

Title: Pennsylvania State Horticultural Association news, v.17

Place of Publication: State College, Pa.

Copyright Date: 1940

Master Negative Storage Number: MNS# PSt SNP aAg096.9

Volume:

17

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P41

Pennsylvania State Horticultural Association News

PUBLISHED BY THE ASSOCIATION

Issued Quarterly at State College, Pa.

Subscription Included in Annual Dues of \$2.00

Entered as second-class matter at the Post Office at State College, Pa.

Vol. XVII

State College, Pa., March, 1940

No. 1

81



Proceedings of the
Eighty-first Annual Meeting
Farm Show Building, Harrisburg, Penna.
January 16, 17 and 18, 1940

When Planning Your Planting

Plan To Use Waynesboro Trees, Grown By
Virginia's Largest Growers.

Offered in a large assortment of varieties, including the out-
standing new ones, as well as the old standbys.

Varieties of APPLE available for Spring '40 Planting:

Albemarle Pippin	Lowry	Smokehouse
Baldwin	Macoun	Stayman
Ben Davis	Maiden Blush	Summer Rambo
Bonum	M. B. Twig	Summer Yellow Delicious
Cortland	Milton	Sweet Paradise
Delicious	New Red Delicious	Transcendent Crab
Early Harvest	New Red Duchess	Turley
Fall Pippin	New Red Jonathan	Virginia Beauty
Grimes Golden	New Red Rome	Winesap
Hyslop Crab	New Red Stayman	Winter Banana
Jonathan	N. W. Greening	Yellow Delicious
Lady	Paragon	Yellow Transparent
Liveland Raspberry	Red June	York Imperial
Lodi	Rome Beauty	YORKING

PEACH

Alton	Golden Jubilee	Mikado
Belle of Georgia	Greensboro	Red Bird
Brackett	Hale	Rochester
Carman	Hale Haven	Salway
Champion	Heath Cling	Slappy
Crawford's Early	Hiley	South Haven
Crawford's Late	Indian	Valiant
Early Elberta	Late Elberta	Vedette
Elberta	Mayflower	Veteran

MISCELLANEOUS FRUITS

Cherry	Fig	Boysenberry
Pear	Quince	Blackberry
Plum	Grape	Youngberry
Apricot	Raspberry	Blueberry

Send us your WANT LIST now for quotations while a more
complete assortment of varieties is available, at lower prices
than will most likely be possible later in the season.

Waynesboro Nurseries, Inc.

Waynesboro, Virginia

State Horticultural Association of Pennsylvania



OFFICERS FOR 1940

President	J. A. Runk, Huntingdon
Vice President	H. W. Skinner, Chambersburg
Secretary	J. U. Ruef, State College
Treasurer	H. M. Anderson, New Park

STANDING COMMITTEES

Executive Committee: The above named officers and R. J. Gillan, St. Thomas; J. Eric Linde, Orefield; H. F. Hershey, Hamburg.

Legislation and Representatives on Agricultural Council: J. Eric Linde, Orefield, Ch.; G. F. Gillan, St. Thomas; M. E. Knouse, Peach Glen; J. T. Raine, Fairview; R. T. Crisswell, Chambersburg; H. S. Nolt, Columbia; W. E. Grove, York Springs.

State Farm Show and Exhibition: Guy L. Hayman, Northbrook, Ch.; Paul Thayer, Carlisle; R. C. McDonald, Shippensburg; W. O. Bingham, St. Thomas.

Insect Pests: J. O. Pepper, State College, Ch.; H. N. Worthley, State College; H. F. Hershey, Hamburg.

Plant Diseases: H. W. Thurston, State College, Ch.; R. S. Kirby, State College; H. F. Hershey, Hamburg.

Game Laws: J. A. Runk, Huntingdon, Ch.; Geo. Balthaser, Wernersville; R. H. Bell, Harrisburg.

True-to-Name Trees: F. N. Fagan, State College, Ch.; G. L. Baugher, Aspers; Geo. Stein, Wrightsville.

Advertising: Roy Hafer, Fayetteville, Ch.; Geo. Goodling, Loganville; John Mengel, Leesport; Guy L. Smith, North East; Harry Stoner, Orrtanna; Simon Snyder, Ephrata.

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Lodi	Rome Beauty	YORKING

P E A C H

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Belle of Georgia	Greensboro	Red Bird
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Complete Fertilizers (10-6-4) and Ingredients

Miscible Oils, Oil Emulsions and Lime Sulphur Solution

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Lead, Calcium and Zinc Arsenates

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Wettable Sulphur and "Magnetic 70" Sulphur Paste

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Bordeaux Mixture, Cupro-K and Spray Cop

Sulphur, Copper and Rotenone Dusts

Nicotine Sulphate and Tobacco Dusts

Copper Sulphate - All Forms

Spray and Dusting Lime

Summer Spray Oils

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Co-Operative Ass'n, Inc.**

Owned and Controlled by Pennsylvania's Farmers

3607 Derry Street

HARRISBURG, PENNSYLVANIA

REPORT OF COMMITTEES

The following is a report of the various resolutions submitted for action at the annual meeting:

WHEREAS, the bushel apple package situation is in a very chaotic state, due to the fact that there are so many different sizes and types of boxes and styles of packs, resulting in some growers delivering to the trade as much as one-fourth bushels of apples in a so-called bushel box;

THEREFORE, be it resolved that the President of this Society is hereby instructed to appoint, after due deliberation, a committee of members representing the main growing sections of the state, which committee is to meet in the near future and recommend a practical, uniform box and style of pack, holding one bushel of apples, with sufficient tolerance to offset any reasonable shrinkage in storage; and further urge the use thereof by the growers of this state and surrounding states.

Be it further resolved that the above named committee contact the heads of the Horticultural Societies of West Virginia, Maryland and Virginia, requesting that they appoint similar committees to endeavor to work out means by which the box can be standardized.

Be it further resolved that representatives from the four states get together and standardize the size of the box.
Approved.

WHEREAS, Discriminatory taxes and unwarranted restrictions on the channels of fruit distribution have a damaging effect by increasing the costs of marketing, raising prices to consumers and lowering returns received by producers, and

WHEREAS, Trade barrier measures of this type have been opposed by the nation's leading agricultural organizations, as well as by the representative business, labor and consumer groups, and

WHEREAS, Special taxes on chain stores, as one of the serious forms of such unsound and discriminatory legislation, have been particularly condemned by these organizations, as well as by Pennsylvania State Horticultural Society at its convention last year, therefore

BE IT RESOLVED that the Pennsylvania State Horticultural Society again express its complete and unqualified disapproval of all measures such as the proposed Patman Federal Chain Store Bill, and call upon other horticultural societies throughout the nation to work actively against this

proposal for repeal of such state anti-chain store taxes as are now in effect, and

BE IT FURTHER RESOLVED that copies of this resolution be forwarded to secretaries of state and national horticultural groups, to members of the House and Senate of the Pennsylvania State Legislature and to members of the Pennsylvania delegation in Congress.

Approved.

WHEREAS, the use of apple cider is on the increase, publicity is becoming more common in advising the use of fruit juices in the diet, each year sees a more difficult means of disposing of the cull and grades of lower than U. S. No. 1 apples, that it becomes necessary to establish some definite and scientific method of manufacture of good cider or apple juice, and to establish laws covering the method of manufacture and sale.

THEREFORE: be it resolved, that this Association instruct its legislative committee to have a law promulgated for introduction to the State Legislature, defining cider, a standardized method of manufacture and grade of fruit to be used, and methods of preservation, as well as containers to be used.

Approved.

RESOLVED, that we express our appreciation to the Farm Show Commission for the better facilities and space provided for the apple exhibits, and

Be IT FURTHER RESOLVED, that we request them to improve our meeting rooms by furnishing racks for hats and coats in each room, a blackboard and chart space, and a more sound proof partition between meeting rooms.

Approved.

RESOLVED, that we express our appreciation to Bureau of Markets for the unlimited services rendered by members of the Inspection Service in judging commercial apple entries in the apple exhibit.

Approved.

RESOLVED, that we commend the then Secretary of Agriculture and Bureau of Markets for their efficient aid in moving peaches and apples in 1938-39.

Approved.

RESOLVED, that we request Secretary of Agriculture to take full advantage of Act S2212 of 76th Congress making moneys available.

Approved.

(Signed) F. E. Griest,
Chairman Resolutions Committee.

TRUE TO NAME COMMITTEE

GEO. BAUGHER, Chairman True To Name Committee

Your committee arranged a one-day fruit tree identification school which was held in July. The school was attended by nurserymen from York, Lancaster and Adams counties. One-half day was spent at Worley's Nursery and one-half day at the Adams County Nursery.

Dr. Upshall of the Vineland Experiment Station, a noted authority on identification of stone fruit trees, had previously examined these two nurseries.

Your committee feels that you, the commercial fruit growers, would marvel at the ability of Dr. Upshall to identify the different stone fruit varieties. He has spent years studying the different leaf structures; the arrangement of the veins in the leaf; the edging of the leaf—whether jagged, smooth, sawtoothed, or otherwise; the color and the arrangement of the limbs and buds. The practical application of this knowledge is Dr. Upshall's secret of success.

The visiting nurserymen were very much impressed by Dr. Upshall's work and by mutual agreement decided to employ Dr. Upshall to examine their own nurseries this coming season.

Your committee feels that this work, which will be continued, will be a big benefit to the planters of nursery stock, by giving them fruit trees which are true to name.

GOOD'S Keystone Brand SPRAYS

KESOE 83—Super-stabilized oil emulsion containing 83% by volume petroleum oil. May be combined with Lime Sulfur, Wettable Sulfur, Bordeaux, or Nicotine for dormant or delayed dormant spray.

KEYSTONE STABILIZED OIL EMULSION—66% by volume petroleum oil emulsified with Good's Potash Fish Oil Soap.

FISH OIL SOAPS—for making your own emulsions with petroleum oil, ethylene dichloride, paradichlorobenzene, carbon bisulfide, etc.

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Manufacturing Chemists — since 1868
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PHILADELPHIA, PA.

Kelly's

Certified Fruit Trees

Complete assortment of high quality
Fruit Trees at

Greatly Reduced Prices

APPLE PEAR PEACH
PLUM CHERRY

Small Fruits and Shrubs

It will pay you to plant Kelly trees
this year.

Send for your free copy of our big new
1940 Book of Bargains.

Kelly Brothers Nurseries

18 Maple St.
DANSVILLE, N. Y.

TREASURER'S REPORT

H. M. ANDERSON, Treasurer

1939		Receipts	
Jan. 18	Balance in Ephrata Bank	\$	578.39
	Reserved to pay outstanding accounts		11.50
	Received from C. B. Snyder		566.89
Jan. 18	Received from Savings Account		651.42
Jan. 18	Dues from Lanc. Assoc.		22.00
Mar. 3	Interest from back coupons Empire Prop. Corp.		20.22
Apr. 1	Received from J. U. Ruef		100.00
Apr. 4	Received from S. A. Smith (York County dues)		68.00
Jan. 12	(1940) Interest from Bonds		4.00
	Interest from Savings Account		14.58
		\$1,447.11	
Jan. 18	Balance in State College Account		328.81
	Total Receipts at State College		1,702.14
	(See report following)		\$2,030.95

1939		Disbursements	
Apr. 4	Deposited in Savings Account	\$1,000.00	
Apr. 24	Paid to Davidson Corporation		2.00
May 5	Paid to Sylvia Meeker		34.00
May 22	Paid to Everett Allen (printing vouchers)		2.40
Jan. 12	(1940) Credit on Savings		14.58
	Balance in Bank		394.13
		\$1,447.11	
	Total Expenditures State College Account		\$1,720.59
	Balance in State College		308.78
	Cash on hand		1.58
		\$2,030.95	

PENNSYLVANIA STATE HORTICULTURAL ASSOCIATION EXPENDITURES

Jan. 18, 1939	Dr. Ira A. Manville—Expenses	\$	100.00
" 23	D. M. James—Banquet		99.38
" 23	H. W. Prettyman—Expenses Mtgs.		25.05
" 23	Crabtree Co.—Medals		52.00
" 23	St. Louis Button Co.—Badges Mtgs.		20.32
" 23	J. K. Shaw—Expenses Mtgs.		44.15
" 23	A. J. Farley—Expenses Mtgs.		25.48
" 23	Harrisburg Telegraph Menu folders		10.00
" 23	W. S. Hough—Expenses Mtgs.		25.20
Feb. 6, 1939	Philipsburg Ledger Co.—printing programs		157.00
" 6	L. P. Batjer—Expenses Mtgs.		28.00
" 6	R. H. Hunt—Expenses Mtgs.		30.91
" 6	Nittany Printing Co.—Letter Heads		9.50
Mar. 22, 1939	Postage—March News		6.84
" 27	H. M. Anderson—Deposit		100.00
Apr. 3, 1939	Mary E. Ruef—Stenographic services		40.00
" 10	Postage—Proceedings late renewals		1.32
May 15, 1939	Philipsburg Ledger Co.—Proceedings & Env.		356.50
" 20	Harrisburger Hotel, meeting room		5.00
" 29	Telephone Philipsburg and Stewartstown		1.10
" 29	Postage, Proceedings late renewals		.80
" 29	Nittany Printing Co.—1000 Gov. Envelopes		35.25
" 29	Penn Publishing Co.—Apple Score Card		22.75
June 17, 1939	Postage, June News		3.09
" 20	W. B. Keeler—Rubber stamp		.40
" 24	Philipsburg Ledger Co.—June News & Env.		162.35
" 26	Mary E. Ruef, Stenographic Services		25.00
July 15, 1939	Stamps—Tour announcements		9.00
" 25	St. Louis Button Co.—Badges fruit tour		11.34
Aug. 7, 1939	Philipsburg Ledger Co.—windshield stickers, envelopes, folders		35.12
" 9	Myla S. Wert—Stenographic service		2.50
" 16	Rev. John W. Brown—Entertainment at Banquet		5.00
" 20	Mary E. Ruef—Stenographic services		10.00
Sept. 18, 1939	Warren Enck—Expenses Washington		4.35
" 25	Postage		10.00
" 26	Postage—Sept. News		1.65
Oct. 17, 1939	Philipsburg Ledger Co.—Sept. News		117.30
" 17	Mary E. Ruef—Stenographic services		20.00
Dec. 9, 1939	Philipsburg Ledger Co.—envelopes and labels		11.05
" 23	Mary E. Ruef—Stenographic service		20.00
" 23	Postage—Dec. News		2.48
" 30	J. U. Ruef—Transportation		
	Philipsburg 2/11, 2/27, 3/17, 6/3, 6/4, 7/8, 9/6, 9/22, 11/18, 11/27, 12/11		28.60
	Huntingdon, 5/8/39		4.00
	Harrisburg, 5/20/39		9.00
	Hancock, Md., 7/6/39		9.75
Jan. 11, 1940	Office Supplies		9.75
" 11	Postal Deposit		6.00
Telephone—			
	1/18/39—St. Thomas		1.05
	2/10/39—Philipsburg		.40
	5/ 3/39—Gettysburg - Allentown		1.25
	5/ 4/39—Philipsburg		.20
	5/ 8/39—Stewartstown		.90
	6/ 7/39—Philipsburg		.20

6/ 9/39—Philipsburg	-----	.20
6/14/39—Philipsburg	-----	.20
10/2/39—Biglerville	-----	.90
10/6/39—Chambersburg	-----	.95
10/6/39—Carlisle - Winchester	-----	.95
12/4/39—Philipsburg	-----	.20
12/9/39—Boyertown	-----	1.05
12/9/39—St. Thomas	-----	1.05
1/ 7/40—Philipsburg	-----	.40
Telegrams—		
1/12/39—Rochester, N. Y.	-----	.29
7/25/39—Biglerville - Pittsburgh	-----	.47
Traverse City, Mich	-----	1.42
7/29/39—Martinsburg, W. Va.	-----	.32
10/6/39—Hayman, Goodling, Hacker, Yoder, Cowen, Snyder, Brace, Enck, Hershey	-----	2.29
11/29/39—Pittsburgh	-----	.32
Total Expenditures	-----	\$1,720.59
Balance State College Bank 1/11/40	-----	308.78
Cash on hand	-----	1.58
		<hr/>
		\$2,030.95
Balance—State College Bank, January 18, 1939	-----	\$ 328.81
Receipts—		
Jan. 23, 1939—Dues and Advertising		188.99
Feb. 6 " " "		131.75
Feb. 14 " " "		58.00
Feb. 27 " " "		75.00
Mar. 20 " " "		59.00
Mar. 27 " " "		63.50
Apr. 3 " " "		78.50
Apr. 10 " " "		69.41
Apr. 13 " " "		29.00
Apr. 14 " " "		22.00
Apr. 17 " " "		40.00
Apr. 24 " " "		60.87
Apr. 29 " " "		44.00
May 8 " " "		9.00
May 15 " " "		26.50
May 29 " " "		26.66
June 19 " " "		27.00
June 24 " " "		81.00
July 3 " " "		62.82
July 17 " " "		27.00
July 20 " " "		14.50
July 25 " " "		16.00
Aug. 4 " " "		20.50
Aug. 21 " " "		28.00
Sept. 18 " " "		50.00
Oct. 17 " " "		73.32
Oct. 17 " " "		20.00
Nov. 6 " " "		24.75
Dec. 9 " " "		47.00
Jan. 8, 1940 " " "		169.57
Jan. 10 " " "		58.50
Total Receipts	-----	\$1,702.14
		328.81
		<hr/>
Total Receipts plus balance	-----	\$2,030.95

We find the report to be correct.

C. B. SNYDER, Chairman.

St. Thomas, Pa., February 21, 1940

Dear Fruit Grower:—

At the annual meeting of the State Horticultural Association, held in Harrisburg during January, the question of Standardization of Apple Boxes was discussed. At the end of the discussion, a committee was appointed to obtain information on the various size boxes used in 1939, and the shape anticipated in 1940. It is hoped that the following information requested will assist the committee in preparing a standard container satisfactory to the growers in Pennsylvania. This committee is working in cooperation with similar committees in adjacent States.

I hope you will consider this work of value to you as an aid in your future marketing program, and that you will return this information to me as soon as possible, using the enclosed envelope for mailing.

1. Have you used Boxes?.....
2. What size?: 1 bu..... 1¹/₈..... 1¹/₅.....
3. How were apples packed?
Jumble
Face and Fill.....
Wrapped and Placed.....
Tight Pack.....
4. What kind of box will you use this year?.....
5. What type of pack this year?.....

Very truly yours,

R. J. Gillan, Chairman
Package Standardization Committee.

PACKAGE STANDARDIZATION COMMITTEE

R. Johnson Gillan, Chairman	St. Thomas, Pa.
J. Eric Linde	Orefield, Pa., R. D. 1
J. B. Kauffman	York, Pa., R. D. 7
H. W. Skinner	Chambersburg, Pa.
W. E. Roth	Gettysburg, Pa.
H. J. Oyler	Gettysburg, Pa., R. D.
Frederick E. Griest	Floradale, Pa.
Lionel E. Newcomer	Boyertown, Pa.
Sheldon Funk	Boyertown, Pa.

DIVERSIFICATION ON THE FRUIT FARM

J. H. GOURLEY, Chief in Horticulture, Ohio Agricultural Experiment Station, Wooster, Ohio.

The condition and health of the fruit industry is receiving more attention in "high places" at the present than at any previous time in the history of American orcharding. (Of course everything else is also). This is obviously because there has been distress and a distressed condition is not good for the country. For years we believed that it was temporary, that shortly everything would be all right and that a laissez faire policy both individually and collectively was good enough. But we have finally come to realize that there is more deciduous fruit produced many years than the market can absorb at a profit to the producer. Hence, most fruit growers are seeking a solution but none seems to be at hand, at least none that has application to all alike. Certainly it is not our purpose here to offer any panacea for the situation. Not all sections are equally affected but probably all have suffered to a considerable extent. The prime objective now is to stabilize the industry as a whole and make it less speculative, if possible.

May we look at the drastic action in the far West as an example of the effort growers are making to adjust production to demand? It has been reported that in the state of Washington alone from 4,000 to 6,500 acres of apples were removed during the past year, or at least went out of production due to neglect. The crop in that state has dropped from 24,000 cars per year to 12,000, which is estimated to be two million boxes, or over one million dollars in revenue for the district. They are perplexed as to what can be raised in place of apples. Acreages as a rule are too small to diversify on the present holdings which run from 5 to 20 acres, as a rule. One writer says there is not one crop proposed that is not already overproduced. It is suggested out there that production per acre must go up and "sweat, frugality, cooperation of neighbor with neighbor, and mortgage holder with owner" must be practiced if they are to remain in business and make a profit. They already have a production of 500 to 600 bushels per acre and not infrequently reach more, as compared to a yield of below 200 bushels in many Eastern orchards.

Somewhat on the side, it is only fair to mention that many a fruit farm in the East is in difficulty because past earnings from it have been unfortunately invested in outside "securities" such as Florida real estate, stocks and bonds which proved well nigh worthless, the building of storages and homes based on future earnings, the purchase of equipment with the hope and expectation that fruit would sell at

higher prices next year. Even as you and I! We can call this poor judgment, bad management, or what not, but it has been common and nearly everyone has slipped to some extent.

Efforts to relieve the situation in East

While statistics are not available for the East, it is well known that something has been done along the line of acreage reduction and more is in the offing. In Illinois, for instance, it was reported last year that about 400,000 apple and 761,000 peach trees had been removed. A few years ago there was a heavy removal of peach trees both in the Fort Valley section of Georgia and in California but since that time there has been a renewal of planting in Georgia and the Carolinas. Many individuals throughout the entire Eastern fruit region have adopted a program of removing old orchards, obsolete varieties, and trees that are planted on unfavorable sites. But a more concerted action is needed, an interstate or regional program, which in the aggregate would remove some thirty million bushels of apples from the market.

Better packages and more uniform packing under guaranteed standards are both needed if the industry is to be stabilized. Probably much more will be done in the advertising of fruit than in the past but it is difficult to raise adequate funds on a volunteer basis. Special mention should also be made of fruit products, an infant industry that is capable of wide expansion. Small equipment suitable for the home has come onto the market recently that produces an excellent apple juice. In our own experience we have increased the number of apples used several fold and are delighted with apple juice as a substitute for other fruit juices at breakfast and often three times a day. Commercial production of fruit juices, canned apple sauce and apples for cooking, as well as frozen fruits are all increasing at an enormous rate and the future is likely to see a much greater expansion. Professor Fagan advises me that the apple canning industry this year will account for about 100,000,000 pounds in the Eastern apple belt and that quite a sizable percentage has gone into apple sauce.*

The last effort which we may mention is that of the purchase of apples by the Surplus Commodities Corporation. The plan called for the purchase of about ten million bushels. This has relieved the situation in many sections but should be thought of only as a temporary expedient.

*The reader is referred to two recent books dealing with this subject: The freezing Preservation of Fruits, Fruit Juices, and Vegetables. Tressler and Evers, 1936, Avi Publishing Co. Fruit and Vegetable Juices. Tressler, Joslyn and Marsh, 1939. Avi Publishing Co.

