.0
3	9.8	9.0	7.4	19	7.1	9.0	5.0
4	11.0	8.1	7.1	20	7.0	8.4	5.0
5	10.5	7.7	6.9	21	6.9	8.2	4.9
6	9.9	7.4	6.8	22	6.8	8.0	4.8
7	9.0	7.2	6.7	23	6.7	8.0	4.7
8	8.3	7.8	6.5	24	11.5	8.1	4.2
9	8.4	8.2	6.4	25	10.0	8.1	4.1
10	9.5	8.5	6.0	26	8.5	8.0	4.2
11	10.4	8.7	5.6	27	9.6	8.0	4.3
12	10.3	8.9	5.5	28	10.6	8.0	4.4
13	10.1	8.5	5.4	29	9.5	8.0	4.5
14	9.9	8.2	5.3	30	9.6	8.1	6.0
15	9.0	9.5	5.2	31	.....	8.0	5.1
16	8.3	12.0	5.1				

a At depth 0–12 inches.

Burley tobacco land.

LEXINGTON, KY.

Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*	June, 1896. *a*		July, 1896. *a*		August, 1896. *a*	
	Moisture.	Moisture.	Moisture.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1	25.6	28.2	26.6	26.0	1.00	23.5	.....	25.3	0.42
2	24.7	27.5	25.4	26.7	.....	23.1	.....	25.0	1.47
3	24.4	26.3	24.3	27.2	1.35	23.2	.....	24.1	.....
4	24.2	25.2	24.2	27.6	.....	23.8	0.49	24.0	.....
5	24.1	24.4	24.1	27.7	.....	23.9	.....	24.0	.....
6	23.9	24.7	27.7	27.8	.75	23.8	.....	24.3	.....
7	23.8	25.0	26.5	27.7	.....	23.7	.....	25.3	.57
8	23.6	25.6	25.5	27.5	.40	24.0	.....	25.1	.....
9	23.5	26.3	24.6	27.2	.60	27.9	1.59	25.8	.....
10	23.3	26.4	24.2	26.8	.....	27.8	.....	24.5	.....
11	23.1	26.4	23.9	26.7	.....	27.5	.18	24.0	.....
12	23.1	25.9	23.7	26.7	.....	27.0	.07	22.6	.....
13	23.3	25.6	23.3	26.7	.03	26.5	.....	22.5	.....
14	23.5	24.8	22.9	26.8	.01	26.0	.....	22.8	.....
15	23.8	24.1	22.7	26.9	.....	26.0	.03	22.4	.....
16	24.1	23.3	22.3	26.0	.....	26.1	.62	22.1	.07
17	24.4	22.7	22.1	24.6	.03	26.1	.....	21.8	.....
18	24.1	22.1	21.9	23.8	.....	25.6	.....	21.8	.....
19	23.9	22.0	21.7	23.3	.....	25.5	.....	22.2	.....
20	24.4	22.8	21.2	23.1	.....	28.4	1.25	22.9	.....
21	26.3	25.0	20.6	23.0	.....	29.8	2.30	23.5	.19
22	27.2	27.2	19.8	23.4	.....	29.7	1.03	24.2	.....
23	25.9	28.5	19.3	23.9	.63	29.0	1.02	24.6	.56
24	24.8	29.7	19.4	24.4	.05	28.5	.01	24.9	.....
25	24.2	29.8	19.5	24.8	.....	27.5	.....	24.9	.....
26	25.0	29.7	19.9	25.0	.....	26.5	.....	24.9	.....
27	24.7	29.5	20.7	25.4	1.15	25.0	.....	25.1	.04
28	23.6	27.9	21.5	25.6	.05	22.5	.....	25.7	.....
29	23.9	27.1	22.8	25.2	.....	22.0	.....	25.8	.....
30	25.8	26.1	22.5	24.5	.....	23.0	.....	25.0	.....
31	.....	25.8	23.2	.....	.....	24.6	.56	23.8	.....

Day.	May, 1897. *b*		June, 1897. *b*		July, 1897. *b*		August, 1897. *b*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1	.....	.....	25.3	.....	17.4	0.04	15.4	0.04
2	.....	.....	24.9	Trace.	17.1	.02	14.4	.....
3	.....	.....	25.8	0.31	16.5	.....	12.9	.....
4	.....	.....	25.0	Trace.	16.6	.....	12.0	.....
5	.....	.....	24.7	.....	16.3	.02	11.8	.....
6	.....	.....	24.3	.....	16.2	.13	10.3	.....
7	35.6	.....	23.7	.07	15.8	.....	8.9	.....
8	.....	.....	23.5	.....	15.5	.....	8.2	.....
9	32.4	Trace.	22.9	.....	15.2	.....	7.7	.09
10	32.7	0.94	21.5	.....	16.5	.33	7.5	.13
11	32.7	.34	21.6	.....	16.7	.02	7.5	.....
12	31.5	.43	20.7	.....	16.7	.01	7.3	.....
13	30.5	.01	19.5	.....	16.3	.03	7.0	.....
14	29.7	.04	18.4	.....	16.0	.....	6.8	.....
15	29.5	.....	17.0	.....	15.5	.....	6.9	.10
16	29.1	.05	16.0	.....	18.2	.51	6.7	.....
17	28.6	.....	20.3	.93	17.8	.01	6.5	.....
18	28.2	.....	20.8	.51	17.4	.....	6.4	.....
19	28.0	.....	19.5	.....	16.9	Trace.	6.3	.....
20	27.3	.....	18.9	.18	16.6	.06	6.2	.....
21	27.1	.....	18.3	.....	15.9	.....	5.9	.....
22	26.7	.....	17.7	.....	15.0	.....	21.5	1.69
23	28.4	1.07	17.1	.07	13.5	.45	19.3	.....
24	28.0	.28	21.0	2.04	15.2	.12	18.1	.....
25	27.5	Trace.	20.4	.01	15.6	.46	18.4	.24
26	27.3	.....	19.7	.....	19.3	.....	17.8	.....
27	26.9	Trace.	19.1	Trace.	18.4	.01	16.9	.....
28	26.9	.21	18.7	Trace.	17.9	.....	16.1	.....
29	26.7	Trace.	18.3	.....	17.2	.....	15.0	.....
30	26.2	.....	17.8	.10	16.7	.10	15.0	.33
31	25.8	.....	.....	.....	16.1	.....	14.9	.....

a At depth 0–12 inches.
b Determined by the electrical method at depth 3 to 6 inches.

GREENDALE, KY.

Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*	Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*
	Moisture.	Moisture.	Moisture.		Moisture.	Moisture.	Moisture.
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
1	21.4	23.8	26.0	17	21.1	19.3	21.9
2	22.7	24.7	25.0	18	21.1	17.0	21.2
3	24.2	23.3	24.4	19	22.0	15.5	21.1
4	25.6	22.1	24.1	20	22.8	16.0	21.0
5	26.4	21.1	24.7	21	22.5	17.0	20.9
6	26.3	20.2	26.2	22	21.6	18.3	20.9
7	25.6	19.3	25.9	23	22.0	19.6	20.9
8	24.8	18.8	25.0	24	24.7	20.9	21.0
9	24.2	17.9	24.8	25	24.7	24.2	21.2
10	23.8	17.4	24.3	26	19.0	26.2	21.1
11	23.6	16.5	22.4	27	13.6	26.9	21.0
12	23.8	16.1	21.5	28	12.6	26.7	20.8
13	25.5	15.9	22.8	29	13.6	26.6	20.7
14	25.8	16.0	22.2	30	15.6	25.9	20.5
15	24.1	18.3	20.8	31		25.2	21.5
16	22.5	20.6	22.1				

a At depth 0–12 inches.

Export tobacco land.

HOPKINSVILLE, KY.

Day.	May, 1897. *a*		June, 1897. *a*		July, 1897. *a*		August, 1897. *a*	
	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.	Moisture.	Rain.
	Per cent.	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*	*Per cent.*	*Inch.*
1			18.0		18.5		14.2	
2			17.8	0.20	18.0		14.1	
3			17.6	.15	17.2		13.9	
4			17.5		17.0		13.8	
5			17.2		18.1	0.23	14.2	0.18
6			16.9		18.2	.03	14.6	
7			17.2	.15	18.0		14.8	
8			17.6		18.8		14.8	.09
9			17.3	.02	17.7	.10	15.5	.09
10			17.2		17.2	.05	15.2	.65
11			17.2		16.8	.05	14.7	.40
12			17.2		16.1		14.6	
13			17.5		15.9		13.8	
14			17.3		15.7		13.7	
15	24.3		17.2	.03	13.8	.45	13.6	
16	21.3		18.0	.23	13.6		13.4	
17	20.8		18.0		13.8		13.4	
18	20.1		18.0		14.0		13.3	
19	19.2		19.0	.30	14.2	.03	13.3	
20	19.0		20.0	.67	14.7	.02	13.3	
21	18.9		19.2	.40	14.6	.15	13.3	.02
22	18.0		19.0		14.8		13.2	.29
23	19.0	0.20	23.8	.45	14.7		13.2	
24	18.5		25.4	.01	14.6		13.2	
25	18.2		26.8	.02	14.8	.10	13.0	
26	17.6		26.5		14.9	.31	12.9	
27	17.5	.10	25.4		14.9	.05	12.8	
28	17.4		20.1		14.8			
29	18.0	.21	18.5	.15	14.8			
30	18.5		19.0	.03	14.6			
31	18.2				14.3			

a Determined by the electrical method at depth 3 to 6 inches.

NEWSTEAD, KY.

Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*	Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*
	Moisture.	Moisture.	Moisture.		Moisture.	Moisture.	Moisture.
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
1	20.0	22.2	20.9	17	15.7	16.0	13.3
2	19.8	21.6	20.7	18	15.9	16.0	13.2
3	19.5	20.2	20.0	19	15.9	14.8	13.3
4	19.6	18.5	19.3	20	15.1	14.5	16.0
5	20.0	17.6	18.4	21	14.2	14.0	15.2
6	20.5	18.3	17.6	22	14.5	13.8	14.7
7	19.9	20.0	17.0	23	15.2	14.8	14.0
8	19.3	21.6	16.5	24	15.2	18.2	13.3
9	17.9	21.9	16.1	25	14.7	20.5	12.9
10	17.1	21.5	16.7	26	14.9	20.3	12.8
11	17.1	20.5	16.4	27	15.9	20.2	12.8
12	17.4	20.2	15.8	28	15.3	19.6	13.0
13	16.5	19.2	15.2	29	15.3	19.2	13.8
14	16.5	18.8	15.0	30	17.4	20.8	15.0
15	17.0	17.8	14.5	31	.....	21.6	14.5
16	16.3	17.1	13.8				

a At depth 0–12 inches.

Manufacturing tobacco land.

EASTHAM, VA.

Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*	Day.	June, 1895. *a*	July, 1895. *a*	August, 1895. *a*
	Moisture.	Moisture.	Moisture.		Moisture.	Moisture.	Moisture.
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
1	.....	.....	27.1	17	23.7	22.4	24.9
2	.....	23.4	21.5	18	22.1	22.9	24.4
3	23.3	22.8	21.0	19	21.2	23.4	25.7
4	23.1	23.0	20.8	20	20.8	23.3	25.3
5	22.9	23.4	20.9	21	20.8	21.3	22.8
6	22.8	21.9	21.2	22	21.0	20.2	22.6
7	22.7	20.8	22.3	23	21.4	19.8	22.0
8	22.6	20.6	24.2	24	21.6	20.8	21.5
9	22.2	23.5	23.5	25	21.6	26.2	20.8
10	22.1	23.5	22.7	26	21.4	25.5	20.4
11	23.7	22.4	22.3	27	21.3	23.7	20.0
12	22.2	21.6	22.1	28	21.2	23.8	22.5
13	22.5	21.1	22.3	29	21.1	25.0	28.4
14	25.9	21.2	22.6	30	21.0	23.3	.....
15	27.3	21.9	23.2	31	.....	22.2	.....
16	25.7	22.8	24.0				

a At depth 0–12 inches.

TABLES OF MECHANICAL ANALYSES OF SUBSOILS OF PRINCIPAL DISTRICTS.

The following tables give the mechanical analyses of the subsoils of the principal districts:

Cigar tobacco land.

NORTHERN DISTRICTS.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.0.5–0.0001 mm.).
	Massachusetts.		*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*
1039	Hatfield	6–30 inches	0.21	1.48	0.00	0.00	2.50	28.11	55.78	10.71	0.63	0.92
1111	Whately	6–18 inches	.77	1.84	.00	.20	.30	8.91	69.98	14.35	.93	1.98
1173	Hatfield	8–30 inches	.59	2.71	.00	.00	.40	9.00	42.12	38.90	3.07	3.17
875	do	Subsoil	.66	2.15	.00	.00	.12	2.31	40.30	40.41	4.15	4.50
901	do	9–30 inches	.82	2.90	.00	.00	.21	2.13	38.11	45.09	4.76	5.98
	Average		.61	2.20	.00	.04	.71	10.09	49.26	30.89	2.71	3.31
	Connecticut.											
1066	Poquonock	12–36 inches	.41	.76	1.33	7.40	21.80	31.78	32.77	1.74	.45	.19
959	Windsor	11–35 inches	.58	1.30	.00	.07	.36	22.52	65.08	7.46	1.01	1.33
1305	Bloomfield	11–12 inches	.58	1.39	.40	1.18	4.68	39.87	45.11	3.82	.84	1.63
1277	South Windsor	10 inches	.84	2.13	.00	.16	.60	14.93	67.20	10.93	1.16	1.67
831	East Hartford	0–10 inches	.76	4.60	.82	5.39	19.51	24.47	28.34	11.88	1.20	2.41
842	do	10–30 inches	.46	2.08	1.05	5.03	18.31	25.83	32.11	11.31	1.15	2.51
1254	Poquonock	9–30 inches	.56	1.64	3.22	7.53	19.63	23.76	34.50	5.92	.78	2.53
729	East Hartford	do	.49	2.05	.09	.30	1.11	9.95	52.47	27.73	3.56	4.00
1303	Wethersfield	10–18 inches	2.18	6.85	2.39	2.32	3.26	10.51	51.66	12.94	3.03	4.65
	Average		.76	2.53	1.03	3.26	9.92	22.62	45.47	10.41	1.36	2.32
	New York.											
1357	Fulton	11–20 inches	.76	1.34	.94	1.33	2.67	14.84	71.28	5.41	.52	1.36
1279	Phœnix	18 inches	.91	1.71	.81	1.10	7.22	47.39	34.65	3.32	.95	2.58
1286	Butler	12–14 inches	1.51	5.40	2.60	4.57	18.01	37.71	16.44	6.44	2.43	5.21
1287	do	18–20 inches	.69	1.82	3.71	5.88	21.66	38.37	15.71	4.80	2.08	5.54
1281	South Granby	6 inches	1.21	2.26	.21	.29	.60	4.61	37.26	42.57	4.20	6.13
1353	Lysander	Subsoil	.93	2.63	2.20	4.17	14.90	23.60	21.21	19.16	3.48	8.05
1285	South Butler	9–10 inches	.84	1.89	1.73	2.05	4.41	17.67	39.56	18.08	3.77	10.08
1283	Fayetteville	6–18 inches	1.09	3.23	3.11	2.71	6.42	18.41	27.90	20.70	5.92	10.60
1355	Cato	9–18 inches	1.33	4.05	1.87	2.84	6.09	18.54	35.02	15.33	3.06	12.18
1289	Baldwinsville	Subsoil	1.32	3.83	2.21	3.03	8.17	23.58	26.16	15.12	4.51	12.55
	Average		1.06	2.82	1.94	2.80	9.02	24.47	32.52	15.09	3.09	7.43
	Pennsylvania.											
2508	Washington	Shaly limestone, 18–36 inches.	1.31	2.40	.13	2.31	21.77	8.92	24.77	21.57	4.41	11.83
2514	Washington, 2 miles east.	Shaly limestone, 12–30 inches.	2.36	3.01	2.55	3.03	3.90	12.20	29.33	22.53	6.96	12.27
2574	Columbia	River land, 12–30 inches.	2.26	2.64	.22	.30	1.66	9.18	52.32	13.82	4.50	12.68
2516	Washington	Shaly limestone, 12–30 inches.	1.87	2.69	.11	.18	1.37	1.60	42.83	28.43	4.96	16.03
2511	York, 4 miles southeast.	Phillite	2.36	5.40	.36	.33	.65	1.22	36.65	30.68	5.23	16.19
	Average		2.03	3.23	.67	1.23	5.87	6.62	37.18	23.41	5.21	13.80
2510	York, 9 miles east	Trenton limestone, 12–30 inches.	3.68	4.17	.57	.80	1.07	1.92	18.83	35.58	10.98	22.47
2570	Wrightsville	do	4.51	4.62	.88	.92	.96	1.30	17.72	36.82	7.14	23.87
2508	York, 3½ miles east	Trenton limestone, 12–24 inches.	2.40	3.52	1.06	.94	.67	1.15	12.35	43.64	8.79	25.23
2804	Lititz	Trenton limestone, subsoil.	2.85	4.83	1.41	1.38	1.55	4.98	15.54	30.52	5.27	31.96
1360	Marietta	Trenton limestone, 9–30 inches.	5.59	4.36	.12	.22	.27	.37	7.48	28.28	16.24	35.80
16	Lititz	do	2.63	5.30	.06	.40	.93	5.11	11.45	30.55	10.35	36.30
	Average		3.61	4.47	.68	.78	.91	2.47	13.89	34.23	9.79	29.27

Cigar tobacco land—Continued.

NORTHERN DISTRICTS—Continued.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
	Ohio.		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
3090	Miamisburg	Glacial drift, 9–24 inches.	2.49	2.69	.15	.65	2.18	4.90	13.84	41.49	6.68	25.60
3111	Germantown	Glacial drift, 12–24 inches.	2.58	2.27	.03	.13	.48	.96	11.84	47.81	7.85	26.75
3120	....do	....do	3.96	3.06	.03	.20	.95	2.50	17.07	40.25	6.08	27.40
3121	....do	Glacial drift, 24–36 inches.	3.16	2.68	1.36	2.07	5.38	11.80	18.71	20.86	5.05	30.35
	Average		3.05	2.67	.39	.76	2.25	5.04	15.36	37.60	6.41	27.52
	Wisconsin.											
1498	Newark	Limestone, 7–18 inches.	1.47	1.87	3.82	5.13	20.11	31.35	9.26	13.13	1.71	11.53
3259	Stoughton, 5½ miles east.	Oak opening, 9–30 inches.	2.98	1.94	.75	2.01	14.87	36.44	10.91	9.58	2.41	18.65
3249	Edgerton, 4 miles west.	Prairie, 12–36 inches	5.57	3.03	.18	.58	2.92	2.98	17.88	37.27	7.62	22.60
3245	Edgerton, 4 miles northwest.	Oak opening, 12–36 inches.	4.26	3.08	.06	.42	2.96	5.51	18.79	35.67	6.74	23.20
3253	Stoughton, 6 miles east.	Oak opening, 12–30 inches.	5.15	3.00	.02	.11	.41	.58	14.98	42.56	8.71	23.30
3257	Stoughton, 4 miles east.	Prairie, 9–33 inches.	6.06	4.24	.05	.09	.45	.84	17.30	39.35	8.46	23.75
3255	Stoughton, 4½ miles east.	Oak opening, 36 inches.	5.20	2.94	.52	.97	4.97	5.15	17.01	33.89	5.73	23.90
3247	Edgerton, 2 miles southwest.	Prairie, 12–36 inches	4.86	3.84	.15	.47	2.13	3.15	19.06	35.35	7.26	24.53
3251	Edgerton, ½ miles northwest.	Oak opening, 9–36 inches.	4.72	2.28	.38	1.06	.76	17.00	14.63	25.99	4.81	27.40
3254	Stoughton, 6 miles east.	Oak opening, 30–39 inches.	6.71	3.05	.00	.02	.18	.35	16.97	37.56	6.63	28.70
	Average		4.70	2.93	.59	1.09	4.93	10.34	15.68	31.04	6.01	22.76

SOUTHERN DISTRICTS.