Crop diversification as a possible solution

All of these and many other proposals might be discussed at length but I wish at this time to suggest new consideration of an old practice—that of diversification of crops in the farm program. True, diversification is not applicable to all sections nor to all fruit farms in any given area, but it is one of several possible ways out of the present dilemma. It will depend upon the individual, his interest and experience, and his willingness to work out such a plan. It depends on the size of the farm, the size of the family, the market outlets. I proposed this plan to an excellent authority the other day and he immediately said there were two sides to that question. What, for instance, would you substitute in the cotton belt, in the far West, in California? Another acquaintance countered with the objection that any diversification throws an undue burden on the management part of the enterprise. It means that the management must have a wide knowledge of several lines which in this day of high specialization is increasingly difficult. Then, he continued, there is the question of overhead which should be kept at a minimum. He thought it wise to diversify only in new lines that would require about the same capital equipment such as sprayers, tillage tools, storages, etc. He also felt that livestock meant more land since it was folly to raise livestock on anything other than home grown feed. However, he believed potatoes, both sweet and Irish, small fruits, and beef cattle worked best on his farm. But we both agreed that there was no better opportunity for diversification than in the Northeastern United States. That fits Pennsylvania (and Ohio). Both soil, climate and market conditions make it possible.

The thought back of it is that only one cash crop, such as apples or peaches, is an example of having "all of our eggs in one basket." Too often the crop fails or the price is low, or substitutes are purchased, or some other factor reduces the income below the expense of producing it, that is, the industry is a hazardous one. To see a promising crop wiped out in a few hours or less of low temperature is a tragedy that few industries must experience.

Therefore the objects are:

1. To have more than one source of cash income.
2. To distribute labor throughout the season and thus retain a better grade of labor.
3. To give greater diversity to selling, especially where a home market is maintained or a local market is catered to.
4. To help overcome natural hazards of climate and give a better adaptation of crops to soils. Even on a small farm there is often quite a difference of soil types and topography.
5. To keep the enterprise young which is good for the farm management and good for the individual.

But how is this diversity to be done? Well that hits at the nub of the question, for probably no one would care to pose as knowing enough to say how each individual should handle his problem. Certainly it would be disastrous if all used the same crops. We are well aware, also that any crop we may mention is also over-produced in the total but it would be better for the individual to grow several crops in order to have a better balanced program. It is likely that some one crop should be a specialty, that is, a main core of interest should be maintained.

A few suggestions, gathered from observation and consultation with successful growers in my own state, would be as follows:

a. Diversity by growing more than one kind of fruit. This may be that the apple grower will also have a block of peaches, prunes, grapes, or small fruits. Just what, would depend upon his own conditions and preferences.

As an example, I may cite one successful grower who has 100 acres of apples, beginning with Transparent and ending in May or June with Stark and Winesap. His first cash crop comes from three acres of strawberries. Then comes six acres of black raspberries, 2 acres of red raspberries, and a few Boysenberries, which brings him up to the early apples. At his roadside stand he also sells sweet cherries, peaches, honey and flowers, as well as cantaloupes, sweet corn and other vegetables.

While I do not wish to go into the matter of varieties, this grower prefers Premier and Dorsett strawberries, New Logan, Bristol, and Naples blackcaps, Newburgh, Marcy and Taylor reds, Windsor and Schmidt sweet cherries, and Red Lake currants.

b. Diversify with some line of livestock. We used to think that poultry was a good ally but the hatching season and orchard activities coincide pretty closely. But with fall or winter hatching coming into vogue much of this objection would be overcome. As you well know, many fruit growers are in the commercial poultry business. One large fruit farm in Ohio has been in the turkey business for many years, and most successfully. One grower told me recently that this year they would make their money from sheep but some years feeding cattle paid best. Another writes me, "We have always kept some livestock (feeders) and I really believe that we have derived more benefit from this type of diversification than from any other source." In this connection we might mention the utilization of cull apples in large quantities by making silage. The state of Washington and also Virginia have published results of experiments and instructions on its manufacture. One of our orchardists is feeding a silage

made of four and a half parts fresh apples and one part corn stover. Whenever cull apples are worth less than five dollars a ton he puts them in the silo, although dairymen say they are worth six dollars a ton. This silage is fed at the rate of 35 pounds a day per head along with mixed hay. Cattle relish such silage and have shown no digestive disorders.

c. Diversify with potatoes and other vegetables. One correspondent in northern Ohio says that early peas, string beans, lima beans, sweet corn, and melons have helped out materially in years when fruits were not too abundant. In one section a number of growers are raising lima beans and selling fresh or putting them in cold storage for later sale. One forces rhubarb and others have fairly large acreages of asparagus.

d. Nursery stock and Christmas trees are grown by a good many orchardists and some of them do a small landscape business.

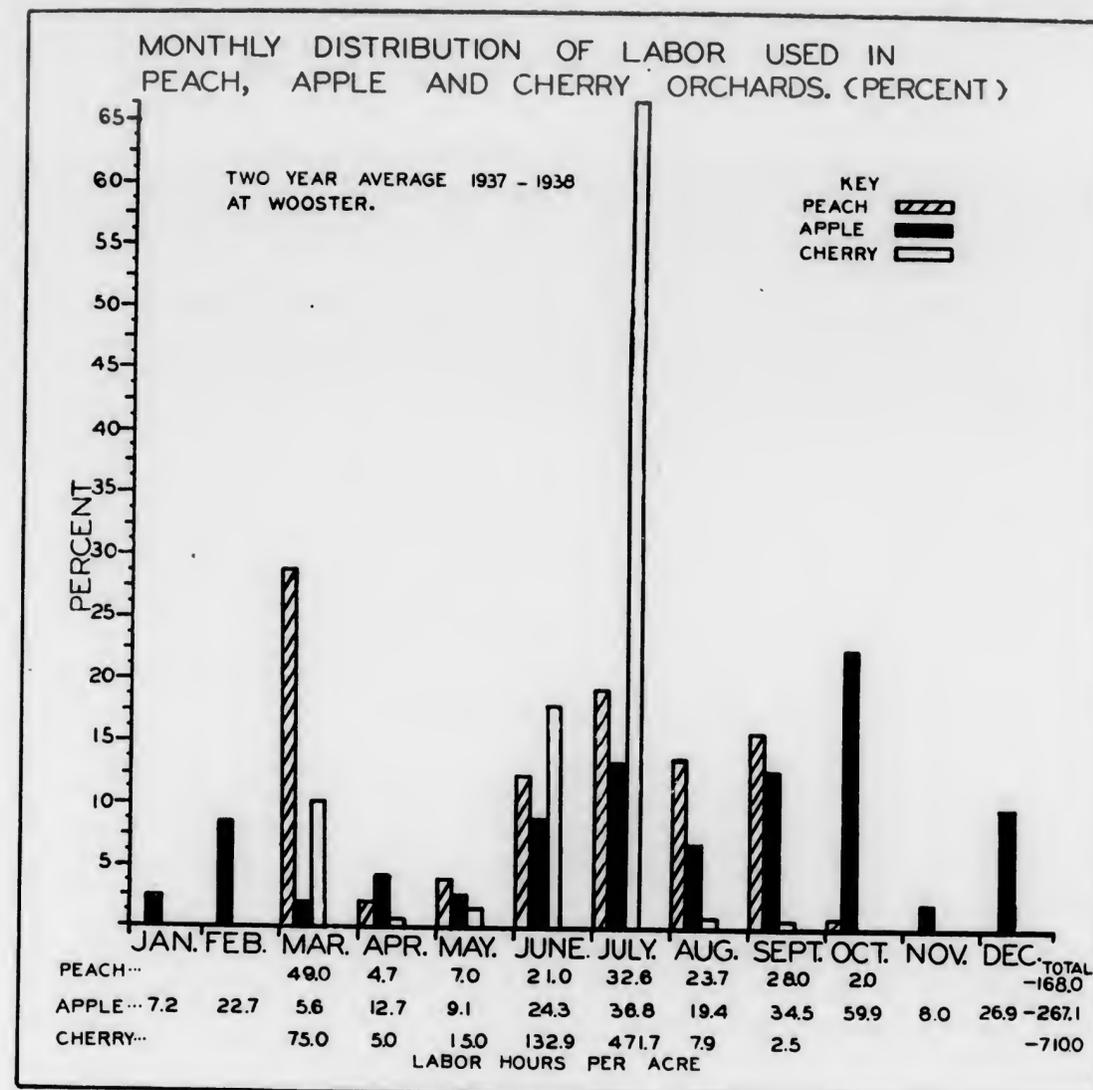
e. Some diversify with outside activities, such as being agents for farm machinery, spray machines and materials, and most everything else within the scope of one's imagination. Too great diversity or division of one's time may prove disastrous and the individual must measure his own abilities and talents along this line.

Certainly such a program requires greater ability as a manager, more equipment and capital investment, and more skilled help. But it lessens the risks and often saves an otherwise impossible venture.

Distribution of labor

The chief considerations in the matter are labor distribution throughout the year and market for the products grown. We have just made an analysis of labor on apples, peaches and cherries at the Ohio Experiment Station. This shows the highest peak in labor hours per acre for apples during September and October, that is, during picking season. It is 34.5 in September and 59.9 in October. Pruning operations during February raise the labor to 22.7 and thinning and spraying to 24.3 in June and 36.8 during July. Peaches reached their peak in March due to pruning and early spraying of 49.0 hours per acre. The other peaks were July 32.6 and September 28.0 due mainly to thinning, picking, and gassing the trees. Cherries showed an extraordinary labor peak at picking time—132.9 hours per acre in June and 471.7 in July. (See Fig.)

With these data as a background, one can determine what other crops would fit best with the fruit schedule. Both feeder steers and lambs, purchased in the fall and sold in



the early spring would occupy the labor at a period of the year when orchard operations are light. Or if they were pastured in the spring little attention need be given them during the period of greatest activity in the orchard. Early potatoes could be planted a little ahead of the peak of the season in the orchard and harvested a little ahead of the picking season of apples. Late potatoes would not fit so well but are often grown by the orchardist.

One grower in Georgia writes that he keeps labor employed through the year as follows: He grows 15 acres of strawberries and picks them from April 20 until about May 20. He has several varieties of peach in his 50 acre block beginning with Mayflower about May 20 and ending with Elberta about August 15. His 13 acres of staked tomatoes occupy help from June 15 to August 15 which interferes con-

siderably with the peaches. From July 15 until Christmas he plants and sells turnip salad, spinach, collards, broccoli, and Chinese cabbage. He also has one-tenth acre of hot house tomatoes.

So one sees that the attempts to diversify are legion. If the buying power were raised and the employment situation relieved and export markets opened up, much of the difficulty would be automatically solved.

Returns per hour of labor for different enterprises

The Cornell Extension Service has published a comprehensive report on farm management for fruit growers (Bulletin 355) and I quote from it.

"Returns per hour on apples were higher than on any other crops for the 14 year period 1921 to 1934. In general, cash crops, such as alfalfa, canning-factory tomatoes, cabbage, and potatoes gave good returns for the time spent on them. Hay, other than alfalfa, and grain paid little or nothing for labor after all other expenses were paid.

"Yield is one of the most important factors affecting the returns per hour of labor on an enterprise.

"Next to fruit, canning-factory tomatoes and cabbage are some of the most profitable cash crops for western New York. Cabbage is a highly speculative crop. Although losses were heavy in some years, cabbage has paid well over a period of years.

"In making an adjustment away from wheat, farmers should include as much as possible of the crops that give the highest returns per hour of labor. On well-drained soil, apples are probably the most profitable crops for the western New York fruit section. Where one is close to Lake Ontario and where the soil is especially well adapted to fruit, peaches and cherries may be profitable additions to the farm business."

We may feel that these figures are a bit out-of-date in the light of the past couple of fruit seasons, but they point to several important considerations in a study of this problem of diversification.

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FRUIT AND VEGETABLE DISTRIBUTION IN THE NEW YORK AND PHILADELPHIA MARKETS

**WILLIAM C. CROW, Senior Agricultural Economist, United States
Department of Agriculture.**

The reason for my appearance on this program is to urge you to devote a part of your time and attention to the subject of distribution of your products. For many years, most

of the emphasis in agricultural meetings and in research has been placed on the problems of actual production, often to the neglect of the problems of distribution, which are of at least equal importance. Perhaps the reason for this may be found in the fact that, to a large extent, changes in production technique can be brought about by individual action, while the individual must take the marketing system as he finds it unless he is to work with other individuals and groups in effecting necessary changes.

The importance of distribution to you producers of fruits and vegetables can best be brought out by the citing of one or two figures. It cost about one and a half billion dollars to distribute one billion dollars' worth of fruits and vegetables from the farmers to the consumers of the United States in 1936. That is, for every dollar the housewife spent for fruits and vegetables, you growers received only 40 cents. Considerably more than half of this one and a half billion dollar marketing bill was incurred after the produce reached the large cities. For this reason, when the Bureau of Agricultural Economics began studying the fundamentals of our marketing system to try to find out where improvements might be made, it first looked into conditions in the large city markets.

Brief surveys have been made of the wholesale markets in 40 of the large cities of the country, cities which are outlets for about half of the total fruit and vegetable production of the country. More intensive studies have been made in Philadelphia, New York City, Kansas City and Atlanta. An analysis of the situation in these 40 cities reveals that many problems are common to nearly all of them. So whether you use the New York, the Philadelphia, or the Baltimore market, you will be interested in some of the problems which exist in all these places.

Problems in City Wholesale Fruit and Vegetable Markets

1. In many cities the wholesale markets for fruits and vegetables are very old. Two of the oldest markets for which any record was found are the Faneuil Hall Market of Boston which is about 200 years old and the French Market of New Orleans, about 150 years old. Each is still one of the most important markets of the city in which it is located. Only 44 of the 101 markets in the 40 cities studied have been built during the last 20 years, and many of these are railroad-produce terminals.

Many changes have taken place since these markets were constructed. The population has increased manifold. Methods of transportation have changed from water and wagon to rail and motor truck. Produce from distant producing areas has become available throughout the year. Per-



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capita consumption has increased. Yet with all these changes the markets have undergone little change. Many of them, new as well as old, are improperly located, designed and equipped.

In several respects, many of these markets are inadequate. Many of the buildings are not suitable for the efficient handling of produce. They are old, were not designed for handling fruits and vegetables, have not been kept in good repair, and cannot now properly protect perishable products against the weather.

Most of the buildings are not equipped with cold storage rooms and many do not have adequate facilities for common storage.

Frequently stores are too narrow, too small, and as a rule they have no rear entrances. Frequently motor trucks must unload supplies at the front of these narrow stores at the same time that other trucks are loading. When this small space is occupied by one truck other trucks often stand in the narrow street waiting their turn at the curb. In at least one city, farmers' trucks line the curb so that trucks hauling to or from the stores must find parking space some distance down the street or around the corner, and supplies must be moved along crowded sidewalks between the store and the truck. In most cities, traffic congestion is so serious at times that trucks cannot even get near the sidewalk and supplies must be carried by hand to the stores.

Floors of stores and the sidewalks in front of them, as a rule are not at the height of truck beds and the floors of railroad cars. Hence, the produce must be lifted and lowered (and frequently dropped) in loading and unloading.

As some stores are so small or so narrow that the only available space is far in the rear, fruits and vegetables are displayed on the sidewalks and even the streets, exposed to all kinds of weather. Occasionally refuse of the gutter is piled against the packages of produce.

Many of the farmers' or truckers' markets that operate either separately or in connection with other markets are likewise inadequately equipped. Frequently the only available space for display and sale is along crowded streets. In other cities an open lot is provided, and trading must be carried on without so much as a shed to keep off the rain and hot sun.

Many other illustrations of improperly designed and equipped markets could be cited, but the conditions already

described should be sufficient to give a picture of the situation.

Conditions like these mean increased labor, waste of time, high operating costs, inadequate merchandising (display, storage, etc.), unnecessary handling, needless exposure, large losses from spoilage or at least sufficient deterioration so that spoilage will be rapid later in the retail store, unsanitary conditions, and many other unsatisfactory items.

These conditions make real efficiency in marketing perishable products very difficult, if not almost impossible, to attain.

2. In many cities such conditions have led to the establishment of competing markets in other sections of the city. Often these markets are little better than the old and do not approach a real solution to the problem.

Railroads have built, at enormous expense, modern produce-terminal markets, separate from the regular markets, and have restricted their use to produce arriving over their own lines. Then other railroads have built competing markets to handle produce arriving over their lines. Other agencies have likewise set up new markets which were not designed to provide a complete and efficient single market for the city but which merely resulted in dividing the business among several markets no one of which is adequate. In this way much money has been wasted in providing unnecessary, inadequate and duplicating facilities. In 33 out of the 40 cities covered in the recent survey, there are two or more wholesale and jobbing markets for fruits and vegetables; 15 of the cities have three or more such markets; and in one city there are nine markets.

The waste in providing facilities is not by far the most serious evil in having too many markets. Business is so split that much cross-hauling, or trucking, among markets is necessary. This entails not only a continuing needless expense for cartage but increases spoilage and is conducive to the development of racketeering. Often no one market has a complete line of goods, so buyers must go from one market to another, perhaps in widely separated parts of the city, to obtain supplies. Operating expense increases. Often so much time and handling are required that produce reaches the retail store in poor condition. Supplies are scattered, price-making becomes a difficult process, and it is hard to enforce necessary regulations. Furthermore, the very existence of these separate markets produces a situation where, because of vested interest, previous investment, and inter-market strife, it is difficult to effect the thorough market reorganization that is needed. Too many markets in a city is a distinct hindrance to the efficient handling of produce.

3. In addition to inadequate markets and the existence of too many markets in a city, a third problem has become very serious. In most cities the markets do not have proper facilities for handling the increasing quantities of motor truck receipts. In 1936, about 44 per cent of the fruit and vegetable supply of 40 large cities arrived by motor truck. During each of the last two years, Philadelphia has received more by truck than by rail. Large trucks have crowded into old markets situated on narrow streets, bringing serious traffic congestion. In some markets literally hours are required for a truck to get into a market and unload, and the same is true of buyers' trucks coming into the market to pick up purchases.

The situation is exactly as though a hundred of you fruit growers here in Pennsylvania were to come into Harrisburg and attempt to use the row of stores in a couple of the main business blocks for your packing sheds, all side by side, and all fronting only on the one street. You would bring all your fruit in from the orchards, unload it onto the sidewalks, and carry it into these buildings. After it was packed, you would carry it out again, lift it up from the sidewalk to your trucks, and haul it away. Each of you would be handling, say, from one to ten carloads of fruit each day, and would have from 10 to 50 trucks trying to get to each of these packing houses, all located along this one block. The trucks couldn't all get there when they wanted to, of course. They would have to form in line and wait their turn. If the weather was hot, and peaches were getting ripe, that would be just too bad. Well, that is exactly what is taking place in Dock Street, and in Washington Street in New York, and in many other markets, every night of the year. Producers and shippers have streamlined their handling and packing methods. Hours and days have been cut from transportation schedules between shipping point and markets. Speedy trucks and arterial highways insure quick delivery from the markets. But the markets themselves have failed to keep pace with these modern developments.

Not only have increased truck receipts produced traffic congestion but by being forced into particular markets they have in many cities increased the volume of business of these markets far beyond that which they can efficiently handle. This is happening in cities where, at the same time, railroad-produce terminals are more than one-half idle.

Motor trucks are apparently here to stay, so any reorganization of terminal markets must take them into account. In many cities conditions have become so bad that adequate facilities must be provided for handling fruits and vegetables arriving by truck. Failure to provide such facilities will not only tend to prevent reduction of marketing costs, but be-

cause of the flexible nature of this method of transportation will tend to encourage the movement of product around the established markets rather than through them. Here is a problem that the markets must solve or it will be a factor in their destruction.

4. A fourth evil in most markets is due to the fact that in few cities it is possible for fruits and vegetables to be unloaded directly from the railroad cars into the wholesale market. A truck haul through heavy traffic is usually necessary. This is true even in new markets, which is only one way in which new markets have not been designed to cure the evils of the old. In New York, the cost of hauling from the various piers and team tracks, where produce must be unloaded, to the Washington Street market adds up to the staggering sum of about 3 million dollars a year. In addition to the cartage costs, other costs due to inability to unload cars directly into the markets include delays, spoilage, exposure, inconvenience, and often the development of rackets making unnecessary charges for services rendered or levying charges for services which are not performed at all. A good market must reduce hauling and other handling to a minimum.

5. Long, unregulated selling hours, lack of information on supplies, and unethical practices are among the other serious problems common to most of our markets. Long selling hours not only increase the cost of doing business or force dealers and their employees to work excessively long hours, but they also tend to lead to greater price fluctuations throughout the selling period. Lack of information on supplies is a distinct handicap to the proper operation of price-making forces. Improper sampling, unjust claims against railroads for damages, racketeering, and improper returns to shippers are practices that not only increase the costs of marketing but encourage buyers and shippers to deal directly with each other rather than through the established markets. To some extent, unfair practices are being overcome by legislation and by trade regulations, but much more needs to be done.

Conditions in Philadelphia are quite similar to those which I have just described as being common to most of the large cities. There are five wholesale fruit and vegetable markets in Philadelphia, and the path that produce takes in moving through them may be illustrated by using a carload of oranges as an example. The oranges would probably be unloaded from a boat on a pier along the Delaware River. Then they would be loaded into a freight car and hauled either to the Pennsylvania produce terminal or to the Baltimore and Ohio-Reading produce terminal, where they would be unloaded, displayed, and sold at auction. Then the oranges would probably be reloaded into a truck and hauled to the

Dock Street Market or the Callowhill Street Market, where they would be displayed and sold to the retailer. Of course, this handling through many markets is expensive and is not particularly beneficial to the produce. Most of the rail receipts in Philadelphia are unloaded at either one of the two railroad-produce terminals and sold there, with a large part moving to the Dock and Callowhill Street Markets. Truck receipts have not until recently been permitted at either of the railroad terminal markets, so most of them go to the Dock Street and Callowhill Markets. The railroad produce terminals are at least 50 per cent unused, while the Dock Street Market during the busy season cannot begin to handle the amount of business that is pouring into it. Since supplies are scattered through five markets, buyers must often go to as many as three of them in order to obtain a complete line of produce.

Our recent studies in New York show that New York City consumers spend about one-fourth of a billion dollars per year for fruits and vegetables and that half this amount goes to pay the cost of getting this produce from the city limit to the housewife's kitchen. The situation in New York is similar to that in Philadelphia, though much worse. For example, rail receipts for the most part come to the New Jersey side of the Hudson River. From there they are floated across the river to piers, where as much of each car as the dealers think can be sold is unloaded (the remainder being floated back to New Jersey). A part of this unloaded produce may be sold on the pier or it may move on to some other place without being sold there. Some is delivered by truck from the pier to trucks of buyers standing along the shore, perhaps less than 200 yards away, with a cartage charge of about \$30 a carload. A large part moves from the piers to the Washington Street store area, some two blocks away, at a cost of about \$40 per car. In this store area is handled not only supplies arriving by rail but also an immense volume of truck receipts, which come directly from producing areas along the entire Atlantic seaboard, and also much of the boat receipts which are carted from the piers of the various steamship lines. The Washington Street area is so congested that often the incoming trucks cannot get near the stores and produce must be carried the remaining distance by hand.

After sales have been made, the produce is again loaded into trucks, usually by being carried or moved by hand trucks for a distance of one or two blocks to the buyer's truck which is parked in an adjacent street. The cost of such portage in this one market area amounts to about one and one-third million dollars per year. A large part of the supplies from Washington Street are hauled to secondary markets, such as Wallabout and Bronx, to be unloaded, resold, and re-

loaded. After passing through a number of successive markets, subjected to a great deal of delay, separate cartage operations, portrages, exposure and other costly factors, the produce reaches the retail store, much of it in a deteriorated condition.