	Florida.											
2827	Ocala	Light hammock, 0–9 inches.	0.35	1.16	(*a*)	1.59	15.63	62.87	15.70	1.25	0.48	0.61
2819	Fort Meade	Gray hammock, 0–30 inches.	1.06	2.50	0.80	3.81	13.77	50.10	24.41	.90	.55	.99
2821	....do	Gray hammock, 20–36 inches.	1.03	2.16	.36	1.40	8.30	48.87	35.36	1.00	.52	1.17
2829	Ocala	Light hammock, 24–36 inches.	.30	.65	(*a*)	1.45	19.63	62.40	11.65	1.80	.62	1.26
2828	.... do	Light hammock, 9–24 inches.	.22	.75	(*a*)	1.80	18.25	65.37	10.07	1.20	.55	1.39
2823	Fort Meade	Mulatto hammock, 12–36 inches.	.47	1.43	.70	2.50	14.30	53.60	24.46	.62	.34	1.58
2820	....do	Gray hammock, 0–20 inches.	1.39	2.88	.25	1.36	7.76	41.75	41.22	1.22	.70	1.58
2826	....do	High pine land, 0–18 inches.	.47	1.60	.10	.65	4.58	47.88	40.90	.58	.23	1.68
2847	Silver Spring	Light hammock, 12–24 inches.	.19	.40	.62	5.57	28.66	52.74	9.84	.38	.20	1.82
2822	Fort Meade	Mulatto hammock, 0–12 inches.	.62	1.53	.78	2.85	14.35	53.51	23.50	.65	.44	2.07
2837	Ocala	Mixed land, 0–12 inches.	.39	1.63	.09	4.07	32.31	44.72	11.10	2.55	.53	2.09
2845	....do	Mixed land, soil	.31	1.34	.10	1.95	24.46	60.25	9.59	.42	.19	2.10
2838	....do	Mixed land, 12–36 inches.	.06	.49	(*a*)	3.15	24.94	51.10	13.47	2.33	1.10	2.29
2830	Ocala, one-half mile south.	Light hammock, 0–12 inches.	.49	1.36	(*a*)	3.07	21.44	55.54	13.30	2.68	1.33	2.39
2841	Ocala, 2 miles south.	Mixed land, 24–36 inches.	.41	1.10	(*a*)	1.90	13.83	63.70	12.85	2.06	.94	2.48
2825	Fort Meade, 1½ miles south.	High pine land, 20–36 inches.	.48	2.22	.52	3.14	17.23	49.29	23.14	.62	.36	2.62
2824	....do	High pine land, 0–20 inches.	1.54	3.02	.52	2.94	16.00	47.95	24.73	.86	.38	2.62
2852	Bartow	High pine land, 0–9 inches.	.81	3.37	.35	2.21	20.83	46.70	21.89	1.24	.41	2.83

a Trace.

Cigar tobacco land—Continued.

SOUTHERN DISTRICTS—Continued.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
	Florida—Continued.		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
2846	Ocala	Mixed land, subsoil.	.24	.72	.32	2.42	27.55	57.44	6.84	.50	.24	3.00
2850	Bartow	High pine land, 0–9 inches.	.55	2.44	.17	2.31	19.74	45.32	25.71	.97	.38	3.05
2831	Ocala, one-half mile south.	Light hammock, 12–30 inches.	.32	.92	.28	3.30	22.29	55.29	10.64	2.62	1.64	3.06
2818	Fort Meade	Gray hammock, 20–36 inches.	1.06	3.06	.40	4.29	19.15	46.70	20.19	.78	.47	3.44
2853	Bartow	High pine land, 9–30 inches.	.54	1.24	.24	1.61	17.91	49.22	24.98	.78	.24	3.60
2817	Fort Meade	Gray hammock, 0–20 inches.	.94	2.13	.41	2.97	12.92	48.99	26.69	.74	.30	3.93
2839	Ocala, 2 miles south	Mixed land, 0–12 inches.	.78	1.56	(*a*)	2.12	16.88	57.57	11.30	2.26	1.27	5.19
2851	Bartow	High pine land, 9–30 inches.	.36	1.09	.10	1.83	19.57	48.41	23.66	.65	.21	4.15
2840	Ocala, 2 miles south	Mixed land, 12–24 inches.	.19	.72	(*a*)	1.95	13.15	62.53	12.35	1.81	.87	5.85
2842	Ocala, one-half mile east.	Mixed land, 0–9 inches.	1.11	3.46	(*a*)	3.50	32.95	34.15	10.64	2.96	.95	9.63
2843	Ocala, 1½ miles east	Mixed land, 9–24 inches.	1.41	3.20	(*a*)	3.67	30.80	33.00	9.45	2.24	.87	14.66
	Average		.62	1.73	.26	2.60	18.94	51.53	18.95	1.33	.59	3.21
2894	Quincy	Lafayette, 0–12 inches.	.33	1.63	.13	1.61	9.48	56.71	20.82	3.75	.81	4.37
2897	.....do	.....do	.84	4.35	1.01	5.35	18.33	40.86	14.49	4.31	.99	7.95
2899	.....do	Lafayette, 0–9 inches.	.71	3.32	.45	2.10	19.25	47.37	15.28	4.99	.92	5.61
2901	.....do	Lafayette, soil	.43	1.41	1.11	10.33	33.07	37.18	9.14	3.53	.49	2.65
	Average		.58	2.68	.68	4.85	20.03	45.53	14.93	4.15	.80	5.15
2895	Quincy	Lafayette, 12–36 inches.	.53	4.00	.18	1.45	9.38	46.30	14.16	4.70	.88	18.16
2900	.....do	Lafayette, 9–30 inches.	1.31	5.89	.59	1.55	8.11	34.36	15.27	3.48	.77	29.15
2896	.....do	Lafayette, sub-soil.	1.31	5.94	.51	1.24	6.06	33.41	13.58	2.79	1.74	34.15
2898	.....do	Lafayette, 12–20 inches.	1.55	6.92	.88	3.52	11.68	26.54	10.54	2.51	.88	35.73
	Average		1.18	5.69	.54	1.94	8.81	35.15	13.39	3.37	1.07	29.30
	Texas.											
2282	Willis	24 inches	.31	.55	.82	4.45	26.17	39.60	11.61	8.57	1.95	6.07
2284	.....do	20–24 inches	.14	.38	3.61	12.31	29.63	30.33	14.70	4.93	.84	2.65
2286	.....do	6–24 inches	.24	.44	.46	2.98	17.85	41.23	16.18	13.19	1.97	5.37
	Average		.23	.46	1.63	6.58	24.55	37.05	14.16	8.90	1.59	4.70
	California.											
2263	San Rafael	6–24 inches	1.27	3.91	2.94	5.49	19.44	27.33	12.85	13.37	2.18	10.77
	Cuba.											
308	Vuelta Abajo	Cigar tobacco	.54	3.83	1.70	6.20	9.40	18.20	48.85	8.03	.18	2.60
311	.....do	.....do	.46	2.46	1.00	6.60	15.10	26.75	39.05	4.46	1.44	3.15
310	.....do	.....do	.10	5.46	.13	.94	7.02	25.50	50.64	4.75	2.99	4.95
309	.....do	.....do	.55	2.68	3.45	2.80	4.50	18.70	55.80	5.11	1.04	5.34
307	.....do	.....do	.77	4.15	12.90	8.15	8.35	17.75	28.15	7.99	1.39	8.75
306	.....do	.....do	.99	4.20	5.20	3.03	5.30	23.15	36.05	8.82	3.97	9.35
	Average		.74	3.80	4.06	4.62	8.28	21.67	43.09	6.53	1.82	5.69
1959	Camajuani	Remedios (cigar) tobacco.	5.70	8.94	1.25	.41	.94	9.53	21.39	24.44	9.66	19.60
1958	.....do	.....do	3.84	8.62	3.21	.41	.49	3.85	14.77	17.80	7.90	34.85
1960	.....do	.....do	3.14	11.29	.65	.25	.30	3.20	14.05	17.90	11.81	37.10
1961	.....do	.....do	8.00	11.17	.15	.38	.36	1.47	9.69	24.80	8.09	37.71
	Average		5.17	10.01	1.31	.36	.52	4.51	14.97	21.24	9.37	32.32