Conditions such as these in New York City, Philadelphia and most of our other large cities are detrimental to the interest of a number of groups: (1) Farmers suffer through lower prices and spoilage, and even if farmers do not use the large city markets they often sell in places where prices are determined by the prices prevailing in the nearest large city; (2) consumers must pay higher prices for deteriorated produce; (3) the railroads suffer a loss of business because produce arriving by rail is subjected to more handlings and greater expense than that arriving by motor truck; (4) the independent retailer who has to buy in these markets, with their high costs and deteriorated produce, finds it difficult to compete with chain stores and groups of retailers who have banded themselves together in such a way that produce moves directly from producing areas to some centrally located warehouse and on directly to the retail store without moving through the wholesale markets; (5) workers labor for long hours; (6) wholesale dealers operating in these markets find that the cost of distribution through their channel is so high that large quantities of produce are being moved around their markets directly to large-scale buyers, other buyers, and to surrounding towns and cities, with the result that for a number of years they have been finding it difficult to compete with the newer channels of distribution. Hence in some of the cities the volume handled in the wholesale markets has actually declined, while in others the volume has remained the same, although it continually represents a smaller and smaller proportion of the total fruits and vegetables handled in the city.

What, then, are the essentials of a good terminal wholesale fruit and vegetable market?

A good terminal-produce market should be

A. Complete

1. Centralize both rail and truck receipts (and boat receipts if possible) from all states.
2. Enable dealers to supply buyers with a full line of goods.

B. Well located

1. Shortest time-distance to retail stores.
2. Easily accessible to main highways and city arteries.
3. On low-cost land to permit economical lay-out.

4. On an area large enough to take care of future expansion.

C. Well designed

1. Direct unloading from rail and truck to sales floor.
2. Stores with front and rear entrances designed for ample display space, storage room and offices.
3. Wide streets and adequate parking areas.
4. Fenced to improve market reporting, regulation and sanitation.

D. Constructed at reasonable cost

1. Provide only necessary facilities.
2. Such facilities as are provided should be plain, inexpensive, economical, sufficient but not elaborate.

E. Well managed

1. Managed in such a way that it will operate in the general interest of the public without discrimination against any type of dealer or buyer, or against produce from any state.
2. The charge made for the use of the facilities in the market should be as low as possible and should not be designed to produce a profit for any organization.

If conditions in these markets are so bad and are injurious to so many groups, then why hasn't something been done to improve them? The principal reason is that no one individual or group is big enough to effect a change in the marketing system. Many groups are involved and they must be brought together. These would include growers, wholesalers, jobbers, brokers, railroads, cold storage houses, retailers, truckers, city and State governmental agencies, and the like. In some cities, where a substantial majority of each of these groups desires action, there is no agency to make the necessary plans to bring the groups together, and to get the necessary action. Hence the principal need in such cities is for some agency to develop the plans and put them into effect.

In Philadelphia, many plans have been worked out for improving the market, some of which would save from one to two million dollars annually on the cost of distribution. These plans have been discussed with members of the trade, growers, and other groups concerned, but as yet no course of action has been decided upon. Many meetings have been held with the trade; truckers, buyers in Philadelphia and surrounding towns, and buyers who used to come to Philadelphia and surrounding towns, and buyers who used to come to Philadelphia but who now do not, have been interviewed.

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There have been discussions with railroad officials and with consumers. There has been much publicity given, both by public and private agencies, to conditions there. Both newspapers and radio have taken up the discussions. Growers have held many meetings to discuss the situation, have established county committees, State committees, and a regional committee for the purpose of insisting on improvements; and finally a joint committee composed of members of the trade, growers, and consumers was established to coordinate the activities of the groups.

Some months ago this committee asked the agencies that conducted the original survey of the market for more information on the possibilities of developing a complete wholesale market around one of the present markets; that is, around Callowhill Street, Dock Street, or the railroad terminals. Such a report has been prepared and estimates made of approximate costs of developing a complete market around each of these three areas, including sales platforms, modern store units, wide streets to expedite traffic, cold storages, team trucks, and rail connections to each store. In each area any suitable facilities which are already available would be utilized. Very briefly, these costs may be summarized in this way: Assuming that the entire cost would be paid for from rentals of the store units, the probable monthly rental per store necessary to cover maintenance and operation, and to amortize the investment in 25 years, would be \$510 for the Dock Street area, \$340 for the Callowhill Street area, and \$1.60 at the railroad terminals.

Such plans were based on the development of a really adequate, complete and centralized market, requiring a sufficient area in which to handle the 75,000 carloads of fruits and vegetables which are marketed in Philadelphia each year. The Dock Street property owners have now advanced some proposals for a few minor improvements and readjustments in that area, but they have not indicated any willingness to cooperate on a program of far-reaching importance or really adequate developments.

The expenditure of large additional sums of money on the market facilities in Philadelphia will not materially reduce the costs of distributing fruits and vegetables, unless it corrects the fundamental evils and shortcomings of the city's marketing system. Millions of dollars have been spent by the railroads for terminals, yet a very serious and costly marketing problem still exists because in the expenditure of those millions, no provision was made for a complete and coordinated market. Vastly over-built facilities were set up for a part of the operations, with no provision as to where or how the remainder of the distributing activities were to be carried on. Now it is being proposed that additional hun-

dreds of thousands of dollars be expended in some minor alterations to the other parts of the system, that is, to the Dock Street properties, but still without any regard for coordination or unification of the market as a whole, or for a correction of the major underlying problems. Such expenditures would merely tend to perpetuate the present condition and high distributive costs—widely separated competing parts of the marketing system; outgrown, crowded and inadequate quarters; part of the market without railroad connections and therefore with no possibility of reducing the costly hauling from one part of the market to another; no adequate facilities for the immense volume of truck receipts; and the other inevitable evils which are bound to prevail under such conditions: extra hauling and exposure of perishable products, with excessive deterioration and spoilage; long hours of business for both buyers and sellers; lack of information on supplies; and racketeering and various unethical practices.

One of the few actual and tangible efforts which has been made in Philadelphia to improve handling conditions and to lessen traffic congestion in the market was the opening of "C" platform for truck receipts. As many of you know, "C" platform is one of the long, enclosed platforms of the produce terminals of the Pennsylvania Railroad, which has been practically unused for many years. About a year ago, a group of dealers leased this platform from the railroad, and opened it as a terminal for trucks, with the idea of using it as a delivery station and wholesale market for some of the truck receipts. Bitter opposition developed, and only a very small number of trucks have unloaded there. According to articles printed in the Philadelphia newspapers, the opposition was stirred up by Dock Street property owners.

Quite naturally the owners of these properties will fight any new developments, for much better facilities could be provided at far less cost. At the time the survey of the market was made, average store rents in Dock Street were about \$300 per month. In the new market which has just been completed in Kansas City, the very best store units that could be designed, with our present knowledge, are renting for \$150 per month. Small wonder that Dock Street property owners are said to be apprehensive of the development of any competing facilities.

But the question is, who really pays for these extra rentals and the other high distribution costs? In the long run, some part of it must surely come out of the returns to growers who send their products to that market.

There are, among the dealers in Philadelphia, a large number who realize the handicaps and obstacles under which

they are operating, and who are very anxious to have a first-class market. Numerous consumer and civic groups have become genuinely interested in the problem, and we have been told that they plan really to do something about it. You growers and shippers, who are so directly affected, should take every opportunity to express your interests in these problems, and to cooperate with all of the groups who are attempting to get constructive action.



AIR-COOLING THE COLD STORAGE

R. D. ANTHONY, Pennsylvania State College, State College, Pa.

Nine years ago Professor Fagan built an experimental storage at State College. Previous to this we had made an extensive study of the "common" or air-cooled storage. These studies had been made at State College, in a number of commercial storages throughout the State, and especially at the Marble Laboratory for Storage Research at Canton, Pennsylvania. The air-cooled storage had proved to have certain very desirable qualities and certain definite limits.

In the properly constructed and efficiently handled air-cooled storage, apples could be kept without scalding and without shriveling, and, if the fall temperatures were low, such kinds as Stayman and Rome could be maintained in good condition till late winter. But a warm fall would start the ripening process to such an extent that the fruit would become too ripe for best commercial uses, and most varieties could not be kept to advantage later than Christmas. This was especially true in the south eastern part of the State where temperatures are considerably warmer than at State College or at Canton.

The cold storage at State College was an attempt to combine the desirable features of the air-cooled storage with the ability to cool the fruit quickly at harvest time so that it could be kept through the normal storage period. Because of this, the storage has large doors placed on opposite sides so that when these were opened any air movement outside would sweep fresh air through the stacks. These doors are opened for several hours at least three times a week and as they are used as loading doors there is considerable ventilation whenever fruit is brought in or removed.

The refrigerating system is direct expansion ammonia with a cooling tower for the water for the condenser.

This storage has proved entirely satisfactory and very economical in use because for about four months nature sup-

plies most of the cooling and all the ventilation. About one K. W. of current is used per bushel of capacity per season.

The success of this and many other similar farm storages throughout the state has increased the interest in cold storage construction. Now many growers who are satisfied that they want a cold storage are asking whether they should use a direct expansion system or a blower system.

I am not going to attempt an answer to that question. In fact, our feeling at present is that there is no certain answer to this question. We know the direct expansion system has been in use for many years and, in general, has proved satisfactory. We know that some growers are well satisfied with a blower system. We also know of cases where both systems have failed.

Analysis of cases of failure and success in various storages has confirmed our belief that proper construction and operation of the storage is much more fundamental than the choice of any particular refrigerating system. Economy of operation and the necessity for efficient ventilation make it highly desirable to run the storage as an air-cooled storage whenever outdoor conditions justify it. This means we must have large ventilating doors, stacks so placed that air can get through them and packages not too tight to let in air, slatted floors and ventilating space over the fruit. In most of Pennsylvania the storage temperature can be kept between 32 and 36° for about four months by controlling the intake of fresh air. It is not necessary to have a power blower to do this if the outside doors are large enough. It is much cheaper to open a door than to use a power fan.

A direct expansion system without outside ventilation will usually give scalded fruit by February or early March. If you are determined to keep your storage tightly closed a blower system will supply air movement and probably check scald. On the other hand, blower systems are not "fool proof"; ventilation may not be uniform and some fruit may shrivel while other lots show some scald. Both systems have proved satisfactory when combined with proper ventilation.

Again let me emphasize that the first step in building a cold storage is to build an efficient air-cooled storage with an insulated floor. The choice of the refrigerating machinery can depend on price, nearness of a good service agency, water, storage space, and a dozen other minor factors.

CAUSE OF CULL APPLES AND THEIR ELIMINATION

F. N. FAGAN, Pennsylvania State College, State College, Pa.

Most growers know the cause or causes of cull apples. At least any grower that has ever packed a crop under State-Federal Grade Inspection knows a cull apple.

This cull apple problem has been before the growers at their State Meetings in Virginia, West Virginia, Maryland, Pennsylvania, and many other states, for several years. We all know there has been talk about having laws passed to rule the cull off the market. I understand a law has been passed, or at least talked about in the State of Missouri, which would require that all apple culls be branded if offered for sale as fresh fruit. The brand would be the word "Culls" in three-inch letters. The Virginia growers devoted much time at their December 1939 Society Meeting to the cull apple problem. In the 1939 Virginia Society Report the discussion on the cull apple subject takes up 18 printed pages.

Laws may be passed to regulate the sale of what may be called cull fruit; however, will such laws, United States or State, be constitutional? I do not believe such "lawing" will get rid of the fruit cull at all, or keep it off the market. Right now the "U. S. Unclassified Grade" covers any apple not up to U. S. Fancy; U. S. No. 1; U. S. Utility; U. S. Commercial; U. S. Combination and U. S. Hail Grade. U. S. Unclassified grade might be a cull.

Just what is a cull, anyway? To me, and I rather expect to most of you as well as to many consumers, the U. S. Utility apple is nothing but a real good cull. Let us see what could be packed and called a Utility apple. The apple must not be over-ripe; not very mealy or soft; carefully hand-picked; not so seriously deformed that the appearance is severely affected; smooth, solid russeting that does not affect more than one-half of the surface (it could affect 49% of the surface); limb-rub; hail punk marks that may not affect more than 1-10 of the surface; hail cuts that are healed and affect not more than an area $\frac{1}{2}$ inch in diameter; visible water core which affects an area of not more than $\frac{1}{2}$ inch in diameter; scab spots or cedar rust which affects not more than an area of $\frac{3}{4}$ of an inch (a spot of scab or cedar rust could be 74-100 of an inch in diameter and still pass); sooty blotch or fly speck fungus that affects not more than $\frac{1}{3}$ of the apple's surface; not more than 5 healed insect stings. Just picture what a Utility apple can be.

When we look this "trading horse", the Utility apple, in the face, most of us will say it is darn near a cull. So at least to most of us, anything below Utility is a cull. On the domestic fresh fruit market today most apples under $2\frac{1}{4}$ " in dia-

meter, clean or otherwise, are culls as far as general use is concerned. A 2-inch apple, regardless of how perfect it may be, is just not wanted. So we might say that most small apples below 2 1/4" are culls.

It would be nice for the good grower if the United States Health Officers would find that scab, cedar rust, limb rub, spray burn, sun scald, insect stings, water core, hail punk, bitter pit, etc., damage the apple to such an extent outside the limit of U. S. Utility, that it was not fit for human use. The health law would then rule the cull out of the market. I, for one, do not expect the health officers to find this to be the case.

I expect this cull problem will be with us until such a time comes, that the grower who produces a crop which grades a large per cent of culls, will just go out of business.

You men know what causes most of the culls produced. You all know most people would rather not use a cull. You all know that most people do not want a cull of anything—fruit or shoes. Our apple canners would rather not work up the cull fruit. Even the vinegar business could get along all right without culls.

When the "Fair Labor Standards Act of 1938" gets into full swing at 40 cents an hour, Oct. 24, 1945, I rather expect the canners of apples will not even be able to use a U. S. No. 2 canner in any way except for cider. At 40 cents an hour, I hardly see how any one can hand-work 24,999 pounds of bad apple tissue out of 100 pounds of apple flesh. The cost of hand-work, I believe, would leave a loss, for the canner, as he would only have 75.001 pounds of good flesh left. The apple canner will be no different than the hotel, the restaurant, and the pie baker, for they also will be paying 40 cents an hour. In fact, I rather doubt where the 30 cents an hour labor (as of October 24, 1939) left any profit in working up a U. S. No. 2 canner this last season.

As I see the trend of things even the U. S. Utility grade of apple may work itself into being a cull, just because of our economic set up.

Some culls are produced and the grower can do nothing to prevent such production. Most culls are produced by causes that can be controlled by the grower. The causes of culls that the grower probably cannot control are:

1. Extra dry weather—resulting in small fruits. However, with good soil culture and thinning he can do much to prevent small apples.
2. Weather conditions affecting growth resulting in cork, bitter pit, water core, etc.

Canning House Prices For Apples—1939:

70c a 100# for U. S. #1 Canners 30c a 100# for U. S. #2 Canners
20c a 100# for Ciders

In some locations if fruit graded below 60% U. S. #1, prices were:
60c a 100# for U. S. #1 Canners 30c a 100# for U. S. #2 Canners
20c a 100# for Ciders

Grade Records of Some Crops—Tree-run York, Stayman and Baldwin

Orchard Number	The % of the #1	Grades #2	Ciders	No. of Bu.	lbs. of Fruit at 45lb. to 1 u.	Age of trees—yrs.
1	95	4	1	30,000	1,350,000	15-20
2	87	8	5	21,000	945,000	25
3	95	3	2	35,000	1,575,000	40
4	98	1	1	20,000	900,000	25
5	98	1	1	25,000	1,125,000	30
6	93	4	3	2,631	118,395	20-31
7	94	2	4	1,430	64,350	25
8	63	34	7	8,000	360,000	various
9	69	25	4	15,000	675,000	20
10	57	40	3	20,000	900,000	30
11	64	27	9	10,000	450,000	various
12	60	30	7	2,000	90,000	various

What return did #3 orchard receive for the 1939 crop?

U. S. #1	95%	on 1,575,000 lbs.	\$10,473.75
U. S. #2	3%	"	141.75
Ciders	2%	"	63.00

Total received \$10,678.50

What return would #3 orchard have received if the fruit had graded as did the fruit of #10 orchard?

U. S. #1	57%	on 1,575,000 lbs.	\$ 6,284.25
U. S. #2	40%	"	1,890.00
Ciders	3%	"	94.50

Total received \$ 8,268.75

The difference in favor of a grade of 95% - 3% - 2% is \$2,409.75

Care of the Orchards in 1939

#3 orchard 40 yr. old trees	#10 orchard - 30 yr. old trees
Received manure	5lb of nitrate fertilizer
received 10lb Cyanamid per tree	part in sod and part cultivated
sod culture	received pruning
received pruning	no thinning of green fruit
no thinning of green fruit	a delayed dormant spray of L. S.
a delayed dormant spray of L. S.	Pink spray of L. S.
also 83% oil	Petal fall spray of L. S. and lead
Pre-pink spray of L. S.	2 cover sprays with lead
Pink spray of L. S.	
Petal spray of L. S. and lead	
1 cover spray of L. S. and lead	
3 cover sprays of Bordeaux and lead	

You can decide for yourself if the extra \$2,409.75 is worth the effort. If the low grade of 57%-40%-3% of #10 orchard was due to codling moth or scab what will be the cost of this grower's fight in 1940?

3. Hail may cause an entire cull crop. Hail insurance will cover the cost of production and the vinegar plant can use the apples.
4. Poor pollination may cause a lot of lop-sided apples.
5. A freeze or a frost may cause lop-sided apples and russet.

The causes of culls that good growers can largely prevent are:

1. The common mechanical bruise. The grower can, and I believe will, in time, just have to cut out the rough handling of his fruit, beginning with the picking and ending with the final delivery of the package.
2. Small apples—when the crop is heavy the grower will have to thin the green fruit, and give good soil culture in a way that will hold moisture for full development of the crop.
3. Nearly all insects and diseases can be controlled and most growers know this fact.

The large per cent of culls produced each year is the result of some type of neglect in orchard operations. Let us look at some crop figures that show the growers can produce crops with only a few culls. These figures also show that a grower cannot afford to produce a crop with a high per cent of culls. The data being handed you at this time comes from orchards mostly in our large apple belt in Southern and Southeastern Pennsylvania.

Even in a year of rather low prices for apples the good, careful grower paid expenses. He may not have made much or any profit. The grower who neglected only one or two orchard operations, did not pay expenses.

As I study the cull apple problem, I come to the following conclusions.

1. To get rid of the problem the commercial grower will have to stop growing culls, of any variety.
2. Many poor and unwanted varieties must go out of production, for such varieties are culls to the trade.
3. Education of the consumer to the economy of using the higher grades of apples.
4. The passing of regulations by the Federal and State Governments requiring that any and all fruit offered for sale, be branded as to grade. The most good coming from such a regulation will be from its educational value and not from its penal value. For many years to come we will still have growers who will sell culls into the fresh fruit channels because we will have buyers (more so than consumers) who will buy such fruit.

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NEW PEACH VARIETIES

C. O. DUNBAR, Pennsylvania State College, State College, Pa.

A few weeks ago when the Secretary asked me to give a talk on new peach varieties, I told him the time was about three years too soon. The trouble is that right now we are in a state of transition or change and while we know quite a few varieties not to plant, no single new variety has as yet proved its worth for a sufficiently long period to warrant its recommendation.

As most of you well remember, each year during the past ten or fifteen years has seen at least one and usually several candidates for the peach hall of fame. Not only did the pictures and propaganda in the nursery catalog promise much but in quite a few cases the first commercial fruits actually seemed to have superior quality.

However desirable it is that a peach should have high quality it is equally necessary that the variety have other valuable characteristics such as size, color, firmness of flesh, freedom from fuzz, hardness of bud, vigor and productiveness of tree. In addition the fruit should ripen slowly and remain firm for some time after attaining good color. The qualifications mentioned above are only a few of those absolutely necessary so it is easy to see why most of the newer peach varieties have failed to survive.

Perhaps it is too much to expect that a peach variety shall have all of these good points but it must have more of them than the variety it is supposed to replace or else it cannot be considered worthy of trial.

What many of you would like is a variety of Elberta season which retains the desirable features of Elberta but eliminates some of the unwanted ones such as the bitter taste and only fair to medium color and attractiveness.

Unfortunately the Elberta substitute is not yet at hand, but several new varieties appear to offer considerable promise, not as substitutes for Elberta but perhaps as supplements to lengthen the peach marketing season.

In Southern Pennsylvania the 1939 Elberta peach crop ripened over a long period because of drouth or other peculiar weather conditions. There was as much difference as ten days between first picking dates of orchards located but a few miles apart. This permitted orderly marketing of a large crop of peaches over a considerable length of time instead of a flood of peaches all at once which would have demoralized the market.

However, we cannot always depend upon nature to help us and there is no question but what Elberta is overplanted so I believe we should not wait until trouble is already upon

us but should try to avoid it by a little foresight. We shall always have a certain number of acres planted to peaches, but if the marketing of this acreage is spread over a six weeks period instead of six days a more stabilized market should result.

It is true that we shall have competition from other peach growing districts but several varieties will meet this competition better than one variety alone.

There are several other advantages of growing more than one variety of peaches. They are:

- (1) More even distribution of labor and income.
- (2) Possibility of marketing more of the crop nearby.
- (3) Some fruit will hit the peak or high price market.
- (4) Reduction of the frost hazard.
- (5) Elimination of the chance of losing entire crop due to excess rainfall or wind at harvest time.

The list of new varieties of peaches offered by nurserymen in the last few years is a very lengthy one and time permits discussion of only those varieties which for some reason or other have appeared more promising than the rest. This list will of necessity omit those varieties so new that no commercial grower has yet grown them.

In general most of the newer varieties ripen much earlier than Elberta, with comparatively few later in season. Exact comparative ripening dates are difficult to obtain for no one southern Pennsylvania grower has every variety in bearing. Therefore it will be necessary to make comparisons between different orchards. Ripening dates in your own orchard may be a little earlier or somewhat later depending upon your exact location. Ripening dates as given are for Arendtsville and vicinity.

First on our list comes Mikado or June Elberta. This is not July Elberta but is a small to medium yellow Freestone suitable entirely for local markets and not too good even for that purpose. With us it ripens about July 15.

Marigold, which ripens a week later is much firmer, has less fuzz and is superior in quality although a semi-cling. Marigold is both too soft and too small except for local trade but for this purpose has made money for some growers. It has rather high eating quality.

Oriole, a yellow Freestone which follows Marigold by a week or ten days is one of the highest quality peaches of all, but the flesh is a pale lemon color and the variety is both too soft and too small for the general commercial trade.

Of nearly the same season as Oriole is Golden Jubilee with which you are all familiar. This variety has been

greatly overplanted because it has many weak points. The two halves do not fill out equally, one side becomes too soft before the other side gets really ripe, and the peach itself ripens too rapidly and does not carry well to markets. Another very serious objection to Jubilee is that it retains considerable of the bitter taste which makes Elberta objectionable.

The New Jersey experiment station recommends Triogem (N. J. No. 70 as an improvement over Golden Jubilee and in two Pennsylvania orchards the first fruits of this variety looked most promising and it was one of the few new varieties appearing to have sufficient firmness to make it a successful commercial peach.

Triogem, however, is no peach for a careless grower for it requires a good soil, good culture, and careful pruning and heavy thinning in order to be of good size.

One comment which should be made right here is that the more recent of the new peach varieties should not be picked too early. They color several days before they are ripe and if picked too soon will have poor quality, size and color. They should be treated more like a Hale type of peach and after showing color allowed to hang somewhat longer than Elberta. This statement of course does not apply to those new varieties already discarded on account of being too soft.

Hale Haven has made a favorable impression on quite a few growers in Pennsylvania and elsewhere. Unfavorable comments have been, in some cases, uneven size and ripening and possibly a tendency toward stringiness in flesh. Just the same Hale Haven is one of the most promising of the new varieties.

Other yellow fleshed peaches which may have a place are Golden East and Golden Globe. The speaker has not seen any Pennsylvania grown fruits of these two varieties but has grown Golden East in Connecticut and eaten New Jersey grown Golden East and Golden Globe. Incidentally he bought a peck basket of Golden Globe and eight peaches filled the basket rounding full and the price was 75 cents. These two varieties may not be over hardy so should be planted with caution.

Two other new yellow peaches which have done quite well with a few growers are July Elberta and Haleberta. Reports outside of the state have been unfavorable for these varieties but nevertheless at least one Pennsylvania grower is quite enthusiastic over them and he is both experienced and successful, so his opinion should carry considerable weight.

If a grower has special markets which demand a white fleshed peach two possibilities for early ones are Raritan Rose and Cumberland with Raritan Rose having more color and perhaps being a little firmer fleshed. Their season is just before Golden Jubilee.

Another white peach which to the speaker looks more promising than either of these two varieties is Delicious. However the New Jersey Experiment Station which originated this variety no longer recommend it and probably for a very good reason.

A late white peach of large size and considerable color and quality is White Hale which ripens about with regular Hale. This peach has real commercial possibilities and is certainly worthy of trial.

Summing up: Do not condemn a new peach variety just because it may not be perfect, for it may be at least a step forward. Sooner or later better varieties will come in to take the place of those we now have and to compete with other states we must grow the better ones. Do not be plungers but at the same time let us not close our eyes to progress. The one and only right way to determine the value of a new peach variety is to grow a few of them in your own orchard.

—o—

BUYERS' PREFERENCES AND GROWERS' ACTIVITIES WHICH WILL PROMOTE MORE SATISFACTORY MARKETING

GEORGE LAFBURY, Pittsburgh, Pa.

In complying with the request of the Secretary to address your association on the subject, "Buyers' Preferences and Growers' Activities Which Will Promote More Satisfactory Marketing", I now realize that I have placed myself in an equivocal position. We fellows in the terminal markets need plenty of alibis of our own in accounting for the poor job we have performed this season. As a matter of fact it is with some hesitancy that I come before you to address you on this subject and certainly do not do so in a critical sense but rather in a suggestive capacity because, after all, our interests are the same and we will progress and prosper in the same degree as you the producers. I also understand that it is something new for you to ask some one from the selling end of the business to appear on your program, all of which flatters me very much indeed, especially when I know that there are many apple men in the larger markets who are better qualified from the standpoint of ability and experience to cope with this subject.

Let us digress for a moment and discuss the changes that have taken place in the terminal markets. After all, receivers, jobbers and distributors are factors in the economic and physical process of conveying commodities from the producers to the consumers. Distribution has become more complex with each year. There have been many changes in the personnel of receivers and distributors. I believe that I can safely say that the men who are in the distributing and receiving end of the apple business sense an obligation to the producers which they did not feel so many years ago. Most of us feel that our work involves our national economy and that our failure to meet our obligations is a deterrent to our national welfare. The justification of our economic existence is in effectuating change of ownership from producer to consumer on the most economical basis and with the least possible waste.

In discussing the subject which is assigned to me I do not believe I would be fairly representing the receiver and the distributing factors if I merely asked you to do something which would make it easier to sell your apples and at the same time would not offer to you substantial and material cooperation and coordination. Our national trade organizations are fully cognizant of their obligations and responsibilities in this direction and during the past few years have not failed to comply with these requests for coordination and cooperation whenever the producing factors have called upon them. For many years I have participated in trade organization activities in an official way. I can distinctly remember trade organization activities of a few years ago when the chief topics before the trade organizations were legislation and transportation. During the past five years there has not been a convention of the National League of Wholesale Fresh Fruit and Vegetable Distributors when at least half of the convention's time was not consumed in discussing methods of packing, marketing, advertising and other forms of exploitation calculated to increase the consumptive demand for perishables and to facilitate the proper marketing thereof.

We must also not lose sight of the fact that there has been an evolution in the dietetic habits of the American consuming public. Many years ago, at least when I was a boy, our principal and nearly our only fruit from fall to spring was apples. We ate them freely, practically every day. We had old-fashioned parents, who believed in having a few bushels of apples in the cellar and they were always accessible and our chief dessert was apples in some form or other. Today we live in apartments or homes with central heating plants not practical to keep more than one or two days supply of apples. In other words, the consuming public is living on a hand to mouth basis. We have noted at times of strikes

or transportation tie-ups that it only requires forty-eight to seventy-two hours after stoppage of the flow of perishables into any principal market to bring that city close to a famine. In the meantime, there has been a vast and continuously increasing production of citrus fruits, salad vegetables such as lettuce, escarole, root vegetables such as carrots, beets, etc. Coming to the point, as each year passes, new commodities are developed which immediately become competitive with apples.

The acreage of citrus fruits has increased by leaps and bounds during the past twenty years. Today there is an over supply of citrus fruits and unless the Divine Providence intervenes with the visitation of a catastrophe of the elements the over supply of citrus fruits will be worse five years from now than it is today.

I am conscious that I am painting a very dark picture but I believe the practical and honest thing to do under these conditions is to look facts straight in the face.

I wonder how many of you heard or read the address of Porter R. Taylor, Chief, General Crop Section, A. A. A., Washington, D. C., at the International Apple Association Convention at Cincinnati last August. In my humble judgment this was one of the finest talks I ever listened to and if you do not have a copy of this address I suggest that you obtain a copy of it from Mr. Taylor. Of course Mr. Taylor addressed the convention on the subject of marketing the 1939-1940 crop of apples but nearly everything he said in that address was applicable to the apple industry for years to come.

Briefly, he advised:

1. Market U. S. No. 1 and commercial grades in fresh fruit channels.
2. Keep cull fruit and utility grade of undesirable varieties out of fresh market channels and dispose of them in by-product outlets.
3. Do everything possible to promote the sale of good fruit at reasonable prices so that the maximum consumption may be secured.

Mr. Taylor said many other things but these three comments, in my humble judgment summarized salvation of the apple industry and I am going to dwell in more detail on these recommendations.

I have heard dozens of explanations regarding the apple market this season. However, I have been up to my neck every day in apples since the first Early Harvest was shipped last spring. Regardless of the fact that the export demand has been shut off and regardless of the fact that Cali-

ifornia, Florida and Texas have produced the largest citrus crops in history I can assure you that a very important reason for a sloppy apple market during the past few months has been the heavy supply of off grade apples in every market in the United States. Day after day, at least in the markets in our territory and I mean Cleveland, Cincinnati, Columbus, Pittsburgh, Buffalo and all of the intermediate cities, we have been polluted with low grade apples which range from No. 2 to No. 10. Truck after truck of apples has been brought into these markets that did not have one decent apple in the load. We have seen thousands of bushels of these apples sold at \$.20 to \$.50 per bushel and you and I know that the producer is not getting his basket back not to speak of a little to meet the cost of production. Now this brings up the subject of, "What are you going to do about it?" State laws have been discussed in Virginia, Pennsylvania and other states, but for the life of me I cannot see how state laws to prohibit the shipping of off grade apples can remedy the situation. How can we expect Pennsylvania and Virginia or any other state to pass such a law when it would simply open the gates for the surrounding sections to dump their culls into our own states. Even for the sake of argument if every state in the union passed such a law it would be so different in requirements, etc., in the different states that it would still open the door for somebody to evade the laws. It seems to me that the only solution is a federal law which would effectually prohibit the transportation of cull apples from state to state and this federal law should be supplemented with state laws covering the intra-state shipment and movement of these culls. It seems to me that it is a shame that the producer of high grade apples is being ruined by the careless and indifferent grower and the consumer is being cheated with a lot of inferior fruit.

In my humble judgment the trend in the eastern producing sections is definitely towards boxes. There are many reasons for this. For instance, practically every retailer and jobber has one or more trucks and one of the important reasons for his preference for boxes is because of the saving of space in his truck and in his store or warehouse as well as the fact that in the physical handling of boxes there is less damage and bruising than in the handling of either tub or round bottom bushels. In my visits in the apple sections during the past two or three years I have been asked many times as to which is the best box to use. My answer to this is that it is up to the producer and packing factors to get together and decide on the same type of box. I find growers using bushel boxes, one and one-eighth bushel boxes and one and one-fifth bushel boxes. I suppose the grower who is putting in excess of one bushel in the box is doing so to get a selling advantage over his competitive growers and shippers. However, this

sort of competition always adjusts itself in time and if some agreement is not reached you will find yourselves one day giving the public one and one-fifth and one and one-eighth bushels of apples for the same prices that you might be obtaining for one bushel of apples. Why not decide now on a box containing one bushel and stick to it?

Then there is the question of varieties. It seems as though the varieties of apples change almost with the styles of women's clothing. I have been in the apple business something like twenty-five years but I confess to you right now that there are many varieties of apples that I cannot identify and neither can you and yet they are listed as commercial varieties of apples. If you and I cannot distinguish between fifty to two hundred varieties of apples how can we expect the average housewife to do so? It seems to me that there is lots of room for discussion and agreement on this subject among the Horticultural Associations.

Now with reference to marketing, grading and packing of Pennsylvania apples. I must compliment many of you folks for some of the fine packs and grades put up by Pennsylvania apple growers. However, there is still room for improvement. A prominent Virginia apple grower was visiting me in Pittsburgh last week and he asked me a question that has been asked of me by many Pennsylvania growers. He wanted to know why there was such a wide spread between the prices of northwestern apples and eastern apples of the same varieties and on the same markets. This is a very difficult question to answer, unless we go back a few years. As all of you old timers know there was a time when there was hardly a straight pack of apples put up in any apple section. The northwestern folks realized that their chief expenses were packing and transportation and they decided forthwith to pack nothing but the fancier apples and in the most approved manner and to keep their culls at home. I can well remember when northwestern box packs brought as high as \$3.00 to \$4.00 per bushel and eastern apples at the same time sold from \$1.00 to \$2.00 per bushel. The differential has been greatly decreased and I sincerely believe that we will see the day when there will be little or no differential in the prices realized. Coordinated with the evolution in the packing of apples there has also been an evolution in merchandising. Competition between jobbers and retailers is greater today than at any previous time in the history of the industry. Any retailer will tell you that wastage is one of the principal factors with which he is confronted in the selling of perishables. For a number of years the only apple that a retailer could buy with the assurance that he would sell every apple at a fixed price was the northwestern apple. When he bought a box of extra fancy Delicious or any other northwestern

variety and the box was marked, "Extra Fancy" and as containing 125 apples he knew that he was going to sell 125 apples at a fixed price. Today there are many fine packs of Pennsylvania apples but there is still room for improvement. We have sold thousands of bushels of apples for a grower in Adams County who leans over backwards to put up an A No. 1 pack and with the result that his apples, regardless of variety, top the Pittsburgh market day in and day out throughout the season. Most buyers do not even take the trouble to lift an apple off the top layer of his package but merely pick up the cover for general inspection.

I would like to tell you a little story about this grower to illustrate the pride he takes in his pack and the reputation of his brand. Several years ago, because of growing conditions, Wealthy apples had very little color. The Wealthies were good sized, good shape and just enough color to pass inspection. Several of our large jobbing buyers who buy from us and take these apples into surrounding territories and afterwards sell them at a bushel at a time to retailers asked me to request this grower to face his Wealthies with better colored apples. Mind you, the customers were asking that this be done. We called up the grower on the telephone and explained the situation and he replied by saying, "Even if this means that you get \$.10 to \$.15 a bushel more I would not face my apples and I never will and I am perfectly satisfied for you to continue to sell my Wealthies at present prices." Now folks, this looks like getting entirely too meticulous but I believe this grower was right because he has established a reputation among the buying trade so that when they look at the top of his bushel they see it all and it is worth money to him.

Let me tell you another story about one of your members. He grows a lot of Gravensteins. He takes great pride in his pack and grade and has established a large outlet in several eastern markets including Pittsburgh. For years California shipped almost daily cars of Gravensteins to Pittsburgh. One day several years ago we had a few hundred bushels of our Pennsylvania friend's Gravensteins stacked up on our pavements and the president of the auction company stopped and asked me if we would continue to have a regular supply of Pennsylvania Gravensteins and I asked him the reason for his question. He said, "For years we have had a nice tonnage of California Gravensteins on our auction but since this Pennsylvania grower has been putting these Gravensteins into Pittsburgh we have had difficulty in even selling one or two cars a week of California Gravenstein apples." Now members of the Pennsylvania Horticultural Association, I submit to you that what has been accomplished in Gravensteins can be accomplished in Delicious, Staymans, Rome Beauties and other varieties.

Getting back to the subject of grading and packing let me tell you another little anecdote. Three or four years ago I was visiting several of our grower friends in the Cumberland Valley and one of the finest men I know in that Valley said to me, "I have been comparing my account sales from you with accountings that you have sent to other growers and I notice one grower in particular is getting \$.10 to \$.15 more per bushel on the same variety of U. S. No. 1 apples as I have been shipping to you and I cannot help but feel that you are showing my neighbor preference." I answered him by saying, "Yes, there is some preference, but it is being experienced by our buyers and not by our salesmen." "They think your neighbor's pack and grade is a little better than yours." The point is, gentlemen, that both of these growers were putting up packs of U. S. No. 1 apples but the grower that was getting the premium was absolutely ignoring tolerances and was trying to put up a 100% pack instead of a 95% pack. I am glad to tell you now that the grower that made that complaint evidently took the hint because for the past several years his packs have been selling at the top.

There is something else to this pack and grading besides premium or top prices. I have often thought that all of us think too much in terms of price. For instance, when markets are over-supplied or when the markets are in a draggy condition there is what we call a "buyer's market." In other words, the buyers are selecting only what they want and naturally they take the best packs and at the prevailing prices, whatever they may be and are not interested in the inferior or secondary pack or any price basis. This means that the premium packs are sold at a reasonable profit with practically no deterioration, no storage and no demurrage. While on the other hand, the inferior packs lay around accumulating charges, deteriorating and sometimes have to be cleaned up at a price that does not even pay the grower for his basket and picking. Briefly the benefits of superior grades and packs do not always show on the books.

Summarizing on the subject of grading and packing. Granting that Pennsylvania and other eastern growers zealously endeavor to improve their quality and packs I prophesy that the differential in prices now existing between northwestern and eastern apples will be brought down almost to the vanishing point. After all, Pennsylvania apples have inherent qualities that are superior to northwestern apples and I believe that when they are graded and packed 100% that you growers will reap the full benefits of your efforts.

Now with reference to the advertising and exploitation of apples. I think Appalachian Apples, Inc. has performed a wonderful job. I am sure that Pennsylvania and eastern Delicious, Staymans and Winesaps are better known in the mar-

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kets today and that there is a better demand and movement for these varieties than existed before the creation of your association. First let us discuss the necessity of the advertising of apples. Nearly every kind of food stuff is being advertised and the American public is urged to eat this and that because of its caloric and vitamin content, and if we do not eat it we are going to disintegrate and become physical and nervous wrecks. This advertising has reached the stage where even the small boy is non-plussed as to what to eat for breakfast. When he sits down at the table he is confronted with a life problem because what he eats, according to the radio, will decide whether he is to be a cowboy, an aviator or a home run baseball player. The young mother is being sold on the inhibition that it is impossible to raise her progeny properly; in fact she is assured that they will grow up toothless, unless they are fed a pint or a quart of orange juice each day, and the young debutante is warned that she must take pineapple juice, tomato juice, sauerkraut juice and grapefruit juice if she is to retain that alluring figure and that rosy hue to her blooming cheeks. Briefly, gentlemen, a great battle is raging among the various food interests for its share of the human diet. After all, the capacity of the human stomach is limited and if you apple producers do not go after your share you are going to be left high and dry with a nice crop of apples and no one to eat it.

As to what form this advertising should take that is beyond me but it certainly is a subject for all of us to think about and conjure with.

Sometime I hope to see the day when all of the apple producers of the United States get in under the same tent and each grower contributes his share to conducting a national advertising campaign. What I have in mind is the idea of selling the American consuming public on virtues of apples and to build up in them an inhibition that they cannot live successfully physically unless they eat plenty of apples. If that is effectuated the rest will be easy; each variety and each section will get its share of the profits.

In the event that a national tie-up of apple growers is effectuated for the purpose of advertising designed to reach every consumer, this does not, in my judgment, mean the work of regional apple associations is ended. Retailers who handle fruits and vegetables exclusively handle an average of 50 to 60 items. General grocers handle an average of 500 to 1500 items. We cannot expect any retailer to delegate himself as your particular salesman. Experience has shown however that retailers push those items on which they are afforded sales helps and in which they are furnished attractive display material and other sales helps such as have been furnished by the Appalachian Apples, Inc.

Wholesalers of fruits and vegetables are well organized and are showing increasing interest in cooperating with fruit producers groups. Where these groups have gone in for advertising and where they have made available promotional display material the National League of Wholesale Fresh Fruit and Vegetable Distributors call these to the attention of their members through bulletins, circulars and letters and urge full cooperation with the work done by the producers.

Last year the National League cooperated with the Northeastern Vegetable and Potato Council in special efforts to move crops in that area when they threatened to be in over-abundance. Some tangible and intangible results were achieved, but the experience gained suggests that it is a perfectly practical procedure for producers through their committee to work with the wholesale trade and make effective merchandising campaigns on given commodities. Mind you, this character of work is more or less in the experimental stage but we are all gaining by it through this experience and it is the hope of the interested men in the wholesale perishable industry that we will see the day when there will be a continuous coordination of effort through these channels.

As a matter of fact, wholesale merchandising has been experiencing an evolution that should have careful consideration. A great deal of emphasis has been placed upon the work done by the chains in the moving of surplus crops. Far be it from me to withhold any credit from these chains but as a practical merchandiser I have never considered it good merchandising when all of the emphasis is placed upon price and that price a low price. For example, vast quantities of grapefruit have been sold through these campaigns and on a price basis that meant little or no return to the grapefruit producer but which created a devastating competition with apples and other fruits.

Naturally producers in distress think of chains in terms of concentrated buying factors and it seems that the first impulse of fruit growers and shippers is to run to the chains for an easy and quick outlet. I submit to you, however, the fact that it is been shown by governmental and agricultural college investigations that the independent outlet on fruits and vegetables is greatly in excess of the chain outlets. To neglect this largest outlet is to court disaster.

In fact it is becoming increasingly clear to thinking producers that centralized buying factors are eliminating free and open competition. A few years ago several of the larger chains, notably the Great Atlantic and Pacific Tea Company, created their own wholesale fruit and vegetable companies ostensibly for the purpose of buying their own supplies direct from the producer. You and I could have no quarrel

with this new idea. However, today we find these centralized buying factors not only buying supplies for their own purposes but selling thousands of carloads annually to independent wholesale and jobbing outlets. The whole effect of this operation is to remove competition both on the market terminal and in the shipping districts. It is rapidly leading to the elimination of the independent buying factors in the producing districts. Correlated with these large buying operations of centralized factors is the fear on the part of the independent wholesale and speculative buyers that they dare not engage large quantities of perishables in advance of shipment regardless of crop and market conditions because of the activities of the retail chains in conducting special sales and loss leader sales, thereby ruining the independent operator's prospective market. In my humble opinion, gentlemen, these matters must be given very thoughtful and careful attention. The elimination of free and open competition leads to one result and that is a lower price to the producer. In my judgment, gentlemen, this is something that should have your very careful and thoughtful consideration.

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RECENT DEVELOPMENTS OF CONTOUR ORCHARD PLANTINGS IN PENNSYLVANIA

A. E. COOPER, Extension Agronomist, Pennsylvania State College, State College, Pa.

Pennsylvania fruit growers are rapidly adopting the practice of contour-planting of new orchards. It is not necessary to travel very far in the fruit-producing area to see a contour-planting, even though the acreage is comparatively small. Most interesting is the gain in popularity of this type of planting. In the spring of 1938, the Agricultural Extension Service helped to establish 16 acres of contour orchard for demonstration purposes. With the fall planting season of 1938—and spring and fall planting season of 1939—such contour orchards have increased to about 350 acres. The indications are that the spring of 1940 will see at least 100 acres more orchard being laid out on the contour. Already those who have tried a block of contour orchard either have planted or are planning additional acres on the contour.

There are many examples of the results of erosion in the state, but seldom do we realize how such problems affect the operating costs of an orchard. A gully too deep to cross means going around it. One trip around it may mean so little but the hundreds of times it is necessary to go around

it in the life of an orchard certainly can be expensive. To fill that gully, to be able to cross it, also involves considerable expense. With the memory of some conditions similar to those mentioned, fruit growers are attacking this problem in a logical manner. They are making new plantings on the contour, and reducing the length of the cultivation period so as to have the ground covered for as much of the year as possible. Their thought is to prevent erosion rather than to cure it.

To those who have contour orchards, I might say that contour planting alone is not the complete answer to all erosion or soil washing problems. It must be supported by contour operations in the orchards and a suitable cover crop system.

Contour operations in the orchard mean that all machinery operations should be on the contour paralleling the level rows around the hill. Machinery tracks and tillage marks become minute reservoirs to hold water, because they are level from one end of the row to the other. If such tracks or marks run down hill as they might in a square-planted orchard, the water will follow them and soon move fast enough to cause soil washing. By reducing the speed of water run-off through contour tillage, the soil has an opportunity to absorb more moisture. This reduces the amount of run-off.

Another step in controlling erosion is to build contour ridges with each tree row by plowing several furrows toward the trees from both the upper and lower sides of the contour row. This should be done two or three times during the early life of the orchard. When cultivation with the disk or similar tillage tools is necessary, contour tillage will naturally build these ridges higher. These ridges, again in crossing a field at right angles to the slope, put the brakes on run-off water and act as reservoirs to catch additional moisture in the same manner as terraces. The faster water moves, the greater its soil-carrying capacity and so by putting the brakes on we are reducing the danger of soil washing.

Often much of the value of a heavy rain is lost because it falls too fast for the soil to absorb it. At times, when moisture shortage is a problem in the orchard, rainfall is apt to consist primarily of sudden thundershowers. This fact alone should be a big reason for contour planting.

Cover crops play such an important part in the control of erosion that they cannot be overlooked in any discussion

on that subject. The value of a cover crop from an erosion control standpoint is its ability to tie the soil down with a covering strong enough to put the brakes on any run-off water. One of the best illustrations of an ideal type of crop from the standpoint of resisting erosion is Kentucky bluegrass. However, other things that cannot be overlooked enter into the selection of a cover crop for the orchard.

Even though time will not permit a discussion of the merits of different plants as cover crops, it would seem advisable to say something about domestic ryegrass. It seems to be gaining very rapidly in popularity, because of its characteristics of growth. First, under fairly favorable moisture conditions, it will germinate in about five days. Second, if sown in late summer, it will stool out rapidly and give a thick ground cover. Third, it produces a very large volume of roots. Domestic ryegrass should be seeded at the rate of 20 or more pounds per acre. It is much more desirable than wheat or rye because of the greater volume of roots that it produces, and the fact that it does not grow tall like rye and become difficult to disk under. The cost of seed will average about two dollars per acre, depending on seed prices and rate of seeding.