a Trace.

Bright tobacco land.

VIRGINIA AND NORTH CAROLINA DISTRICTS.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
2032	Gills Station, Va., 2 miles south.	42 inches	0.40	2.09	0.60	8.08	20.66	26.52	25.38	8.24	5.54	2.48
741	Rockymount, N. C	Soil	.16	1.34	2.85	10.03	20.28	27.00	25.13	6.29	2.38	2.90
751	Lancaster, S. C	do	.26	2.52	13.68	18.34	23.45	25.73	12.90	7.85	1.80	3.12
746	Oxford, N. C	do	.18	1.50	2.56	7.89	25.63	23.65	18.70	13.51	3.16	3.33
745	Pitt County, N. C	do	.36	2.18	.00	.92	8.93	55.65	15.85	10.44	1.88	4.00
764	Lancaster, S. C	Subsoil	.00	3.17	6.41	17.48	29.66	17.18	7.14	12.86	2.05	4.05
760	Canton, N. C	do	.47	2.19	5.28	11.16	14.78	17.88	25.37	16.79	2.04	4.85
757	Cana, N. C	do	.91	2.58	3.76	3.22	9.55	19.86	27.77	20.60	6.18	4.87
754	Rockymount, N. C	do	.06	.87	2.97	8.96	17.26	25.14	25.40	11.71	2.73	4.91
744	Cana, N. C	Soil	.66	3.72	.00	2.47	9.14	19.60	37.28	17.32	4.08	5.08
2047	Boydton, Va., 9 miles east.	6–30 inches	.22	.88	3.79	24.93	26.99	15.71	12.10	7.78	3.01	5.18
1663	Danville, Va., near	do	2.62	.87	7.84	8.01	13.50	19.33	24.28	12.96	4.79	5.74
758	Pitt County, N. C	Subsoil	.81	2.30	.19	6.47	7.20	50.15	13.92	14.54	5.77	5.86
748	Weaverville, N. C	Soil	.70	3.64	4.38	6.22	9.42	12.73	28.01	23.25	4.91	5.94
1722	Kentuck, Va., one-half mile south.	4–15 inches	.97	2.85	1.45	5.93	11.91	23.28	26.06	16.01	5.23	6.24
750	Joy, N. C	Soil	1.10	5.13	5.16	7.85	8.17	13.65	26.90	20.95	4.51	6.27
747	Canton, N. C	do	1.00	4.52	4.22	8.35	10.60	14.70	32.42	14.23	3.02	6.67
742	Nelson, N. C	do	.34	1.92	1.02	3.36	9.78	23.62	31.17	17.68	4.46	6.90
1667	Kentuck, Va., 1 mile south.	6–15 inches	.40	2.73	.76	5.01	13.71	23.96	27.31	12.38	5.80	7.00
2049	Boydton, Va., 9 miles east.	6–12 inches	.34	2.11	1.90	7.97	21.90	22.17	21.15	9.95	5.66	7.42
749	Alexander, N. C	Soil	.46	3.05	3.15	8.50	15.19	15.86	24.67	18.45	4.25	7.50
2028	Gills Station, Va	18–30 inches	1.25	4.74	1.24	8.56	15.36	14.45	14.65	16.67	15.71	8.24
117	Oxford, N. C., 4 miles west.	12–16 inches	2.07	.15	.71	1.12	7.37	27.90	24.26	22.77	4.20	8.30
2030	Gills Station, Va., 2 miles east	4–16 inches	.38	1.41	1.19	7.63	16.77	21.83	13.20	16.22	13.74	8.59
761	Weaverville, N. C	Subsoil	.00	2.94	7.30	7.11	9.11	10.55	17.23	31.15	5.84	8.77
763	Joy, N. C	do	.00	.00	6.37	8.18	10.80	13.59	20.08	23.18	4.78	8.85
762	Alexander, N. C	do	.00	.00	3.93	7.89	10.87	11.14	15.52	28.08	7.94	8.91
1372	Danville, Va., near	6–20 inches	1.14	1.03	.14	.74	8.07	28.26	32.16	13.95	5.11	9.17
1329	do	6–18 inches	.44	1.98	4.96	6.30	10.55	17.10	29.03	14.99	5.87	9.25
2052	Boydton, Va., 6 miles east.	6–12 inches	.34	2.02	2.01	11.30	21.88	20.52	17.61	9.92	5.30	9.56
1605	Danville, Va., near	6–18 inches	.71	2.40	1.61	2.29	5.57	19.58	33.13	19.16	6.13	10.00
2031	Gills Station, Va., 2 miles south.	16–30 inches	.70	2.40	1.38	8.04	16.36	18.86	19.73	11.83	10.61	10.05
694	Danville, Va., 9 miles north.	4–30 inches	.38	1.74	.24	.76	5.53	27.35	32.73	15.12	5.55	10.43
2068	Lawrenceville, Va., 4 miles east.	6–18 inches	.42	1.66	.22	9.62	21.20	20.63	13.41	15.89	6.38	10.60
2066	Lawrenceville, Va., 5 miles northeast.	6–30 inches	.30	1.57	1.91	9.47	21.75	26.28	14.41	7.42	6.25	11.11
1751	Kentuck, Va., one-half mile south.	15–30 inches	10.21	6.00	.81	3.32	6.23	11.78	23.91	17.32	9.14	11.24
1668	Kentuck, Va., 1 mile south.	do	8.26	9.99	.16	.73	6.92	14.55	25.50	15.67	8.75	11.46
696	Danville, Va., 7 miles north.	4–12 inches	.72	4.60	.64	1.00	6.30	22.53	36.14	12.45	5.28	11.84
2045	Boydton, Va., 10½ miles east.	6–20 inches	.74	1.96	.83	8.70	16.96	20.25	20.92	11.58	5.08	12.87
2027	Gills Station, Va	6–18 inches	.56	2.24	1.66	8.55	18.34	20.05	19.73	11.24	5.16	13.20
753	Hyco, Va	Subsoil	.72	3.40	.00	.60	1.82	4.69	40.19	31.27	4.84	13.28
789	Danville, Va	6–18 inches	5.13	2.61	1.14	3.58	11.75	28.96	21.68	6.54	3.62	15.05
1833	Kentuck, Va	6–30 inches	.96	2.47	1.42	3.31	6.58	16.39	31.05	15.66	5.94	15.98
755	Nelson, N. C	Subsoil	.56	3.40	1.17	3.31	7.90	18.22	26.49	17.58	4.41	16.58
	Average		1.10	2.24	2.57	6.39	13.67	22.02	23.45	14.08	5.43	8.23