When the first contour orchards were planted in the state, the fruit growers felt that the trees should be lined up in rows crossing the contour. This made it look like a square planted orchard, when viewed up or down the hill. It is but natural that it would seem strange, when for the first time, we saw an orchard with no straight rows. The more recent plantings, however, have been laid out with contour rows only. The trees are planted at regular intervals on the contour with no regard for rows up and down the hill. Ordinarily this method of planting increases the number of trees that can be planted per acre over the first system, and equals the number used per acre in a square planting.

An easier operation of the heavy orchard equipment will result from a contour planting. This fact can best be brought out with some data from the Kansas State Experiment Station: In preparation of crop land seed beds, on average 71½ per cent slope, different operations on the contour were compared with the same operations up and down the slope. Different implements were used, as well as different types of tractors. Some types of equipment, when operated up and down the slope, were not of sufficient weight to make it necessary to drop a gear lower than was necessary for contour operation. In these experiments, savings of 1.6 per cent in time and 6.4 per cent in fuel were recorded in favor of con-

tour operations. With machinery heavy enough to cause a drop in gear, savings of 20.4 per cent in time and 11.7 per cent in fuel were made in favor of contour operations. When all tests were averaged together, the savings were 12.8 per cent in time and 9.4 per cent in fuel in favor of contour operations.

In conclusion I wish to quote a sentence from an article appearing in the October issue of *The American Fruit Growers*, entitled "The New Peach Industry in South Carolina" by A. W. Musser: "The complete system of contour planting, fertilization and growing of cover crops, together with a common sense system of pruning, combines to make the majority of South Carolina orchards excellent producing units in which the trees are healthy, vigorous and long-lived."



The picture above shows a portion of the new contour planting of the G. M. W. Orchard Company in Adams County started in the fall of 1938 and completed in the spring of 1939. It may be clearly seen how contour ridges are built with each row by plowing towards the trees. This practice is continued for several years until ridges are built up for each row. Each ridge acts as a barrier to prevent water from crossing the row and having an opportunity to cut a gully down the hillside.

The second picture is the Blue Church Orchard located in Lehigh county. The slope in this orchard approaches 40%. It was planted on the square system in the spring of 1937.



BLUE CHURCH ORCHARD

A single season of cultivation with the sloping rows resulted in very serious erosion. In the spring of 1938, two hours work with a hand level showed how, by moving about one-eighth of the trees, the orchard could become a contour planting. This change in planting not only reduced the amount of erosion to a place where it was of no serious concern but also reduced the operating costs considerably. The picture was taken in July of 1938, just four months after transplanting.

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FARM COLD STORAGE FOR APPLES, WHY AND HOW WILLIAM R. COLE, Massachusetts State College, Amherst, Mass.

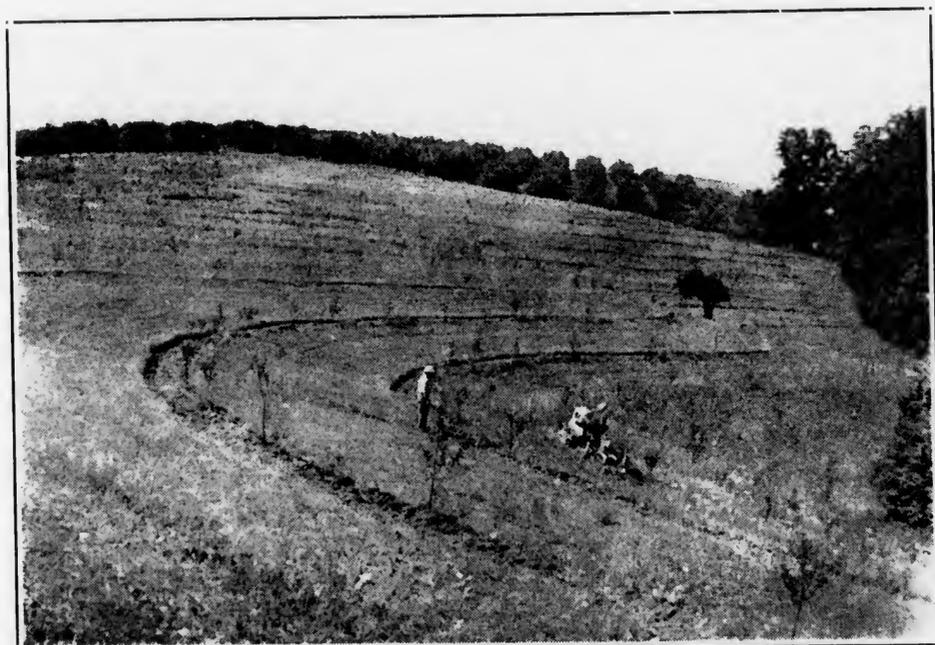
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However, here I am, and before discussing storage, let me offer the best wishes of the fruit growers of Massachusetts who have just completed their annual convention for 1940.

The topic assigned to me and which I was privileged to suggest is "Farm Cold Storage for Apples; Why and How." It was probably unnecessary for me to tell you this, because most of you have already seen it on the program. I believe that Mr. Ruef's sentence in the description of the topic as it

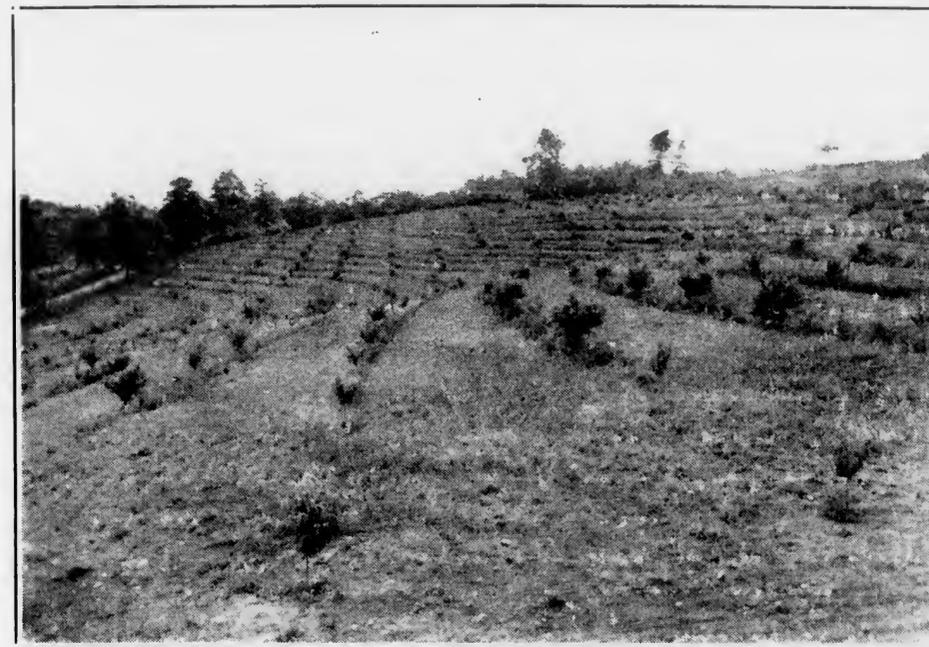
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appears on the program: "Proper storage of apples on the farm makes possible the delivery of good fruit in prime condition to the consumer" just about sums up the "Why" of farm cold storage.

Almost every time that I am privileged to discuss farm cold storage before a group of growers the following statement appears in some form or other; "Well, I can't afford to pay the storage folks so much money every year; I have got to have a cold storage plant of my own and save my money."

Every time this statement is made to me my answer is the same; "You can't expect to save all your cold storage charges by owning your own facilities."

On the average in the New England area the commercial charges per bushel per season for cold storage will run about 22 cents per bushel. Averages for approximately 75 farm cold storage plants varying in size from 1,500 bushels to 45,000 bushels show a per bushel cost for storage services of between 13 and 14 cents per bushel. Some farm storage show costs of 25 cents per bushel; some show costs as low as 8 or 9 cents per bushel.

We, think of cold storage as being one of the most important angles to the orderly distribution of a crop of apples. If no apples were stored, the entire crop of the country were of necessity placed on the market at harvest time, growers would not get 50 per cent of the cost of production. All the apples would be on the market at the same time. Sometimes it appears that too many apples go into cold storage, and consequently many growers do not get satisfactory returns. This 1939-40 apple deal has all the ear-marks of such a situation. However, the growers cannot be 100 per cent guilty in this instance, because they faced a situation of a very heavy crop and a completely non-existent export market which normally takes from 10 to 15 millions of bushels.

A cold storage located close to the area of production, let us say on the farm where the fruit is grown, permits the handling of this fruit in a manner that will preserve for the longest period the quality of the apple. We have a feeling that the less handling an apple gets before going into storage, the better condition it will be in when it finally reaches the consumer. Of course, it will have a considerable amount of handling somewhere in the line from tree to consumer, but experience indicates that if only a little of this handling be done before the fruit goes into storage and the rest is done between storage and the ultimate buyer, he is getting a better product. Experience seems to indicate that apples of a given grade grown on comparable soils and in similar climates reach the consumer in better condition if they are hauled not more than a mile or two between picking and

storing. Similar experience indicates that the storing of orchard-run fruit, with the culls out, will give the consumer better fruit than a practice of picking and grading, sizing, packing, before storing.

This last statement is always open to debate. At least it is in New England. There are growers who support the program of pick, grade, pack, store, sell; and there are growers who support the theory or plan of pick, store, grade, pack and sell.

Up in Massachusetts and the rest of the New England states we have still another group of growers who believe that the best system is to pick, grade, store, pack and sell.

All three of these groups can and do bring forward excellent arguments for their theory of procedure. Undoubtedly those who believe in one or the other of these theories of procedure have excellent support for their feeling in the matter. Undoubtedly conditions vary so that under given circumstances every one of them is right.

It will be noticed, however, that every one of these plans includes the word store somewhere. This indicates, to my mind, that all our growers feel that storage is as important in an orderly market program as any other item.

The majority in New England follow the pick, store, grade, pack, sell plan.

I do not believe it is necessary for me to go very deeply into what happens when an apple is stored or maybe I can say what is prevented from happening because of storage. I am sure you all know that the apple as it develops is part of a living organism which is the tree, and that when it reaches maturity and is removed from the tree it continues to be a living organism, life being carried on by the food which is stored in the apple. Since all life processes are destructive, this continuance of living will ultimately destroy the apple. This natural destruction or breakdown is delayed by setting up artificial conditions of living for the apple. That is what storage is.

If the apple were allowed to mature, drop from the tree and remain in a clean place under the tree for a period of time, it would gradually decay and disappear. These changes are due to continuing to live, and that is what it is; just simply growing old, even as you and I. This aging process is retarded by cold.

If the normal, natural life cycle of this apple were carried on in a temperature of 80° F. and if that were the optimum temperature for rapid living, then a drop of this temperature to 50 or 60° F. would in a measure retard the com-

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I offer the planters, apple, peach, cherry, plum, pear and apricot trees in all the leading varieties, including some of the newer ones that have been carefully examined for trueness to name by expert authorities on identification by leaf characters, etc., as they stand in the nursery rows, at very reasonable prices.



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Adams County Nurseries & Fruit Farms

H. G. Baugher, Prop.

ASPERS, PA.

pletion of its life cycle. This we sometimes do in what we call common storage.

This latter temperature is what we call cold storage conditions. We cannot go much below 30° F. without freezing the apple and thereby completely wrecking this life cycle and defeating our aim.

All this attempt at slowing down the speed of living of this organism which we call the apple is designed to hold this fruit in a condition that will cause the consumer to pay money for it and be satisfied with what he gets.

All this effort towards delaying the death of this organism can in most cases be better carried out if the equipment used is right on the farm where the fruit grows, right under the immediate control, direction, and management of the individual or group of individuals that control and manage, so far as it is possible to do so, the previous growth of this fruit through its cycle of development.

There are, of course, many who will argue that storage is a project that can best be handled by specialists in storage. That theory I cannot subscribe to and I suppose that is why I am here today. I think that the theory which I am proposing and attempting to support is sound; at least there are in Massachusetts growers with a total volume of 900,000 bushels of fruit who subscribe to this theory. There are in the other New England states another group of growers with a volume of 700,000 bushels who also subscribe to this theory.

Of course we know that very much greater volume of fruit is stored in what we call custom cold storages located in central points of production. However, there is a trend toward decentralization of this fruit storage. Four growers in Massachusetts have this year built cold storages on the theory that "We can do a better job of handling our fruit if we have it right here at home." All four of these men have been customers of custom storages. In my opinion, the majority of all growers in New England want and would own storages if they could finance the initial investment.

If I may summarize the why of farm cold storage of apples, I will put it this way:

First, cold storage located on the farm, close to the orchard, permits fruit going into storage with the least possible handling.

Two, cold storage so located permits fruit to go into storage immediately after picking with a very minimum of time elapsing between cutting off from the source of food material, the tree, and delays the burning up of the food materials that are in the apple.

Three, storage on the farm permits the grower to continue to have his produce under his direct control.

Four, under normal conditions as to costs of construction and power, storage charges will be much less on fruit in a farm cold storage than would be the cost if stored in a custom warehouse.

Perhaps what has been said so far is sufficient for the "Why" of farm cold storage. Now for a discussion of the "How".

Proper consideration of this problem of how to get a farm cold storage plant calls for some consideration of present and future crop prospects on the farm under consideration; some thought should be given to the possibility of temporarily or permanently storing a few apples for some nearby orchardist. However, we are discussing a single farm enterprise and therefore will leave the possible custom uses of the plant out of the picture.

The first point to be settled is how large the storage is to be. In general, so far as the speaker is concerned, orchardists are advised to have storage capacity for not more than 60 per cent of the average commercial crop. That is, a man with a commercial crop prospect of 20,000 bushels of apples, averaged over a period of years, should not build a cold storage with a capacity greater than 7,500 bushels. I am not pretending to say that growers do not exceed this volume. Perhaps I should say that I am not saying that growers always follow this advice. However, that is the place we put maximum storage capacity.

After determining the size of storage that appears to be desirable, the next project, so far as New England is concerned, is to determine whether this plant should be built by remodeling an existing structure or by building new. So far, 90 per cent of the cold storages created on farms in New England have been built by remodeling existing structures.

We set up an arbitrary figure of $2\frac{1}{2}$ cubic feet of space necessary for each bushel of apples it is desired to store.

These remodeling jobs have been applied to barn cellars, to dairy barns abandoned for such use, to other type of farm structure and as indicated before, a few new buildings.

In laying out a plan for adapting existing structures or building new, the first dimension suggested is that the room have a height of not less than 9 feet. This is set because the majority of growers use what we know as the approved Eastern apple box as a storage box as well as market package. This box has an outside height of $11\frac{1}{4}$ inches and stacking 8 high, about the limit without using scaffolds, and that 8

high uses $7\frac{1}{2}$ feet of space, leaving, after cleats on the floor, 15 or 16 inches of head space. This much head space is desirable in order that air circulation may be efficient.

The determination of the other two dimensions of the cold room will, of course, be easy enough. If one desires to store 10,000 bushels of apples that means a cubage of 25,000 and divided by 9 gives 2,800 square feet floor area, and that in turn may be 40 feet by 70 feet or any other combination that produces approximately 2800 square feet. We thus have for our 10,000 bushels a "Box" of approximately 70 feet long by 40 feet wide and 9 feet high.

Of course these dimensions, all three of them, are possible of adjustment. Several farm storages have been built where the ceiling level was 14 or 16 feet above the floor and fruit has been packed in such a storage easily and efficiently, especially in cases where two levels may be established outside.

There are, however, one or two factors in a picture of this kind that are important. It is quite necessary that a large volume of fruit be of a single variety. It is desirable that no variety be present in too small quantities, because boxes to be stored 12 or 14 or 16 high must be at least 10 by 10 on the floor.

There are really only two or three necessary factors for success in building a cold storage. The building must be cold-proof and heat-proof. The building must be properly machined in order to produce cold in sufficient volume to remove heat from the apples quickly and to hold the apples at storage temperatures easily. The building must be so constructed that a proper degree of humidity may be held in the room at all times.

Other considerations sometimes thought of as minor and frequently thought of as major are ease of handling fruit in and out and possibility of using outside air as a cold medium once the fruit is reduced to storage temperature.

The cold or heat-proofing of the building is nothing more or less than insulation. There are many insulating materials on the market. Many of these are equally good each with the other as insulation. However, so far there has been discovered nothing any better as an insulating material than vegetable cork, and for most circumstances there is no other material any less expensive than this.

Since most remodeling jobs are on frame structures, the insulation problem is solved by filling the walls with insulating material. For Massachusetts and New England conditions in general, we think of 8 inches of granulated cork as being an efficient blanket for protection against extremes of

cold and heat. We recommend this 8-inch blanket for walls and 10 inches for exposed or semi-exposed ceilings or roofs. Floors being exposed to the constant leakage of earth temperatures and also being apt to have very moist conditions, are usually insulated with sheet insulation. Most recommendations suggest sheet cork of 2 or 3 inches, depending on whether or not the floor is sufficiently below outside grade to make cold insulation important. Putting this another way, if the floor of the room were at approximately outside grade, we would recommend 3 inches of cork as protection against cold leakage; if the floor were 3 feet or more below outside grade, we would recommend 2 inches of sheet cork as sufficient to hold back undue heat leakage from the ground.

The matter of doors, windows, ports or other openings is for settling in each individual case. In general, however, our recommendations are that these openings be as few as possible in number.

Now for a bit of discussion of new storages. I think I will do that by describing one that was built this last year.

This structure is on one of our larger fruit farms. It has a rated capacity of approximately 22,000 bushels. It is 44 feet by 66 feet by 10 feet high in each of two floors. These dimensions 44 and 66 were used so that we might put into the building no piece of timber longer than 12 feet, which is the most economical length of native lumber in our area.

The 66 feet, length, dimension of the building runs east-west. The entire 10 feet of the height of the lower room on the north side is below grade, so that on the north we have a grade entrance into the upper room. We have a grade entrance on the west and east into the lower room. The packing house, which should always be considered in laying out a storage plant, is 16 feet wide and runs the full length on the south side of the lower room. The packing house roof raises half way up the south side of the upper room. Such a lay out makes it possible for all fruit to go into the warehouse, out again through the packing house, without having to be lifted at all; it is always moving either on a level or down hill.

We think that some sort of a lay out similar to this just described is about the ideal for handling fruit, especially on the pick, store, pack, sell plan.

Perhaps I should say in conclusion about this new storage which is a discussion of several, that all insulation, except floors and the banked wall on the lower room, is granulated cork, and the floor and this wall are sheet cork insulated.

The second consideration mentioned above is machining.

I do not think it is the place here to go into details as to figuring of machinery for a cold storage. We do this for our people, and after we have finished doing it, we always suggest that they get machinery sales firms to figure and bid. Let us put it another way. We do not suggest to our growers that they ask machinery builders to bid on a set size compressor and certain footage of coil or certain size blower units. We suggest that farmers indicate to each of three or four or more dealers in this type of equipment:

1. The size of "Box."
2. How the "Box" is insulated.
3. How many boxes of apples per day will go into the "Box" during the harvest season.
4. What period in the calendar is the harvest season.
5. How soon he expects a given condition of cold to be reached.

Most of our fruit up in New England is coming to be McIntosh variety. Those of you who are familiar with this variety know that it must be picked in a short period; we allow ten days.

If I may be permitted to return to the 22,000 bushel cold storage just described, the owner writes the machinery dealers that he has a box 66 feet by 44 feet by 20 feet, insulated on the four walls with 8 inches of granulated cork or equivalent, on the ceiling with 10 inches of cork, on the floor with 3 inches of sheet cork, that a floor divides the 20 feet into two rooms, each approximately 9½ feet high.

The second item which he indicates is that he expects to put into this storage a volume of 2,000 to 2,500 bushels of apples per day during the period September 5 to 20, that he expects the equipment to reduce this volume of fruit to 45° temperature daily during the loading period, and the entire box to 32° in six days after loading is completed.

With the above information most machinery dealers can estimate the cost of machining.

Machinery for cold distribution is made of two types "Coil" and "Blower".

The coil system means just what it says; coils for carrying the refrigerant are hung on the side walls or on the ceiling or both.

In the blowers these coils are hung in a metal box which is set up in one end of the room and from which the cold from the refrigerant in the coils is blown across the room and brought back again into the bottom of the blower, re-cooled and again blown out. It is exactly the same principle as a

modern school house heating plant where the heat is confined in pent houses and where the air is warmed by blowing over hot pipes in these boxes or pent houses.

In the case of our apple storages the air is blown over cold pipes.

Of all the cold storage constructions in Massachusetts and the rest of the New England states in the last seven or eight years almost 100 per cent has been of the blower type. There is one large custom storage which was built of the coil type twelve years ago and built an addition two or three years ago, again using the coil type. One other independent grower built a second unit and used the coil type after having a blower type in a first unit. Outside of these two, approximately 100 plants have been built, all using the blower type of cold distribution.

Initial cost is approximately the same in both cases. The advantage of the blower type over the coil system is that there is no defrosting drip anywhere in the room except under the blower where it can easily be controlled; defrosting takes less time with blower types than with coil types.

I think perhaps I have taken time enough in discussing the construction of storage.

I do want to say that working with more than a 100 growers in the New England states in the last five or six years there has been hardly a case where plans or specifications or directions prepared for one grower would fit the needs of another grower. That, I think is a first rate condition of things.

It is unwise to talk about cost of getting cold storage, but nevertheless, I am willing to suggest that a cold storage plant will cost from 50 cents to one dollar per bushel. This very wide variation is used because some growers may have an excellent building to start with and get away with the lower price. In fact, this past summer I worked on two such projects where the total investment will run between 35 and 40 cents per bushel of capacity. Other projects may call for new construction, and this may run as high as 90 cents to one dollar per bushel of capacity, although recent frame buildings with a capacity of from 15,000 to 30,000 have been put up at a cost of less than 75 cents per bushel.

It is probably in order to offer some suggestion as to the cost of operating a farm cold storage. So far as we are concerned this may be very definitely set up. Please understand I am talking for Massachusetts and New England. We arbitrarily set up 12 per cent of the investment as an over head charge to take care of interest, depreciation, taxes, insurance,

water, etc. The operating cost for power in New England will be 1½ kilowatts per bushel per season.

May I illustrate? A storage holding 20,000 bushels built for 15,000 dollars, complete and ready to go, this includes a one-story packing shed but not a grading machine.

12 per cent of 15,000 dollars is 1800 dollars. 20,000 bushels at 1½ kilowatts is 30,000 kilowatts. In New England the average rate for this power is 3 cents. That gives 900 dollars power cost; 1800 dollars overhead, plus 900 dollars power gives 2,700 dollars annual cost. This on 20,000 bushels would be 13½ cents per bushel.

Just so no one will get too rosy a picture of this, let's have the storage only half full, or 10,000 bushels. Our overhead is just the same, 1800 dollars, our power bill comes down to 450 dollars or a total of 2,250 dollars on 10,000 bushels, or 22½ cents per bushel. May I repeat. I throw in this last sentence only to take a little of the rosy hue away from the 13½ cents.

Storage facilities are needed on most fruit farms for the orderly marketing of the crop. Location of the storage on the farm makes it possible to put the apples in storage promptly and with the least handling, permits sorting, grading, and packing of the fruit by the regular farm help, and keeps the fruit under the care and control of the grower until it is sold.

For satisfactory operation of a storage, it is essential to have a suitable building provided with proper cooling equipment and to store only fruit having a market value which will justify the expense of storage. The conditions to be observed are listed below.

1. Fruit intended for storage should be picked at the optimum stage of maturity.

2. Apples which are to be stored for a long period—three months or more—should be of U. S. Commercial grade or better. Drops may in some years be stored to advantage for short periods.

3. Apples placed in storage should be handled carefully. They should be picked, put in the storage package, and transported from orchard to warehouse in such a manner that bruising is kept at a minimum.

4. A common storage should have the exposed walls and ceilings insulated to protect against frost and to help hold low temperatures obtained from the ground and from the circulation of cold night air. Fans should be provided for ventilation and circulation of cold air for cooling purposes.

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PINK TREATMENT OF

APPLE PESTS

IN CUMBERLAND-SHENANDOAH VALLEYS

●
For Pre-Pink application against SCAB and LEAF SPOT use FLOTOX Wettable Sulphur (7 to 8 pounds per 100 gallons of spray) with ORTHOX Spreader-Adhesive (1 pint). Substitute Lime-Sulphur Solution for FLOTOX Wettable Sulphur if infection has occurred.

●
As an alternative, use FLOTOX Paste Flotation Sulphur (14 to 16 pounds) with ORTHOX Spreader-Adhesive (1 pint). "FLOTOX" has proved to be a NON-CAUSTIC spray, which has provided high effectiveness without the injury to foliage, tree, or production that has followed the use of caustic materials.

●
For Pink application against SCAB, LEAF SPOT and CURCULIO, use FLOTOX Wettable Sulphur (7 to 8 pounds) or FLOTOX Paste Flotation Sulphur (14 to 16 pounds), freshly Hydrated Lime (5 pounds), ORTHOX Standard Lead Arsenate (3 pounds), and ORTHOX Spreader-Adhesive (1 pint).

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5. In a refrigerated storage, the floors, walls, and ceilings should be insulated to reduce heat leakage. Cooling equipment of ample capacity should be installed to maintain proper temperature. Positive air circulation by fans driving air over the evaporating coils assures uniform temperature and rapid cooling of fruit throughout the storage.

6. Apples which are to be held for a long period should be stored at 32° F. McIntosh apples which are to be marketed by January 1 can be held at 45° at the time of harvest and reduced to 32° by the third week after picking. This treatment will allow the apples to develop better flavor than if stored continuously at 32°. During the storage period, relative humidity should be maintained at not less than 85 per cent.

7. Good management is essential to assure satisfactory operation of a cold storage. Proper temperature and humidity must be maintained, pressure gauges watched from day to day to check the functioning of machinery, coils defrosted and equipment and rooms kept neat and clean.

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PRACTICAL SUPPLEMENTARY MEASURES IN CODLING MOTH CONTROL

J. O. PEPPER, Pennsylvania State College, State College, Pa.

The codling moth in Pennsylvania apple orchards is without question one of the most important insects. In recent years this insect has gained foothold in many orchards and is taking much more than its share of the total fruit produced. It is undoubtedly the major pest problem in many orchards and in such cases it is to the growers benefit to make use of all known means to bring the insect under control.

The following supplementary measures with a short discussion of each are offered as some of the effective means that every apple grower can make use of in a fight against the codling moth.

1. **Scraping Trees Thoroughly:** By this is meant the removal of all rough bark on the tree trunk and larger limbs, the cleaning out of old pruning cuts or limb splits, or in other words the removal of all hibernating places of this insect on the tree. This work should be done during the late fall, winter, and early spring making sure to have the job done by the early part of May.

2. **Use of Chemically Treated Bands:** The most satisfactory band that has been used is the two inch width cor-

rugated paper band that has been impregnated with beta-naphthol. If trees have not been well scraped as mentioned in above suggestion, the banding is not worthwhile. In order to show how many worms such bands do collect and kill some 1939 records are given.

Summary of Chemically Treated Band Records on Codling Moth for Southeastern Pennsylvania 1939

County	Number of Trees	Total Number of Worms	Average Number of Worms Collector Per Tree
1	51	2,409	47
2	10	846	84
3	10	286	28
4	21	1,841	87
5	17	1,816	107
6	62	6,825	110
7	6	318	53
8	13	2,722	208
Totals	190	17,063	89.9

The bands are placed on the trunks of the trees about half way between the ground and where the scaffold limbs appear. The bands to be most effective should be placed on the trees between June 1 and 15, so as to be fresh and most effective in collecting and killing the first generation worms. Use care and see that the band touches the tree everywhere, but do not nail on so tight as to crust the paper corrugations.

3. Care of Old Picking Crates: All old picking crates and baskets should be either (a) stored in a fairly tight building and left closed through June, where emerging moths in early summer can not escape or (b) dipped in kerosene before May 1. This last method will kill 95 to 98 per cent of all larvae in the crates and if they are left in open building or on outside all the odor will be gone before harvest season. In 1939 some crates were dipped with good results and it was found that it took about 100 gallons of kerosene to each 1000 crates. This of course depends upon size of crate and kind of wood.

To further give some idea of the number of moths emerging from old picking crates, in 1939 an orchard was selected that had a medium heavy infestation of codling moth during 1938 where some 1500 picking crates were taken at random and stored in a tight building with glass windows at each end. Records were kept on the emergence of moths and a total of 1192 moths were taken from these crates. Certainly the destruction of these moths cannot be overlooked as a great aid in codling moth control.

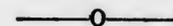
4. General Cleanup Around Orchard: This includes all places around the packing house, the old cull pile, the props

used in the orchard, and any old picking crates or prunings left in the orchard. In short clean up every hibernating place if possible.

5. Proper Pruning of Trees: Be sure to open up tree sufficiently so that a good job of spraying can be done during the spring and summer. It is also very important that the limbs pruned out be collected and burned as these sometime harbor many over-wintering worms. Investigations in one state have shown that on old trees as many as 37 per cent of the over-wintering worms on the tree can be found on the prunings after the tree has been properly pruned. Therefore, be sure to destroy such material.

6. Use of Bait Pails: When properly kept, bait pails are a most practical means of determining codling moth activity in the orchard and timing of spray applications. From several years experience it has been found that five pails are sufficient to give ample records for the average orchard.

It is believed that all the suggestions given here are practical in the average orchard and furthermore that they are compatible with good orchard practices. However, it must be emphasized that these suggestions are not to take the place of a well planned spray program but work hand in hand with it in controlling the codling moth.



INSECT PROBLEMS OF THE NEW YORK FRUIT GROWER

HUGH GLASGOW, Chief in Research, Geneva, New York

When your secretary asked me to talk to this association on the insect problems of the fruit grower I was a little puzzled as to what I could say that might be considered appropriate. Being as familiar as I am with the capable guidance that you growers have here in your own state, I certainly shall not undertake to tell you how I think you should handle your local spray problems. You do not need any such advice from me or from any other outside agency, I am sure.

What I have in mind is rather to discuss briefly a few of the more important insect problems that are likely to be of common interest to all of us, and to outline in a general way how the growers in New York are dealing with them. In doing this we must recognize that while our fruit insects are much the same as those you growers have to contend with here in Pennsylvania, there are bound to be differences not only in the emphasis that must be placed on certain pests but in the details of similar control programs as they have been worked out for the two localities.

Our growers, for example, regularly depend on a three per cent lubricating oil spray as a dormant treatment for the control of such pests as the San Jose scale or the European red mite. Here in Pennsylvania, on the other hand, you are told to use the same type oil at a four per cent dilution. Now oil costs money. Why should you pay for an extra gallon of oil in each 100 gallons of spray if a weaker dilution will do just as well. The answer is simply that in your part of the country these insects have been found to multiply more rapidly, to go through the winter in better condition, or for some reason to be more difficult to hold in check than they are with us in New York and consequently call for a somewhat more drastic control program. Apparent discrepancies of this sort are always likely to appear in the schedules from different sections of the country, but an investigation will usually reveal some sound reason for such differences.

In New York we have seven research workers who are devoting most of their time to the insect problems of the fruit grower, and whatever I may have to say on this general subject as it applies to New York will be based very largely on the findings of these men.

F. Z. Hartzell, who comes originally from your state, has been working for the past ten years or more on dormant applications in an attempt to adapt these to as wide a range of pests as possible. He is also the authority on grape insects and their control in the state.

S. W. Harman has been directly responsible for the codling moth program in Western New York for the past twelve or fifteen years where this insect has been such an important problem.

D. M. Daniel has charge of all problems having to do with biological control. This naturally includes the oriental fruit moth as a major consideration. In addition to these activities Doctor Daniel has been carrying out detailed studies on peach borer control for a number of years as well as studies on certain other fruit insects.

P. J. Chapman is directly responsible for the whole research program in the Hudson Valley and Champlain region. Associated with him in this work are O. H. Hammer and R. W. Dean.

F. G. Munding works largely on pear insects and on the insect pests of small fruits.

I am telling you all this by way of introduction so you will have a general idea of the research setup in New York as it applies to fruit insects, and will understand more clearly perhaps the source of some of the things I may have occasion to refer to in connection with the discussion of our general control program.

In regard to our insect problems, the codling moth, as in most other apple growing sections, is without question the insect pest of outstanding importance, not only on account of the direct losses it causes our growers but because of the many secondary problems that are involved in its control. After the codling moth it is difficult in a state as large as New York to group the other fruit insects in the order of their importance for most of them fluctuate so widely in abundance and destructiveness in different localities or from season to season that it is not easy to single out any one as of first importance.

This past season the insect that caused us by far the greatest concern, at least in western New York, was the rosy apple aphid. This insect had not been particularly troublesome for several years, but in 1939 it made up for lost time and caused losses that would have been tragic had it not been for the excessively heavy crop and the relatively poor prices that prevailed.

Locally the eye spotted bud moth is always a potential hazard. The same can be said of the fruit tree leaf roller and the red mite, although the latter is not ordinarily as much of a problem as it is with you. Outbreaks of some of the other common apple insects such as the apple maggot, apple red bug, San Jose scale, scurfy scale, oystershell scale, red banded leaf roller, plum curculio, and others are likely to flare up locally at any time. We also have a number of other well known apple insects that are either of relatively minor importance to the fruit grower or very local in their distribution, such as the apple curculio, the leaf miners, leaf curling midges, and others.

In the course of the past twenty or thirty years our general spray program, as this applies to apples, has undergone a profound change. Not so long ago, by a dormant application we meant just one thing, the use of a high concentration lime-sulfur spray directed against the San Jose scale. Later several other types of sulfur sprays were introduced, then the plain lubricating oil sprays and the miscible oils appeared. About ten years ago the so-called tar washes or creosote oil sprays were introduced from Europe, followed more recently by a group of insecticides, which for want of a better name have been grouped together as nitro insecticides, represented by such commercial products as Dowspray Dormant, Elgetol, Nitro Kleenup, and others. Most of these dormant insecticides have distinct merit, but the rapid introduction of new materials into this field, together with the combinations that may be made and the constantly widening range of pests we are attempting to embrace in the dormant program has either crowded some of the older materials into the background or rendered them obsolete.

The old lime-sulfur-nicotine combination is still one of our main weapons in fighting the rosy apple aphid notwithstanding its many well recognized limitations. The lubricating oil sprays are generally much quicker in their action and more thorough in cleaning up heavy infestations of the San Jose scale than lime-sulfur besides providing perhaps the most effective single treatment available for red mite control.

At proper concentrations the lubricating oil sprays are highly effective against such pests as the fruit tree leaf roller and pear psylla, while when combined with nicotine and properly timed they have proved effective against the bud moth and the rosy apple aphid, thus greatly extending the season when these pests can be effectively attacked.

The tar washes, when properly made and applied, are highly effective against the rosy aphid, and when combined with lubricating oil sprays control of the San Jose scale and certain other pests is provided for. Unfortunately, the tendency of the red mite to build up more rapidly following such a schedule and its failure to control certain other important pests has greatly retarded a more general acceptance of the tar washes by our growers.

The fact that the rosy aphid fluctuates so violently from year to year, sometimes appearing generally in destructive numbers only after the lapse of several seasons makes it difficult to justify any dormant schedule as a regular program for aphid control unless other important pests can be taken care of at the same time.

While the tar washes are unquestionably effective against the rosy aphid the fact that some of the more recently introduced dormant insecticides appear to be equally, if not more effective against this insect, and at the same time go far toward providing a positive control for certain other important pests such as the bud moth, oystershell scale, scurfy scale and others has tended to crowd the once promising tar washes very much into the background so far as the New York fruit grower is concerned.

Before leaving the subject of dormant applications it might be well to add that some of the more recently introduced nitro sprays have given such a good account of themselves in the three or four years they have been under test in New York that many of our growers are becoming enthusiastic about them, too enthusiastic perhaps for our own peace of mind, since we would naturally have preferred to keep these under observation for a time longer before seeing

them so generally accepted. However this may be, these materials are now in the hands of the grower and they are certainly going to be used in much greater volume in 1940 than ever before. Some of these have given a surprisingly good account of themselves, not only in Mr. Hartzell's experimental work but also as used by practical growers and that too during a major rosy aphid outbreak.

The codling moth with us has always been rather irregular in its behavior. In some parts of western New York, for example, it has presented a terrific problem for years, being so abundant some seasons that growers have all but despaired of holding it in check even by the most drastic means. In still other sections it is relatively unimportant, assuming the role of a minor pest to be taken care of in the course of the regular spray operations without any special attention being given it. In eastern New York it has, in general, been much less troublesome than in some parts of western New York, although in some localities it seems to be definitely on the increase.

By a carefully worked out program where certain non-lead arsenicals such as zinc arsenate and calcium arsenate have been substituted at critical points in the spray schedule for lead arsenate, Doctor Chapman has made it possible for the growers in this region to employ an arsenical schedule successfully against the codling moth and apple maggot and at the same time keep within the legal tolerance for both lead and arsenic.

For a great many years the growers in the heavily infested belt of western New York have had to rely on the standard lead arsenate schedule put on at a rate that made washing obligatory. Since a very real prejudice has developed in the minds of many buyers against washing tender varieties such as McIntosh, this has placed the McIntosh growers in the heavily infested sections under a severe handicap and has created a very real need for some program that would insure satisfactory control of the codling moth and at the same time avoid the need for washing tender varieties. For several seasons Mr. Harman has been working with this in mind, trying to adopt one of the so-called nonwash programs to conditions in western New York. Last season, under Mr. Harman's guidance, such a schedule was followed through by a number of commercial growers in this section with distinctly gratifying results.

Such a program is decidedly more costly to carry out than the regular arsenical schedule, involving as it does the use of more expensive materials applied at somewhat shorter

intervals. This in itself might be expected to deter the average grower from adopting such a schedule if it were not for the fact that the entire cost cannot logically be charged against the codling moth. This becomes apparent when it is recognized that the materials used in such a program frequently play an important role in checking at the same time such secondary pests as scale insects, bud moth, and aphids, pests that might well require special applications for their control; or, if left unchecked, might exact a heavy toll on their own account. With this in mind, many growers feel that the nonwash program is in reality little, if any, more expensive than the regular arsenical sprays they have used in the past. This program, attractive as it admittedly is in many ways, is far from being perfected and much work will still have to be done before it can safely be placed in the hands of the average grower, for there will always be certain hazards involved in its application until there can be some better adjustment worked out between the insect part of the program and that having to do with scab control.

In this brief discussion I have touched on only a few of the problems that seem to be of particular interest to our New York apple growers at this time. In order to guard against possible confusion with your Pennsylvania spray programs I have purposely avoided going into any great detail regarding our own. The detailed spray schedules as they apply to New York conditions have been worked out in an admirable way by Mr. J. A. Evans and others representing the Extension Division at the College of Agriculture. These schedules are available to anyone and will, I feel sure, be found of great interest to any member of this association who takes the trouble to study them.

As has already been pointed out, however, these schedules are not intended to be of general application but were worked out specifically for use under New York conditions. Any attempt to adapt them to your conditions here in Pennsylvania should be left to those agencies in your own state who are responsible for guiding you in such matters.

CONTROL OF INTERNAL CORK OF APPLES BY BORON APPLICATIONS

J. R. MAGNESS, Principal Pomologist, Fruit and Vegetable Crops and Diseases, U. S. Horticultural Station, Beltsville, Maryland.

In opening this discussion we wish first of all to describe as clearly as possible what we mean by internal cork. There are other troubles in apples—particularly the one termed

“bitter pit”, also frequently “Baldwin spot” or “York spot”—which may easily be confused with internal cork. Internal cork of apples is due to boron deficiency in the tree, and is corrected by boron applications. Bitter pit is not appreciably affected by the use of boron.

Apples typically affected with internal cork are shown in figure 1.

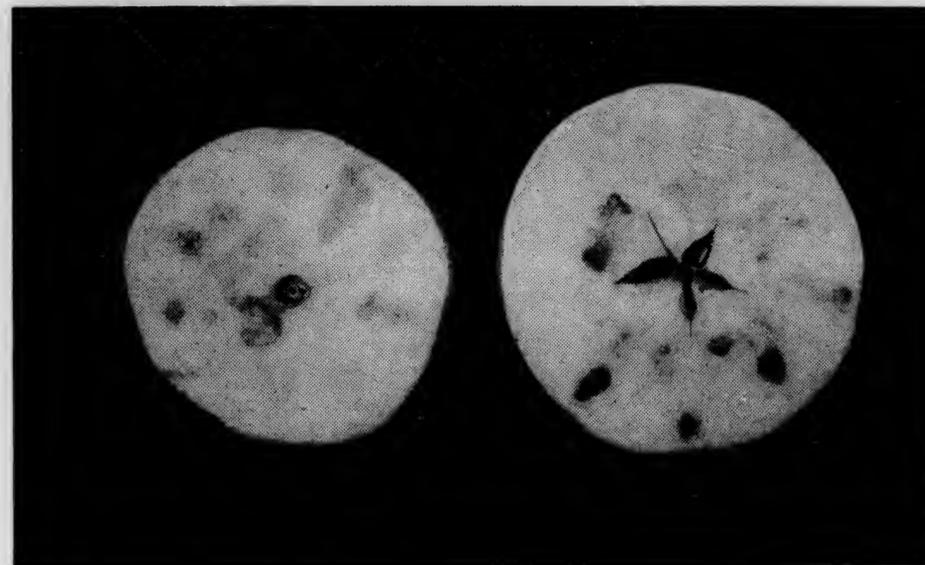


Fig. 1—Internal cork in Ben Davis apples.

The internal cork commonly present in the Middle Atlantic States is characterized by brown areas deep in the flesh of the apple. With certain varieties it occurs immediately around the core, while in other varieties, such as the Ben Davis shown in figure 1, it occurs throughout the flesh of the apple, usually being particularly abundant toward the stem end.

In mild cases of internal cork there is no surface marking of the affected fruit. Under severe cork conditions the surface becomes pebbly or roughened, but even in quite severely affected apples there is no definite spotting of the surface. Affected fruit develops color earlier than sound fruit on the same tree. Typical internal cork begins to show in the apple some 6 to 8 weeks before harvest time.

Bitter pit is characterized by slightly sunken spots on the surface of the fruit. When these spots occur in non-colored areas the skin immediately over the spot is likely to be a slightly darker green in color. A corky area develops immediately below the sunken surface. Except in the most severe cases of bitter pit the brown tissue occurs mainly directly under the skin. The surface spotting of bitter pit and the concentration of the corky tissue near the skin distinguishes

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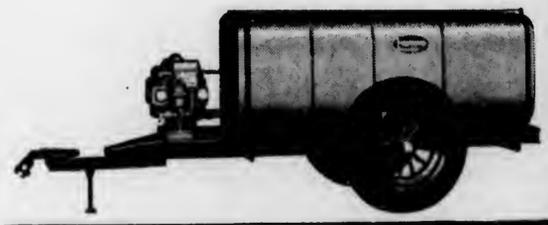
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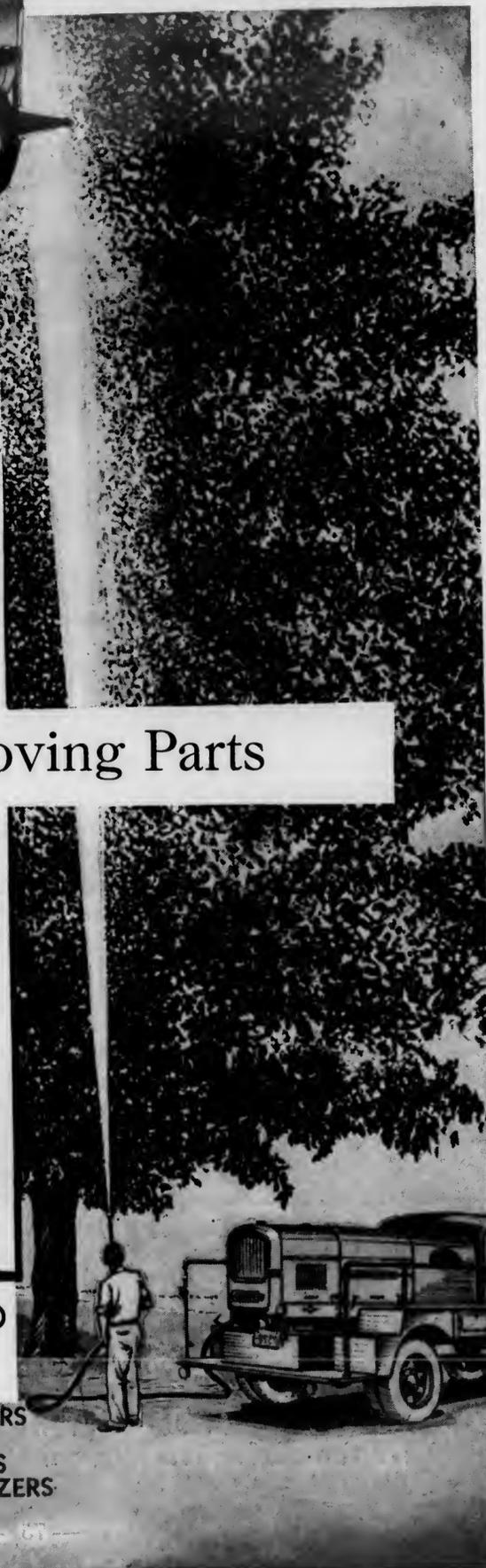
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it from internal cork, which shows no skin discoloration or spotting and develops discoloration deep in the flesh of the apple. Bitter pit is not controlled by boron applications, and no control for it is known at the present time. Bitter pit develops particularly when fruit grows to large size, and anything which stimulates the tree and fruit tends to increase bitter pit development. Thus heavy fertilization, heavy pruning, heavy irrigation, and heavy thinning of the fruit crop all tend to increase the amount of bitter pit.

Prevalence of Internal Cork

Internal cork is likely to be much more widely prevalent during years of severe drought than when normal rainfall occurs. Apparently under such drought conditions the intake of boron by the tree is reduced as compared to seasons of abundant rainfall. In 1939 internal cork was widely prevalent throughout the New England States, eastern New York and in Pennsylvania where near-drought conditions existed during much of the growing season.

Most severely affected varieties in the Potomac Valley area are Ben Davis and its close relatives Gano and Black Ben Davis. Oldenburg (Duchess), Rome Beauty, Grimes Golden and Jonathan are sometimes moderately affected. Yellow Newtown is seriously affected in some areas of the Pacific Northwest. In eastern New York and New England McIntosh and Cortland have been seriously affected. Probably McIntosh, Cortland, and the Ben Davis varieties should be considered the most seriously affected in the Eastern States, with Rome Beauty and Jonathan following. (In response to the question of how many growers present observed internal cork in any fruit in 1939, fully one-third of those present indicated that they had observed it in their fruit.)