Manufacturing tobacco land.

VIRGINIA DISTRICT.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.5 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
	Virginia.		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
649	Charlottesville, 2 miles north.	Gabbro, 8–24 inches	2.34	5.16	6.21	6.30	5.62	9.72	12.56	11.55	10.88	30.60
2064	Lawrenceville	Gneiss, subsoil	2.23	8.68	1.14	4.40	4.86	9.99	20.04	12.41	5.26	31.58
646	Charlottesville, 1 mile northeast.	Gabbro, 9–24 inches	5.65	7.29	.44	.88	.86	.61	4.94	23.89	21.90	34.15
651	Lynchburg	Gneiss, subsoil	3.94	6.99	1.66	2.87	8.96	18.06	12.77	6.89	2.26	35.06
1665	Danville, 1 mile north.	do	12.33	7.85	.45	.40	1.04	4.16	18.33	15.05	5.70	35.20
2060	Lawrenceville, 4 miles east.	Gneiss, 12–30 inches	2.46	7.41	3.84	5.53	7.09	8.04	16.85	5.49	4.44	39.25
650	Charlottesville, 1 mile west.	Gabbro, 8–16 inches	2.78	6.74	3.84	5.61	5.43	7.73	10.11	8.62	7.74	43.18
658	Forest	Gneiss, subsoil	8.97	6.68	1.27	1.64	4.77	7.45	7.47	9.20	8.48	44.70
647	Charlottesville, 2½ miles northeast.	Gabbro, subsoil	8.51	8.49	.06	.17	.19	2.18	5.88	14.83	14.82	44.96
1664	Danville, 3 miles north.	Gneiss, subsoil	7.80	10.50	.16	.13	.25	.91	2.39	24.78	7.89	45.00
2062	Lawrenceville, 4 miles east.	Gneiss, 12–30 inches	3.21	9.19	.66	1.48	3.82	10.40	18.26	4.43	3.60	45.16
652	Lynchburg, 3 miles south.	Gneiss, subsoil	3.44	5.63	.35	1.37	5.72	14.73	10.79	6.70	4.62	45.84
654	Lynchburg, 5 miles west.	do	4.01	7.40	.65	4.23	8.48	12.54	8.93	3.82	3.69	47.13
1997	Mossingford	do	2.88	8.82	1.36	2.07	3.85	6.97	11.31	9.88	5.30	47.33
653	Lynchburg, 4 miles south.	do	5.31	7.13	.28	.88	7.34	9.52	5.42	9.48	6.66	48.20
644	Charlottesville	Gabbro, 8–24 inches	9.55	7.67	.56	.41	.83	1.71	5.56	13.49	9.55	50.11
655	Bedford Springs	Gneiss, subsoil	5.64	8.46	.72	.87	2.05	5.51	7.32	9.91	6.54	52.18
2056	Boydton, 1 mile east	do	3.56	9.12	.04	.02	.06	.32	6.44	17.84	11.26	52.31
642	Charlottesville, one-half mile northeast.	Gabbro, 8–24 inches	7.28	6.48	.67	.99	1.36	2.55	5.50	13.76	9.82	52.46
659	Forest, one-half mile south.	Gneiss, subsoil	8.23	9.07	1.02	2.27	4.39	6.96	4.51	5.09	5.94	53.13
656	Bedford Springs, 1 mile north.	do	6.47	10.50	.16	.42	1.53	5.76	4.08	8.92	5.74	54.53
	Average		5.55	7.87	1.22	2.05	3.74	6.94	9.45	11.29	7.67	44.38

Burley tobacco land—Lower Silurian (Trenton and Hudson River Limestone).

KENTUCKY AND OHIO DISTRICTS.

	Ohio.											
3091	Georgetown, 3 miles east.	12–36 inches	3.24	2.96	0.16	0.93	1.96	2.84	11.31	47.71	6.68	22.25
3087	Aberdeen, 4 miles west.	12–24 inches	3.28	3.67	.20	.37	.48	.80	17.41	33.06	7.78	34.63
3082	Georgetown, 1½ miles southeast.	9–24 inches	4.05	3.46	.02	.09	.13	.42	9.65	34.77	7.70	40.83
3089	Higginsport, 6 miles north.	9–30 inches	4.32	3.98	.01	.03	.10	.45	6.13	32.25	8.35	44.50
	Kentucky.											
3072	Germantown, 2½ miles west.	0–12 inches	2.04	3.83	.02	.58	1.06	1.18	10.12	56.27	9.58	15.58
1101	Mount Sterling	6–18 inches	2.36	3.95	1.52	1.80	1.48	2.40	10.07	42.97	13.39	18.25
1851	Winchester	do	2.48	6.15	.60	1.84	1.77	1.38	3.17	43.26	18.20	22.50
3073	Germantown, 2½ miles west.	12–30 inches	3.28	2.70	.18	.67	.82	.57	9.46	50.03	8.49	23.50
1853	Winchester	6–18 inches	2.38	4.60	1.59	2.71	2.03	1.36	2.74	44.61	14.39	24.75
2585	Lexington, 10 miles southeast.	6–24 inches	3.08	3.69	1.73	2.66	1.90	1.13	5.36	45.76	9.47	25.71
1991	Greendale	13–25 inches	2.22	4.68	.98	1.51	1.17	.55	2.80	50.55	7.97	27.30
2583	Donerail, 1 mile south.	10–24 inches	3.43	4.38	1.22	2.57	3.03	3.00	5.77	38.59	8.75	27.61

Burley tobacco land—Lower Silurian (Trenton and Hudson River Limestone)—Cont'd.

KENTUCKY AND OHIO DISTRICTS—Continued.

No. sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.)	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
	Kentucky—Cont'd.		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1927	Lexington, 8½ miles northeast.	Subsoil	2.55	4.51	.14	1.82	2.38	1.54	5.73	45.90	7.88	27.73
3077	Chatham	12–30 inches	2.54	2.99	.13	.89	1.26	1.35	6.10	47.89	10.36	27.77
2588	Lexington, 10 miles southeast.	12–24 inches	2.65	3.30	1.23	2.49	2.20	.97	5.28	43.31	10.18	28.45
2959	Mays Lick, 2 miles south.	do	4.55	2.78	.31	.98	1.10	1.03	11.22	43.46	6.14	28.53
1849	Winchester	6–18 inches	2.92	5.62	.73	1.43	1.41	1.22	2.23	38.53	16.31	30.20
2960	Mays Lick, 2 miles south.	24–36 inches	3.79	3.30	.33	.96	1.22	1.25	7.99	46.59	4.72	30.70
3070	Maysville, 4 miles west.	0–9 inches	5.66	7.40	.11	.19	.34	.61	13.01	31.41	10.19	31.25
2580	Donerail, one-fourth mile south.	12–24 inches	3.64	4.88	.70	2.54	2.60	1.83	4.31	36.97	7.69	34.36
287	Lexington, 6½ miles north.	7–24 inches	4.68	4.92	1.12	1.82	1.37	.89	4.34	34.40	10.58	35.24
2589	Lexington, 10 miles southeast.	24–36 inches	3.52	4.10	.93	2.35	2.07	1.12	4.92	36.03	8.11	35.53
3069	Germantown, one-half mile east.	12–30 inches	3.61	3.91	.27	.58	.94	1.16	4.75	38.60	9.27	38.37
2586	Lexington, 10 miles southeast.	24–36 inches	3.89	4.38	1.43	2.80	2.35	1.40	4.10	33.34	8.05	38.62
2957	Maysville, 9 miles south.	12–30 inches	5.51	4.22	.46	.80	.89	1.20	9.06	34.55	6.42	38.63
1702	Lexington	9–18 inches	.76	8.53	.00	.00	.24	.11	.97	38.70	11.20	38.92
3071	Maysville, 4 miles west.	do	4.76	4.82	.13	.20	.23	.44	10.44	30.12	7.98	40.17
2581	Donerail, one-fourth mile south.	24–36 inches	4.26	4.86	3.01	3.21	5.24	3.42	5.03	26.42	5.94	40.88
3071	Maysville, 4 miles west.	9–18 inches	3.23	5.02	.05	.13	.25	.53	10.21	29.22	9.94	42.70
3080	Augusta, 1 mile south.	0–12 inches	5.80	5.10	.05	.13	.25	.46	7.67	28.73	9.10	43.20
	Average		3.48	4.42	.64	1.63	1.44	1.22	7.04	39.77	9.36	31.62

Export tobacco land.

KENTUCKY AND TENNESSEE DISTRICTS.

2611	Clarksville, Tenn., 9 miles southeast.	Subcarboniferous limestone, 9–18 inches.	1.32	2.83	0.62	0.87	1.15	1.62	6.65	66.68	6.42	12.14
2605	Clarksville, Tenn., 11 miles east.	Subcarboniferous limestone, 6–24 inches.	1.24	2.74	2.47	4.63	6.37	7.71	10.37	45.29	4.69	14.52
2606	do	Subcarboniferous limestone, 24–36 inches.	1.20	2.36	4.58	7.99	9.04	10.20	9.90	34.74	4.96	15.24
2612	Clarksville, Tenn., 9 miles southeast.	Subcarboniferous limestone, 18–27 inches.	1.33	3.57	.28	.64	.93	1.67	5.17	60.45	9.38	15.24
3158	Hopkinsville, Ky., 2 miles south.	Subcarboniferous limestone, 0–12 inches.	2.26	2.96	.00	.05	.15	1.06	9.94	63.14	5.56	15.75
3232	Henderson, Ky., 9 miles south.	Subcarboniferous limestone, 9–36 inches.	2.30	1.80	.34	.34	.30	.66	13.83	60.20	4.09	16.48
1105	Earlington, Ky.	Carboniferous sandstone, 16–18 inches.	1.78	2.91	.18	.65	.94	1.74	19.83	47.72	6.14	17.03
2619	Clarksville, Tenn., 6 miles east.	Subcarboniferous limestone, 9–18 inches.	1.28	3.06	.07	.14	.52	1.76	4.11	64.43	6.78	18.25
2638	Springfield, Tenn., 1¾ miles north.	Subcarboniferous limestone, 9–18 inches.	1.17	2.35	.28	.36	.45	1.69	10.97	56.22	7.16	18.97

Export tobacco land—Continued.

KENTUCKY AND TENNESSEE DISTRICTS—Continued.