Boron as a Plant Nutrient

Boron is one of the group of elements that is needed only in trace amounts for the maintenance of plant growth. It is only in recent years that it has been recognized that boron is one of the essential elements for plants. A French worker, Agulhon, in 1910 published results showing that small amounts of boron increased the growth of wheat, oats, and radishes grown in sand. Other workers later demonstrated that trace amounts of boron were necessary when plants were grown under carefully controlled conditions. It was not until 1931, however, that a German worker, Brandenburg, demonstrated that boron might be so low in soils as to interfere with proper plant development. He showed that boron deficiency was the underlying cause of heart rot or dry rot in sugar beets and mangolds. Since that time, it has been

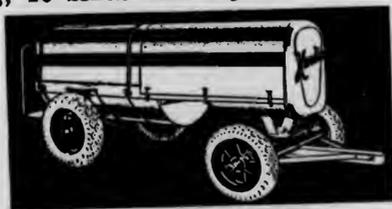
shown by other workers that heart rot or dry rot of beets, turnips, rutabagas, browning of cauliflower, and stem cracking of celery in various parts of the world are caused by boron deficiencies.

Apparently the first work which associated boron deficiency with some of the breakdown diseases of apples was that of the Cawthron Institute in New Zealand. In work started in 1934, they found that internal cork of apples, which is prevalent in that country, was due to deficiency of boron. Shortly thereafter, workers in British Columbia also found that the condition there, which is termed drouth spot or corky core, is also corrected by boron applications. In the spring of 1936, workers in the U. S. Department of Agriculture first put out experimental treatments to determine whether types of breakdown in apples in the eastern United States.

As a result of these experimental treatments, we have found applications of boron to be completely effective in correcting the condition which we have termed internal cork of apples in the Shenandoah and Potomac Valleys. A. B. Burrell, working mainly in the Champlain Valley in New York

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State, has also found boron containing compounds to be fully effective.

Results of Experimental Treatments

During 1936, preliminary results indicated that applications of boron would correct the trouble in Ben Davis. In the fall of 1936, three orchards were selected in the vicinity of Charles Town, W. Va., which were very badly affected with internal cork. Cuttings were made on the fruit in the fall of 1936, and badly affected trees were selected for treatment. In the fall of 1936, applications of boric acid were made to five badly affected trees in each orchard, and borax was applied in one orchard. Again in the early spring of 1937, additional trees were treated with boric acid in each orchard. The results of these soil treatments, as compared to check trees left untreated, are summarized in the following table:

Results of Soil treatments to control internal cork of apples, 1937

Treatment	No. of Trees	Total apples cut	% Free of cork	% Slight cork	% Bad cork
Orchard No. 1, Ben Davis:					
Boric acid, 1 lb.					
per tree, fall -----	5	487	98.0	2.0	0.
Boric acid, 1 lb.					
per tree, spring -----	4	418	99.5	0.25	0.25
Check,					
no treatment -----	4	398	10.2	22.0	68.8
Orchard No. 2, Gano:					
Borax, 2/3 lb.					
per tree, fall -----	4	400	100.0	.0	.0
Boric acid, 2/3 lb.					
per tree, fall -----	5	506	98.4	1.4	0.2
Boric acid, 2/3 lb.					
per tree, spring -----	5	511	100.0	.0	.0
Check,					
no treatment -----	5	498	9.4	15.2	75.4

These results indicate very clearly that either boric acid or borax applied in the fall or in the spring up to three weeks before bloom will almost completely prevent the development of internal cork. These applications were to large trees more than 20 years old and were at the rate of two-thirds pound and one pound per tree. Soil applications were distributed over the area of the soil within the spread of the branches.

Form of Boron to Apply

We have not had consistent differences between applying boron in the form of boric acid and in the form of borax. Borax is sodium borate, a compound very similar to nitrate of soda except that boron is present rather than nitrogen. It contains approximately 11 per cent boron. Boric acid is the material widely used as a mild antiseptic, and contains be-

tween 17 and 18 per cent boron. Both of these materials are relatively inexpensive, and cost about the same on the basis of boron content.

Recommendations

Where orchards are known to produce fruit which is affected with the internal cork that we have described here, we would recommend an application of borax of about one-third pound per tree for trees under 15 years of age, one-half pound for trees 15 to 20 years of age, and one pound for trees 21 years of age and above. Two thirds of this amount of boric acid, or about one-fourth pound for trees under 15 years, one-third pound for trees 15 to 20 years, and one-half to two-thirds pound for trees above 20 years, should be equally effective. After an application has been made, do not repeat until the orchard again begins to produce corky fruit. Boron in excessive amounts is highly toxic to plant growth. Too much boron in irrigation water constitutes a major hazard in some of the irrigated orchards of the West. Therefore, we must sound a caution against the use of boron except where the need is definitely known. Then one application, and one only, should be made to avoid any danger of excess. No injury has been observed on apple trees in our test blocks that received two pounds of boric acid per tree.

Experience to date indicates that one application of the amount recommended above is effective in controlling internal cork for at least three years. In some orchards treated in the spring of 1937 traces of internal cork again appeared in 1939, the third season after application. These traces in the 1939 crop were not sufficient to affect its market value. Present experience, however, would indicate that applications should be made about one in three years in orchards that show the trouble.

Under conditions of very severe boron deficiency a surface discoloration of the fruit may occur early in the growing season—6 to 8 weeks after bloom. This has been termed "surface drouth spot". We have not observed such a condition in Pennsylvania or the states to the southward. Such a condition indicates very severe boron deficiency and such fruit usually drops off before harvest. Also, under conditions of very severe deficiency, a dying-back of terminal branches may occur. Apparently the boron deficiency in the Middle Atlantic States is not generally severe enough to give these more extreme symptoms.

Greenhouse experiments have indicated that boron deficiency may also cause a spotting and pitting in the bark of the tree which is very similar to the so-called "apple measles"

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widely prevalent in orchards. Up to the present, however, it has not been demonstrated under field conditions that boron applications will correct apple measles.

In conclusion, we would emphasize again the necessity of distinguishing between internal cork and such troubles as bitter pit if boron is to be used intelligently. Boron has been completely effective in controlling internal cork. It has been ineffective in controlling bitter pit.

JUNIOR APPLE JUDGING CONTEST

Each year more interest is being shown in the junior apple judging contest sponsored by the Pennsylvania State Horticultural Association. The present contest represents the entry of five teams from Adams, Franklin, Carbon, Lehigh and Chester-Delaware counties. In the past the contest was set up using three plates of five varieties and fifty apples of the fifteen most important varieties for identification. This year the apples used in the contest were selected in the counties from which teams were entered. In the actual judging contest three plates of ten varieties were used for judging purposes and fifty apples of the fifteen varieties for identification. The classes to be placed and the individual apples of the fifteen varieties were far from easy to identify. An effort was made to eliminate as much guess work as possible and during the fall months special training schools on the judging of apples were held in a number of the counties. It is gratifying to note the progress that some of the boys and girls have been making in the identification of varieties and the actual placing of the show apples. Several apples were selected and the coaches given an opportunity to name the varieties. In two cases even the coaches themselves were unable to properly name the apples until after the contest when the apples were cut and the identification made by taste. Several of the contestants identified the apples properly and also offered good reasons for their identification.

From reports of various association members the general opinion is that the judging contest is reaching more boys and girls than the essay contest previously supported by this association and it is hoped that more counties will encourage the boys and girls to enter future contests. The winners of the contest have been awarded gold, silver and bronze medals. All the medals are keystone in shape with a small red enameled apple in the center.

Following will be found a tabulation of the individual scores and also the placing of the teams from the various counties:

CONTESTANTS	INDIVIDUAL SCORES											Total Scores				
	Rome	Jona- than	Winter Banana	York	McIn- tosh	Wine- sap	Para- gon	Stay man	Golden Del.	Fifty Apples						
Adams:																
Lloyd Benner	160	100	200	100	180	200	167	200	200	200	167	200	200	210	1817	
H. Claude Stoner	100	200	180	180	180	100	100	67	180	200	100	200	180	195	1482	
Stephen Heyser	0	167	140	120	200	100	200	200	160	200	200	200	175	1462		
Team Score															4761	
Carbon:																
Ernest Christman	67	0	180	0	200	0	0	0	200	0	0	200	90	737		
Walter A. Hoppel	200	167	160	200	200	100	200	200	200	200	167	200	185	1779		
Ethan Rehrig	160	200	160	200	180	200	200	200	160	200	200	200	180	1840		
Team Score															4356	
Chester - Delaware:																
John Hufford	200	167	120	120	200	200	120	200	200	200	67	200	145	1619		
L. W. Linville	200	0	100	160	180	0	160	180	200	0	100	0	150	1090		
Edward Miller	140	0	160	140	200	0	140	200	140	0	0	0	80	860		
Team Score															3569	
Franklin:																
Frank Brake	0	167	100	200	200	0	200	200	200	0	167	0	120	1154		
Wayne Shuman	180	200	160	180	180	133	180	180	160	167	200	167	150	1710		
Lincoln Spidel	180	67	120	200	180	100	200	180	200	100	167	100	170	1484		
Team Score															4348	
Lehigh:																
Esther Hausman	200	200	160	140	140	67	140	140	200	100	133	100	190	1530		
Ruth Hausman	180	67	140	180	140	0	180	140	160	200	67	200	145	1279		
Ray H. Shelley	200	200	100	180	200	0	180	200	200	200	0	200	170	1450		
Team Score															4259	

President J. A. Runk called the meeting to order with introductory remarks and stated that rather than continue with a lengthy talk the scheduled program should be taken up without delay.

State Horticultural Association 1939 Membership

Name	Address	County
Abraczinkas, Andrew	Catawissa, R. 2	Columbia
Acme Veneer Package Co., Inc.	Orchard Park, N. Y.	
Adams Co. Fruit Packing & Distributing Co.	Biglerville	Adams
Allen, Howard C. & Sons	New Park	York
Allen, S. Guy	New Park	York
Allen, W. F. Co.	Salisbury, Maryland	
Allison, H. W., Estate	Shippensburg, R. 2	Franklin
Almoney, Victor	York, R. 5	York
Altland, John P.	East Berlin, R. 5	York
American Agricultural Chemical Co.	2225 Highland Ave., Baltimore, Md.	
American Cyanamid Co.	30 Rockefeller Plaza, New York City	
Amon, John H.	New Wilmington	Lawrence
Anderson, H. M.	New Park	York
Anderson, H. W.	Stewartstown	York
Anderson, Ralph W.	Fawn Grove	York
Ansbacher-Siegle Corp.	310 N. 7th St., Brooklyn, N. Y.	
Anwyll, Harry L.	Harrisburg	Dauphin
Atkinson, D. W.	Wrightstown	Bucks
Atwater, C. G.	Barrett Co., 40 Rector St., New York City	
Bacon, John, Inc.	Gasport, N. Y.	
Bailey, M. V.	Pennington, New Jersey	
Balderston, Robt.	Fairhope Farm, Glen Mills	Ches.-Del.
Balthaser, G. W.	Wernersville	Berks
Baltzley, S. L.	Gettysburg, R. D.	Adams
Banzhaf, W. H.	Muncy	Lycoming
Baldesberger, W. P.	Bridgeville, R. 2	Allegheny
Bard, J. Bert	Chambersburg	Franklin
Bare, John H.	557 Penn Ave., Sinking Springs	Berks
Barnard, C. P.	Northbrook	Chester
Barnard, Richard	Kennett Square	Ches.-Del.
Barr, I. C.	Greencastle, R. 2	Franklin
Barr, James J.	Narvon	Lancaster
Barr, Morris A.	Phoenixville	Ches.-Del.
Bartholomew, R. E.	Sunbury	Snyder
Bartram, F. M.	Kennett Square	Chester
Bartram, G. M.	402 W. Miner St., West Chester	Chester
Bartram, G. Maurice	West Chester	Chester
Baughner, Geo. L.	Aspers	Adams
Baughner, H. G.	Aspers	Adams
Bausman, H. B.	Thorndale	Chester
Bear, Arthur	York, R. 5	York
Bear, Jacob R.	York, R. 5	York
Bear, John W.	York, R. 5	York
Bear, Paul W.	Mount Wolf, R. 4	York
Bean, John, Mfg. Co.	Lansing, Michigan	
Beaverbrook Farms	Brandywine Summit	Chester
Beaverson, Bertha	York, R. 7	York
Beck, A. F.	Perkasie	Bucks
Bell, R. H.	Bureau of Plant Industry, Harrisburg	Dauphin
Bell, S. G.	West Middlesex	Mercer
Bence, Wm.	Indiana	Indiana

Name	Address	County
Bender, L. J.	Allentown, R. 4	Lehigh
Benner, B. E.	Fairfield, R. D.	Adams
Benner, Hartford G.	Coopersburg, R. 1	Lehigh
Benner, Roy	Perkasie	Bucks
Bensinger, Clarence	Tamaqua, R. D.	Schuylkill
Berger, Elias	Pine Grove	Schuylkill
Berger, Samuel	Hamburg, Star Route	Berks
Berlew, George	Dallas, R. 3	Luzerne
Bethany Orphans Home	Womelsdorf	Berks
Bidwell, Homer	Lake Ariel, R. 1	Wayne
Bikle, Fred C.	Fayetteville, R. 1	Franklin
Bikle, Philip M., Jr.	Chambersburg, R. 6	Franklin
Bingham, A. H.	St. Thomas	Franklin
Bingham, W. O.	St. Thomas	Franklin
Bishop, W. S.	Doylestown	Bucks
Black, John W.	Aspers	Adams
Blaine, Geo. W.	North East	Erie
Blessing, David H.	Newville, R. 1	Dauphin
Bloede, Victor G. Co., Inc.	Baltimore, Md.	
Boak, J. A. & Sons	New Castle, R. 4	Lawrence
Bollinger, Geo. H.	New Castle, R. 3	Lawrence
Boltz, Geo. J.	339 N. 9th St., Pottsville	
Boltz, Mrs. Maude	317 N. 9th St., Pottsville	
Boltz, Peter R.	Lebanon	Lebanon
Borland, Stacy	Indiana, R. 1	Indiana
Bountiful Ridge Nurseries	Princess Anne, Md.	
Bovard & Baldwin	655 E. Washington St., New Castle	Lawrence
Borras, Dr. A.	Large St. and Solly Ave., Philadelphia	
Bowen, E. T.	Moscow, R. 3	Lackawanna
Boyd, Paul C.	Delta	York
Boyer, C. G.	Swineford	Snyder
Boyer, Donald	Biglerville	Adams
Boyer, Ira C.	Middleburg, R. 3	Snyder
Boyer, Jay	Mt. Pleasant Mills	Snyder
Boyer, John F.	Middleburg, R. 4	Snyder
Boyer, W. W.	Biglerville	Adams
Boyertown Fruit Farms	Boyertown	Berks
Brace, Harold G.	Dallas, R. 3	Luzerne
Brahm, G. W.	Fayetteville, R. 1	Franklin
Bream, John	Orrtanna	Adams
Bream, D. M. Co.	Chambersburg	Franklin
Briedenbaugh, H. L.	Boyertown	Berks
Bricker, Dr. E. B.	Lititz	Lancaster
Brinser, Irwin	Bainbridge	York
Brinton, H. C.	Hanover	York
Brossman, John G.	Ephrata	Lancaster
Brown, Bert C.	Marion Center	Indiana
Brown, C. Earl	North Second St., Chambersburg	Franklin
Brown, Fred J., Jr.	Reading, Box 5	Berks
Brown, J. Wallace	Erie, R. 6	Erie
Brown, H. W.	Allentown, R. 3	Lehigh
Brown, J. Turner	New Park	York
Brown, M. G.	Fawn Grove	York
Brown, Norman C.	Waynesboro, R. D., Box 285	Franklin
Brown, Robt.	Bridgeton	York
Brubaker, Daniel A.	Ephrata, R. 2	Lancaster
Bucher, F. S.	Reamstown	Lancaster
Bushey, J. B.	Biglerville, R. 2	Adams

Name	Address	County
Brahman, W. M.	McKnightstown, R. 1	Adams
California Spray Chemical Co.	Elizabeth, N. J.	
Campbell, W. C.	Jamestown, R. 1	Mercer
Carpenter, G. S. L.	74 Washington St., Hagerstown, Md.	
Carroll, Frank	Neshaminy	Bucks
Central Chemical Co.	Hagerstown, Md.	
Chapin, Irvin	Shickshinny, R. 3	Luzerne
Chase, Chas. T.	Bala	Montgomery
Cherry, C. N.	910 Ryan St., New Castle	Lawrence
Clark, A. L.	Olyphant, R. D.	Lackawanna
Clemson, Leonard G.	Halifax	Dauphin
Cleveland Tractor Co.	Cleveland, Ohio	
Clevenger, J. L.	Homer City, R. 1	Indiana
Coates, W. B.	Coatesville, R. 5	Ches.-Del.
Coble, Vallie	Cherry Tree, R. D.	Indiana
Coffroad, L. C.	New Holland, R. 2	Lancaster
Collins, C. E.	301 Cherry St., Dunmore	Wayne
Conrad, Homer	Indiana	Indiana
Coolbaugh, Perry	Dallas, R. D.	Luzerne
Coon, S. J.	Clarks Summit, R. 2	Lackawanna
Cooper, A. E.	State College	Centre
Cooper, C. A.	1000 Highland Ave., Coraopolis	Allegheny
Cope, F. R., Jr.	Dimock	Susquehanna
Cosgrove, Leo	Lancaster, R. 3	Lancaster
Couch, H. R.	Shelocta, R. 2	Indiana
Coupe, Vernon	Homer City, R. D.	Indiana
Coursen, Isaac	Wyoming, R. D.	Luzerne
Covert, Budd	Mercer	Mercer
Cox, J. W.	New Castle, R. 5	Lawrence
Craighead, E. M.	2742 N. 2nd St., Harrisburg	Adams
Creasy, Luther P.	Catawissa, R. 1	Columbia
Cressman, C. K.	Barto, R. D.	Berks
Crist, James D.	Walden, N. Y.	
Crisswell, R. T.	12 N. Second St., Chambersburg	Franklin
Croce, F. D. & Co.	386-8 Washington St., N. Y. C.	
Crone, Wm.	Dover, R. 3	York
Crouse, E. A.	Central Y.M.C.A., Harrisburg	Adams
Crowell, A. & T.	Avondale	Chester
Crowell, Ralph T.	Sunnyside Farm, Buckingham	Bucks
Cummings, Jos. F.	Sunbury	North- umberland
Cyclone Seeder Co.	Urbana, Indiana	
Daly, S. J.	c/o Allegheny Chemical Corp., Berks County Trust Bldg., Reading	Berks
Daniels, Arthur	Lake Ariel, R. 1.	Wayne
Davenport, Eugene	Plymouth	Luzerne
Davis, E. G. N.	Newton Square	Ches.-Del.
Davison, Norman H.	Chambersburg	Franklin
Dayton, Russell	Woodbourne Orchards, Dimock	Susquehanna
DeLong, Cletus Y.	Mertztown, R. 2	Berks
Dennis, A. J.	Zionsville, R. 1	Lehigh
Dennis Brokerage Co.	204 Franklin St., N. Y. C.	
Derbyshire, W. Hastie	Chambersburg, R. 1	Franklin
Detwiler, D. E.	Penn Run, R. 1	Indiana
Dibble, Samuel E.	Shelocta, R. 1	Indiana
Dickenshied, F. S.	Zionsville	Lehigh
Dickinson, B. M.	5634 Stanton Ave., Pittsburgh	Allegheny
Diefenderfer, Dr. Geo.	741 Walnut St., Allentown	Lehigh
Diehl, J. M.	49 N. Jonathan St., Hagerstown, Md.	Franklin

Name	Address	County
Diener, W. L.	1100 Penn St., Reading	Berks
Dilcer, Stanley	Point Pleasant	Bucks
Dill, Robt.	North East	Erie
Diven, J. L.	Livermore, R. D.	Indiana
Dixon, Billie	St. Thomas	Franklin
Dow Chemical Co.	Midland, Michigan	
Dreese, Vern	Freeburg	Snyder
Druck, Albert	Hellam, R. 1	York
Duke, D. R. & B. F.	166 E. Washington St., Chambersburg	Franklin
Dunbar, C. O.	Arendtsville	Adams
Duncan, Miss Eleanor C.	323 E. King St., Shippensburg	Cumberland
Dunlap, James M.	403 W. South St., Carlisle	Cumberland
Dunlap, R. Bruce	Dept. of Welfare, Harrisburg	Dauphin
Dunn, F. H.	Harbor Creek	Erie
Dutweiler, Ira K.	Lebanon	Lebanon
Dye, H. W.	Niagara Sprayer & Chemical Co., Inc., Middleport, N. Y.	
Eaton, Ben	Dallas, R. 3	Luzerne
Eby, Mrs. Caroline	Paradise	Lancaster
Enck, Warren K.	Biglerville	Adams
East Central Fruit Growers Production Credit Assoc.	Hagerstown, Md.	
Edgerton, J. Russell	Westtown	Chester
Edminston, William	New Wilmington, R. D.	Lawrence
Eisenhart, J. C.	York, R. D.	York
Ensminger, J. M.	Dillsburg	York
Erb Bros.	305 E. Front St., Lititz	Lancaster
Eshleman, John E.	Florin	Lancaster
Evans, C. M.	Verona, R. 1	Allegheny
Evans, I. Rowland	Longwood Farms, Kennett Square	Ches.-Del.
Evans, W. H.	Plainsville	Luzerne
Everhart, W. J.	York, R. 3	York
Fagan, F. N.	State College	Centre
Farnsworth-Young Fruit Farm	Waterville, Lucas Co., Ohio	
Feldman, Chas. S.	Chambersburg, R. 4	Franklin
Felty, G. B. D.	Millersville	Lancaster
Fenstermacher, P. S.	Allentown, R. 3	Lehigh
Fetterman, J. Gordon	Media	Delaware
Fisher, Elam S.	Gordenville, R. 1	Lancaster
Fisher, Fred M.	Wernersville	Berks
Fisher, Herbert J.	North Girard	Erie
Fister, Ray	Adams Ave. & Spruce St., Scranton	Lackawanna
Fleming, H. K.	State College	Centre
Fletcher, S. W.	State College	Centre
Flinchbaugh, H. H.	Loganville	York
Flinchbaugh, J. J.	Seven Valleys, R. 2	York
Flora Orchard Co.	Wrightsville	York
Floyd, E. H.	Columbia, R. 1	Lancaster
Fogelsanger, R. B.	Chambersburg, R. 5	Franklin
Fogelsonger, W. H.	210 N. Prince St., Shippensburg	Franklin
Fohl, Mrs. Margaret	75 E. Ridge St., Carlisle	Adams
Forrester, W. R.	Mercer	Mercer
Forry, S. E.	Ephrata, R. 1	Lancaster
Frantz, Ira	Dallas, R. D.	Luzerne
Frantz, S. P.	Trucksville, R. 1	Luzerne
Frazier, Wm. R.	Zionsville	Lehigh