Number.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.05 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.001 mm.).
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
3135	Woodburn, Ky., 1 mile north.	Subcarboniferous limestone, 0–12 inches.	2.38	2.42	.02	.13	.23	3.72	15.35	52.52	5.91	19.05
2923	Springfield, Tenn., 4 miles north.	Subcarboniferous limestone, 9–18 inches.	1.63	4.10	.00	.11	.15	.59	3.54	58.44	12.30	19.21
1720	Clarksville, Tenn., 5 miles northeast.	Subcarboniferous limestone, 6–30 inches.	.78	4.14	.00	.04	.13	.91	8.46	56.46	8.98	19.38
726	Adams Sta., Tenn..	Subcarboniferous limestone, subsoil	1.63	3.08	.00	.05	.15	.74	2.04	61.85	10.45	20.20
3215	Farmington, Ky., 2½ miles northwest.	Lafayette or Columbia, 9–27 inches.	2.66	2.40	.00	.06	.16	.34	12.10	57.95	4.10	20.50
1099	Newstead, Ky.....	Subcarboniferous limestone, 6–18 inches.	2.10	3.06	.05	.18	.11	.34	5.13	63.28	5.19	20.55
1880	Clarksville, Tenn., 8 miles northeast.	Subcarboniferous limestone, 0–6 inches.	.84	4.82	.00	.00	.32	1.29	10.77	46.66	15.12	20.63
2645	Springfield, Tenn., 1½ miles north.	Subcarboniferous limestone, 9–18 inches.	1.53	2.31	.15	.59	.50	.96	9.33	55.27	7.79	20.92
2598	Clarksville, Tenn., 8 miles east.	Subcarboniferous limestone, 12–24 inches.	1.52	3.44	.14	.23	.40	1.40	7.21	57.29	6.87	21.18
2615	Clarksville, Tenn., 6 miles east.	Subcarboniferous limestone, 9–18 inches.	1.35	3.00	.36	.31	.70	2.62	4.00	59.33	7.00	21.20
2646	Springfield, Tenn., 1½ miles north.	Subcarboniferous limestone, 18–27 inches.	1.82	2.65	.71	.81	.60	1.09	8.86	52.55	8.24	22.15
2647	.....do	Subcarboniferous limestone, 27–36 inches.	1.81	2.56	1.21	1.20	.88	1.41	10.51	50.46	6.30	22.45
2599	Clarksville, Tenn., 8 miles east.	Subcarboniferous limestone, 24–36 inches.	1.35	2.48	.24	.35	.59	1.47	8.31	55.55	6.24	22.61
2609	Clarksville, Tenn., 9 miles southeast.	.....do	1.63	2.97	2.77	2.35	2.81	3.21	7.35	46.69	5.33	22.68
1719	Clarksville, Tenn., 6 miles east.	Subsoil	.94	4.92	.00	.25	.50	1.65	8.27	53.09	6.99	22.70
2620	.....do	Subcarboniferous limestone, 18–27 inches.	1.61	3.08	.51	.54	.43	1.53	7.76	56.91	5.67	22.77
2591	Clarksville, Tenn., 7 miles east.	Subcarboniferous limestone, 8–24 inches.	1.41	2.55	.01	.01	.08	.39	3.03	62.02	6.27	22.82
3225	Corydon, Ky., three-fourths mile southeast.	Carboniferous sandstone, 9–36 inches.	2.81	3.34	.00	.00	.02	.06	18.35	48.60	4.29	23.17
1379	Allen Springs, Ky..	Subcarboniferous limestone, subsoil.	1.67	3.31	.20	.46	.63	2.23	13.65	47.09	6.58	23.26
2592	Clarksville, Tenn., 7 miles east.	Subcarboniferous limestone, 24–36 inches.	1.49	2.39	.00	.01	.05	.26	3.81	60.97	6.76	23.31
1431	Bowling Green, Ky.	Subcarboniferous limestone, 6–18 inches.	1.75	2.99	.11	.25	.50	2.34	13.51	47.52	7.20	23.43
3217	Farmington, Ky., 2 miles west.	Lafayette on Columbia, 9–24 inches.	4.08	2.46	.00	.02	.14	.46	14.09	50.50	4.56	23.60
2630	Springfield, Tenn., 4½ miles north.	Subcarboniferous limestone, 18–27 inches.	1.72	4.27	.93	.47	.44	1.06	11.43	48.38	6.70	23.88
2633	Springfield, Tenn., 7 miles north.	Subcarboniferous limestone, 9–18 inches.	2.56	3.75	.30	.41	.38	.66	10.72	48.50	7.91	24.34
2608	Clarksville, Tenn., 9 miles southeast.	Subcarboniferous limestone, 6–24 inches.	1.59	3.08	1.10	1.34	1.42	2.17	7.00	51.26	6.42	24.43
3136	Woodburn, Ky., 1 mile north.	Subcarboniferous limestone, 12–24 inches.	4.02	1.80	.13	.35	.36	3.72	11.85	48.50	4.96	24.90

Export tobacco land—Continued.

KENTUCKY AND TENNESSEE DISTRICTS—Continued.

No sample.	Locality.	Description and depth.	Moisture in air-dry sample.	Organic matter.	Gravel (2–1 mm.).	Coarse sand (1–0.5 mm.).	Medium sand (0.5–0.25 mm.).	Fine sand (0.25–0.1 mm.).	Very fine sand (0.1–0.05 mm.).	Silt (0.05–0.01 mm.).	Fine silt (0.01–0.005 mm.).	Clay (0.005–0.0001 mm.).
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
3171	Hopkinsville, Ky., 9½ miles south.	Subcarboniferous limestone, 12–36 inches.	3.63	2.43	.01	.12	.16	.44	7.71	55.44	5.16	25.00
3197	Paducah, Ky., 15 miles south.	Lafayette or Columbia, 9–30 inches.	4.60	1.88	.00	.02	.08	.22	10.95	51.91	4.08	25.35
2601	Clarksville, Tenn., 11 miles east.	Subcarboniferous limestone, 9–18 inches.	1.60	2.68	.03	.09	.21	.85	5.93	55.45	6.46	25.67
2624	Springfield, Tenn., 4 miles north.	Subcarboniferous limestone, 18–27 inches.	1.70	3.18	.01	.07	.13	.52	4.51	53.77	9.41	26.06
2629	Springfield, Tenn., 4½ miles north.	Subcarboniferous limestone, 9–18 inches.	2.06	4.18	1.99	.81	.50	.98	7.87	47.10	6.75	26.12
3169	Hopkinsville, Ky., 5 miles south.	Subcarboniferous limestone, 12–36 inches.	3.88	2.88	.10	.41	.57	2.08	10.84	47.19	5.80	26.33
2602	Clarksville, Tenn., 11 miles east.	Subcarboniferous limestone, 18–27 inches.	2.33	2.64	.02	.14	.32	.60	5.91	55.08	5.89	26.85
3137	Woodburn, Ky., 1 mile north.	Subcarboniferous limestone, 24–36 inches.	3.34	2.48	.15	.35	.51	6.46	15.14	40.46	4.40	27.00
2636	Springfield, Tenn., 7 miles north.	Subcarboniferous limestone, 6–18 inches.	1.81	3.54	.88	.90	.99	2.49	13.64	41.91	5.76	27.03
3227	Corydon, Ky	Carboniferous sandstone, 9–24 inches.	3.64	2.60	.00	.00	.02	.07	12.37	52.46	3.62	27.05
3159	Hopkinsville, Ky., 2 miles south.	Subcarboniferous limestone, 12–36 inches.	4.56	2.80	.03	.10	.21	.91	8.72	52.10	4.42	27.15
3138	Woodburn, Ky., 1 mile north.	Subcarboniferous limestone, 36–72 inches.	2.72	3.10	.11	.16	.92	17.48	18.37	28.07	3.51	27.53
3209	Fancy Farm, Ky., 3½ miles north.	Lafayette or Columbia, 9–27 inches.	4.82	3.06	.03	.03	.06	.11	12.32	48.63	4.65	28.23
3128	Planol, Ky	Subcarboniferous limestone, 12–36 inches.	3.74	3.18	.08	.53	.44	.92	8.33	49.99	5.77	28.55
3134	Rich Pond, Ky., 1½ miles north.	....do	4.48	3.21	.00	.11	.33	.67	8.36	47.74	4.86	30.38
2642	Springfield, Tenn	Subcarboniferous limestone, 12–24 inches.	2.87	3.11	.00	.03	.04	.19	3.79	50.91	7.43	31.55
2594	Clarksville, Tenn., 5 miles east.	Subcarboniferous limestone, 9–18 inches.	2.48	3.16	.35	.22	.30	.86	6.23	48.08	5.32	31.77
3139	Woodburn, Ky., 1 mile north.	Subcarboniferous limestone, 72–96 inches.	3.86	3.42	.17	.87	.82	3.94	8.63	38.62	4.68	36.30
	Average		2.28	3.01	.41	.59	.74	1.97	9.37	52.10	6.36	22.88