Name	Address	County
Freed, A. J.	Racine	Beaver
Freed, W. A.	Racine	Beaver
Frey, H. E.	Red Lion, R. 2	York
Friend Mfg. Co.	Gasport, New York	
Fritz, Wm.	Orefield	Lehigh
Fry, John L.	c/o Whitner & Co., Reading	Berks
Funk, Sheldon	Boyertown	Berks
Gackenbach, G. A.	Orefield	Lehigh
Gantert, Theo.	152 N. Front St., Reading	Berks
Gardenhour, G. W.	Smithsburg, Md.	
Garrahan, R. H.	Kingston	Luzerne
Garretson, Donald	Aspers, R. D.	Adams
Garrétson, Ryland	Bendersville	Adams
Garrettson, Robt.	Flora Dale	Adams
Garvey, Dr. T. J.	443 W. Chestnut St., Lancaster	Lancaster
Gay, Arthur	Dallas, R. D.	Luzerne
Gehr, Harvey J.	Waynesboro	Franklin
Gehrkin, Jesse F.	New Castle, R. 8	Lawrence
Geiger, Clinton	Neffs	Lehigh
Geiger, Samuel	Schnceksville, R. 1	Lehigh
Gelwix, Dr. J. M.	Chambersburg	Franklin
German, Wilmer	Slatington, R. 1	Lehigh
Gibson, G. Meade	Mercer, R. 1	Mercer
Gibson, Harold	Blairsville, R. D.	Indiana
Gibson, Vernon	Renfrew	
Gibson, W. F.	Yoe	York
Gillan, C. F.	St. Thomas	Franklin
Gillan, G. G.	St. Thomas	Franklin
Gillan, R. J.	St. Thomas	Franklin
Glick, Jonas K.	Gap, R. 2	Lancaster
Goldman Mfg. Co.	Glassboro, New Jersey	
Goldsborough, E. L.	Shepherdstown, W. Va.	
Good, Harvey	Lancaster, R. 8	Lancaster
Goodling, G. A.	Loganville	York
Goshorn, Taylor L.	Quincy, Box 47	Franklin
Gramm, H. V.	St. Thomas	Franklin
Gray, A. G.	Hancock, Md.	
Gray, S. D.	American Potash Institute, Investment Bldg., Washington, D. C.	
Graybill, Floyd	Richfield	Snyder
Greiner, Nathan N.	243 College Ave., Elizabethtown	Lancaster
Griest, Frederick E.	Floradale	Adams
Grimshaw, Harry	North Girard	Erie
Gross, H. S.	York, R. 5	York
Group, Foster C.	Gardners	Adams
Grove, H. R.	York Springs	Adams
Grove, W. E.	York Springs	Adams
Guyton, T. L.	2204 Chestnut St., Harrisburg	Dauphin
Haag, Lester	Virginville	Berks
Haas, Wm.	Coplay, R. 1	Lehigh
Haase, Alfred H.	Narrowsburg, N. Y.	Wayne
Haase, Herman	Narrowsburg, N. Y.	Wayne
Haberman, Mrs. T. C.	Frieddale Farms, Baden	Beaver
Hackenburg, Grant H.	Middleburg	Snyder
Hacker, A. L.	445 Hamilton St., Allentown	Lehigh
Haddock, John C.	Wilkes-Barre	Luzerne

Name	Address	County
Hafer, Harry D.	Fayetteville, R. 1	Franklin
Hafer, John A.	Chambersburg, R. 5	Franklin
Hafer, Roy	Fayetteville, R. 1	Franklin
Haines, Robt. B. 3rd	Hereford, Box 56	Philadelphia
Haldeman, E. W.	Doylestown	Bucks
Hall, L. C.	North Girard	Erie
Hann, Jesse	Hunlock's Creek, R. D.	Luzerne
Harner, M. C.	Paxtonville	Snyder
Harrison Stencil Works	4 N. 5th St., Harrisburg	Dauphin
Harrison, Jos. G.	Harrison's Nurseries, Berlin, Md.	
Hartman, C. A.	Franklin, R. 3	Venango
Hartman, Ernest	Biglerville	Adams
Hartman, L. E.	Cly	York
Hartman, M. T.	Gettysburg	Adams
Hartman, Scott W.	Palm	Berks
Hartzok, John W.	Marion	Franklin
Harvey, H. R.	Foxburg	Clarion
Hassinger, H. C.	Beavertown	Snyder
Hayes, S. B.	Enon Valley, R. 1	Lawrence
Hayman, Guy L.	Northbrook	Chester
Harvey, Cyld	Northbrook	Chester
Hausman, Geo. B.	Coopersburg, R. 2	Lehigh
Haverstick, Paul E.	Lancaster, R. 3	Lancaster
Heacock, O. J.	Biglerville	Adams
Heaps, Marshall	Delta	York
Heaps, T. Jerome	Street, Md.	York
Heffner, Norman	Pine Grove	Schuylkill
Hefterich, W.	Chalfont	Bucks
Hein, Russell	McKeansburg	Schuylkill
Heinz, Henry	Narrowsburg, N. Y.	Wayne
Heisey, S. A.	Greencastle, R. 4	Franklin
Hempstead, Walter	River St., Honesdale	Wayne
Henderson, Lowrie	Stoneboro, R. D.	Mercer
Henninger, E. J.	Pine Grove	Schuylkill
Herb, Ray H.	Orwigsburg	Schuylkill
Herhold, J. C.	North Girard, R. 1	Erie
Herr, C. H.	Lancaster, R. 6	Lancaster
Herr, J. Z.	Elizabethtown College, Elizabethtown	Lancaster
Hershey, H. F.	Hamburg, R. 3, Box 23	Berks
Hershey, H. S.	East Petersburg	Lancaster
Hess, F. M.	601 Main St., Waynesboro	Franklin
Hess, Ira S.	Florin	Lancaster
Hess, Paul G.	Waynesboro, R. 2	Franklin
Hess, Ray B.	Waynesboro, R. 1	Franklin
Hess, R. C.	Waynesboro, R. 2	Franklin
Hess, T. S.	Wapwallopen, Box 27	Luzerne
Hetrick, A. W.	Beavertown	Snyder
Hetrick, J. Frank	Beavertown	Snyder
Hicks, Wm.	Honesdale	Wayne
Higgins, W. A.	Dallas, R. D.	Luzerne
Hildebrandt, John E.	Dallas, R. 2	Luzerne
Hile, Anthony	Curwensville	Clearfield
Hileman, W. Carl	New Castle, R. 3	Lawrence
Hill, Wm. D.	North East	Erie
Hinnershitz, C. Walter	1255 Buttonwood St., Reading	Berks
Hoffman, O. M.	Aspers, R. D.	Adams
Hoge, L. Clark	Leesburg, Va.	
Holler, Arthur	Hellam	York

Name	Address	County
Hood, T. C.	Saltsburg, R. 1	Indiana
Hoopes, Wilmer W.	West Chester	Chester
Horn, W. H.	Chambersburg, R. 10	Franklin
Hornberger, J. W.	Denver, R. 1	Lancaster
Horne, Gomer F.	Ringtown	Schuylkill
Horst, J. Morris	Lebanon, R. 3	Lebanon
Hostetter, Henry N.	Washington Boro, R. 1	Lancaster
Hostetter, Dr. J. E.	Gap, R. 1	Lancaster
Houck, Dallas	New Castle, R. 1	Lawrence
Houk, J. M.	New Castle, R. 6	Lawrence
Houser, Jacob R.	Lampeter	Lancaster
Howard, P. H.	Dover, R. 1	York
Huber, C. H.	Gettysburg	Adams
Huber, Edwin B.	232 S. Main St., Chambersburg	Franklin
Huber, Herman	Narrowsburg, New York	Wayne
Huber, Mack	Willow Street	Lancaster
Huey, S. R.	New Castle, R. 3	Lawrence
Hughes, J. N.	Mercer, R. 1	Mercer
Hunt, N. M.	New Castle, R. 4	Lawrence
Huntsinger, Elvin	Hegins	Schuylkill
Hutchinson, J. D.	204 Post Office Bldg., Wilkes-Barre	Luzerne
Hykes, E. S.	York, R. 4	York
Ide, Silas C.	Sweet Valley, R. 1	Luzerne
Imswiler, John S.	West Union St., West Chester	Chester
Ingham, M. M.	New Castle, R. 5	Lawrence
Jacobs, D. C.	Arendtsville	Adams
Jackson, C. E., Co.	Chambersburg	Franklin
Jacoby, Eric	Clarks Summit, R. 1	Lackawanna
Jaman, John	Bethlehem, R. 1	Northampton
James, J. E.	Box 143, Hagerstown, Md.	
James, W. S.	Micronizer Processing Co., Morristown, N. J.	
Jersey Package Co., Inc.	Bridgeton, N. J.	Lawrence
Johnson, John	New Wilmington	Lawrence
Johnson, R. S.	New Wilmington, R. 1	Luzerne
Johnston, Mrs. F. C.	Dallas	Luzerne
Johnston, M. E.	Connoquenessing	Allegheny
Johnston, Rolland A.	Hereford	Berks
Jones, J. H.	Paradise, R. 1	Lancaster
Joseph, W. H. & Son	119 Fulton St., New York City	
Kane, L. L.	Orrtanna	Adams
Kaltreider, Walter	York, R. 3	York
Kauffman, A. L.	Bird-in-Hand, R. 1	Lancaster
Kauffman, C. B.	Bird-in-Hand	Lancaster
Kauffman, C. E.	Manchester, R. 1	York
Kauffman, J. B.	York, R. 7	York
Kearns, Howard C.	Stewartstown	York
Keil, A. T.	Mars, R. 1	Allegheny
Keller, D. S.	516 Woodland Ave., Grove City	Mercer
Keller, L. H.	Bendersville	Adams
Keller, Paul J.	Alder Run Orchards, Tyrone	Adams
Kelly Bros. Nursery Co.	Danville, N. Y.	
Kendig, Dr. J. S.	Salunga	Lancaster
Kerchner, Harvey T.	Lenhartsville	Berks
Kessler, Geo. W.	Tyrone	Blair
Kiner, Dr. Geo. M.	N. S. Pittsburgh Savings Trust Bldg., Pittsburgh	Indiana
King, L. C.	Mt. Wolf, R. 1	York

Name	Address	County
Kister, U. G.	Etters	York
Klein, Jack	113 Dock St., Philadelphia	
Kleppinger, B. M.	Coopersburg, R. 2	Lehigh
Kleppinger, Robt.	Waterford, Conn. c/o E. Johnston	Bucks
Kline, H. F.	Kintersville	Bucks
Knappenberger, Thos.	Zionsville, R. 1	Lehigh
Knouse, M. E.	Peach Glen	Adams
C. H. Koch	McKeansburg	Schuylkill
Koehler, Paulus E.	826 Washington Ave., Monaca	Beaver
Kohl, Geo. P.	Clarks Summit, R. 2	Lackawanna
Kovacs, Rudolph	Orefield	Lehigh
Kratz, T. Percy	Doylestown	Bucks
Krause, J. W.	Barnesville	Schuylkill
Krebs, H. B.	Mercersburg	Franklin
Kreider, Ben R.	Manheim, R. 1	Lancaster
Kuhns, Victor	Allentown, R. 3	Lehigh
Kunkel, B. F.	Tamaqua, R. 1	Schuylkill
Kuster, R. C.	General Chemical Co., 40 Rector St., N. Y. C.	
Kyle, B. W.	Zionsville, R. 1	Lehigh
Lacoe, Nelson	Clarks Summit, R. 1	Lackawanna
Landis, D. M.	Lancaster, R. 7	Lancaster
Landis, G. W.	Freeburg	Snyder
Landseidel, L. A. & Son	Clarks Summit, R. 2	Lackawanna
Lau, Rev. I. M.	715 Manor St., York	York
Lau, L. B.	East Berlin, R. 2	York
Laudenslager, Martin	Orefield, R. 1	Lehigh
Lauffer, M. J.	Oil City, Box 187	Venango
Lehman, S. S.	Girard	Erie
Leibhart, Samuel H.	Wrightsville, R. 1	York
Leiter, L. H.	Greencastle	Franklin
Lengel, Paul	Pine Grove	Schuylkill
Leonard, F. E.	Carlisle, R. 1	Cumberland
Lepole, Walter	Akron	Lancaster
Lewis, C. B.	Riverton, N. J.	
Lewis, G. T.	Providence Rd., Media	Chester
Lewis, Nelson H.	Pittston, R. 1	Luzerne
Lewis, Norman	Pittston, R. 1	Luzerne
Liberknecht, M. L.	Mt. Wolf	York
Lightner, E. S.	York, R. 5	York
Linde, J. Eric	Orefield, R. 1	Lehigh
Linville, Arthur S.	Media, R. 2	Delaware
Livingood, Mrs. Stella	Robesonia	Berks
Lloyd, Ernest S.	Pottstown, R. 2	Chester
Lockwood, Wm.	N. Girard	Erie
Long, D. Edward	Fayetteville	Franklin
Long, J. C.	340 E. Liberty St., Lancaster	Lancaster
Loop, A. I.	North East	Erie
Loop, H. S.	North East, R. 2	Erie
Loose, H. H.	Menges Mills	York
Lord, John	Wyoming, R. 1	Luzerne
Lott, R. C.	Aspers, R. D.	Adams
Lott, Wm. M.	Gardners	Adams
Loucks, Walter	York Storage & Ice Co., York	York
Lucabaugh, J. W.	Hanover, R. 6	Adams
Luce, D. H.	Harbor Creek	Erie
Luck, Fred F.	New Wilmington, Pa.	Lawrence
McClelland, J. B.	Canonsburg	Washington
McClung, Lewis	429 Sheridan Ave., New Castle	Lawrence

Name	Address	County
McClure Bros.	Quarryville	Lancaster
McClure, F. C.	New Wilmington, R. 5	Lawrence
McCormick, C. M.	Knox Ave., New Castle	Lawrence
McCormick, James	Harrisburg	Dauphin
McDannel, Edgar C.	Biglerville	Adams
McDonald, R. C.	Shippensburg, R. 3	Franklin
McElhaney, Jos. A.	Franklin	Venango
McFadden, E. C.	Hagerstown, Md.	
McHenry, Clarence	Indiana	Indiana
McFarland, Ben	New Castle, R. 4	Lawrence
McFarland, J. Horace	Harrisburg	Dauphin
McGeorge, Mrs. Katherine L.	Orrtanna	Adams
McGinnis, C. R.	605 Colonial Trust Bldg., Reading	Berks
McIlvaine, J. S.	Fayetteville	Franklin
McKee, J. M.	c/o Dairyman Coop. Sales Co., Century Bldg., Pittsburgh	
McKeehan, James	Honesdale	Wayne
McNitt Fruit Farm	Milroy	Mifflin
McPherson Bros.	Bridgeton	York
Mackay, Douglas	West Chester, R. 3	Chester
Mackey, Earl	Orefield	Lehigh
MacNeal, Wm. H.	Parkesburg	Chester
Maloney Bros. Nursery Co.	Dansville, New York	
Marcks, Miss Verna	401 Chestnut St., Emaus	Lehigh
Markey, Mrs. Henrietta	York, R. 2	York
Marsteller, Wm.	Stewartstown	York
Martin, R. A.	Doylestown	Bucks
Martin, Wade	Indiana	Indiana
Marvil Package Co.	Laurel, Delaware	
Matthews, W. H.	Box 313, Salem, Ohio	Lawrence
Mattern, John C.	Beaver Springs	Snyder
Mattern, Jos. C.	310 Newry St., Hollidaysburg	Blair
Maurer, J. Edward	Selinsgrove, R. 1	Snyder
Mauger, Maurice	Boyetown, R. 2	Berks
Maurer, J. J.	Hegins	Schuylkill
Maurer, W. H.	Hegins	Schuylkill
Mayer, Guy S.	Willow Street, R. 1	Lancaster
Mecartney, J. L.	State College	Centre
Meister, Kenneth G.	Chambersburg, R. 6	Franklin
Melcher, Bennett A.	Bally	Berks
Mellinger, Jacob D.	Lancaster, R. 1	Lancaster
Mellor, Wm. W.	North Wayne Ave., Wayne	Chester
Mendelson, S. Meehan	Newton Square	Chester
Merring, Guy	Cortez	Wayne
Metzler, Albert	Paradise	Lancaster
Mickel, Joe	Wexford	Allegheny
Millard, H. E.	Annville	Lebanon
Miller, Abraham H.	Lancaster, R. 1	Lancaster
Miller, Amos	Hanover, R. 3	York
Miller, Blaine	Indiana, R. D.	Indiana
Miller, Christ	Marion	Franklin
Miller, C. Clayton	Marion	Franklin
Miller, Clement R.	Statlersville	Lehigh
Miller, Frank	Lake Ariel	Wayne
Miller, Harvey	Loganville	York
Miller, H. W.	Paw Paw, West Va.	
Miller, Jacob R.	Elizabethtown, R. 3	Lancaster
Miller, John W.	Ephrata, R. 2	Lancaster
Miller, Marvin	Clarks Summit, R. 1	Lackawanna
Miller, R. Wayne	551 Nelson St., Chambersburg	Franklin

Name	Address	County
Mimm, Jonathan	McKeansburg	Schuylkill
Minnich, C. S.	Reading, R. 2	Berks
Mitchell, E. B.	Harrisburg, R. 2	Dauphin
Mitterling, John T.	Mt. Pleasant Mills	Snyder
Mock, P. H.	Cherry Tree	Indiana
Mohr, Frank J.	Fogelsville	Lehigh
Mohrman, Richard	Narrowsburg, N. Y.	Wayne
Molof, A. J.	301 Grape St., Vineland, N. J.	
Moon, Henry T.	Morrisville	Bucks
Moore, M. A.	Lititz	Lancaster
Moore, W. R.	New Wilmington, R. 1	Lawrence
Morse, Carl	New Wilmington	Lawrence
Mowery, Lee	Newville	Cumberland
Mowery, N. E.	40 W. Main St., Mechanicsburg	Franklin
Murphy, P. J.	White Haven, R. D.	Luzerne
Musselman, C. H. Co.	Biglerville	Adams
Musser, W. E.	New Bethlehem, R. 3	Clarion
Muth, Leonard	Coopersburg, R. 2	Lehigh
Myers, A. Jackson	6120 Reedland St., Philadelphia	
Myers, Rueben	Lititz, R. 5	Lancaster
Myers, Chas.	Elm	Lancaster
Myers, Levi M.	Bowmansdale, R. 1	York
National Farm School	Farm School	
National Wooden Box Assn.	308 Barr Bldg., Washington, D. C.	
Neidel, John, Jr.	Oil City, R. 1	Venango
Neiman, Otto	Dover, R. 3	York
Nelson, Corbett D.	711 Evesham Ave., Baltimore, Md.	
Newcomer, L. E.	Boyetown	Franklin
Newman, H. H.	Fayetteville	Berks
Newman, H. W.	New Castle, R. 4	Franklin
Newton, Elmer	New Wilmington, R. D.	Lawrence
Newton, O. A. & Son Co.	Bridgeville, Del.	Lawrence
Niagara Sprayer & Chemical Co.	Middleport, N. Y.	
Nibert, Wm.	Indiana	Indiana
Nicodemus, E. A.	Waynesboro	Franklin
Nitchman, C. H.	Aspers, R. 1	Adams
Nold, Truman	Martinsburg, W. Va.	
Nolt, Harrison S.	Columbia, R. 1	Lancaster
Noss, Jos.	New Castle, R. 5	Lawrence
Oats, Wm.	Hanover, R. 3	York
O'Conner, Haldeman	13 N. Front St., Harrisburg	Dauphin
Ohner, Warren	Schnecksville	Lehigh
Oldfield, W. T.	114 N. George St.	York
Oller, Boyd	Chambersburg, R. 1	Franklin
Oller, Earl	Chambersburg, R. 2	Franklin
Orient Air Conditioning Comm. Refrigerating Co.	222 Orient Ave., Jersey City, N. J.	
Oyler, H. J.	Gettysburg, R. D.	Adams
Packard, Chas. L.	Ore Hill	Blair
Page, C. M.	Etters	York
Palm, Harry	Ephrata, R. 1	Lancaster
Palmer, Aaron H.	Lancaster Co. Almhouse, Lancaster	Lancaster
Pannebaker, Wm. M.	Virgilina, Va.	
Panovec, Victor	Easton, R. 2	Northampton
Pape, John H.	Gettysburg	Adams

Name	Address	County
Paschal, John	Kennett Square	Chester
Passmore, Norman S.	Glen Mills, R. 1	Delaware
Passmore, S. S.	Mendenhall	Chester
Paxson, Ewd. M.	Lumberville, R. D.	Bucks
Paxson, S. L.	Lumberville	Bucks
Peirce, J. S., Sales Mgr.	American Agricultural Chemical Co., 2225 Highland Ave., Baltimore, Md.	
Pelton, H. C.	Hamlin	Wayne
Pennepacker Co.	Emaus	Lehigh
Pepper, J. O.	State College	Centre
Permutit Co.	330 W. 42nd St., New York City	
Peters, James E.	Fayetteville	Franklin
Picster, Frank W.	Reading, R. 2, Box 545	Berks
Pifer, Lewis M.	Blairsville	Indiana
Poff, Leroy	Hummelstown, R. 2	Dauphin
Poor, D. W.	Narrowsburg, N. Y.	Wayne
H. K. Porter, Inc.	6 Ashland St., Everett, Mass.	
Powers, R. H.	Hartwood Farm, Sharpsburg	Allegheny
Pratt, B. G.	Pratt Chemical Co., 50 Church St., N. Y. C.	
Pratt, Lee	Chambersburg	Franklin
Preston, S. D.	448 W. Leicester St., Winchester, Va.	
Quigley, Ford F.	Chagrin Falls, Ohio	
Quigley, Harvey	Bendersville	Adams
Quigley Hafer Ice and Cold Storage Co.	Chambersburg	Franklin
Raffensberger, Chas. E.	Biglerville	Adams
Rahauser, Jos.	Greencastle	Franklin
Raine, Thos.	Fairview	Erie
Rankin, Chas. C.	410 S. Walnut St., West Chester	
Raynor, Bros.	Salisbury, Md.	
Readinger, Austen B.	Fleetwood, R. 1	Berks
Reckard, R. W.	427 Katherine Rd., Upper Darby	Chester
Reist, A. E.	Palmyra	Lebanon
Reist, J. Clarence	Paragon Nut & Fruit Farm, Landisville	Lancaster
Reist, Henry G.	1166 Avon Rd., Schenectady, N. Y.	Lancaster
Reiter, F. G.	Mars	Allegheny
Renfrew, R. N.	Fayetteville, R. 1	Franklin
Rice, Daniel	Eliottsburg	Perry
Rice, R. E.	Biglerville, R. D.	Adams
Richardson, W. T. & Son	Whiteford, Md.	
Rick, Chas. M.	431 Windsor St., Reading	Berks
Rick, John M.	Ellwood City, R. 1	Lawrence
Rick, John	West Leesport, R. 1	Berks
Riley, R. G.	North Girard, R. 1	Erie
Rinehart, E. S.	Mercersburg	Franklin
Rinn, Clويد	Indiana	Indiana
Rittenhouse, Dr. J. S.	Lorane	Berks
Rittenhouse, S. B.	Lorane	Berks
Ritter, Arthur	Allentown, R. 3	Lehigh
Ritter, Astor	Allentown, R. 3	Lehigh
Roberts, Horace	Moorestown, N. J.	
Roberts, J. Earle	220 Dock St., Philadelphia	Philadelphia

Name	Address	County
Roemhild, Albert C.	122 Dock St., Philadelphia	Philadelphia
Rohde, Wm.	Johnstown	Cambria
Rohlfing Orchards	Meyerstown	Lebanon
Rohling, Frank	Meyerstown	
Rohm & Haas Co.	222 W. Washington Sq., Philadelphia	
Rohrer, Geo. H.	Dryville	Berks
Clayton, Rolland	New Ringgold	Schuylkill
Romig Bros.	Downingtown	Chester
Romig, E. B.	McKnightstown	Adams
Root, J. W.	Manheim, R. 1	Lancaster
Rose, C. S.	Lititz, R. 2	Lancaster
Rosensteel, L. C.	Edri	Indiana
Ruef, J. U.	State College	Centre
Ruhl, Dr. H. F.	Manheim, Box 236	Lancaster
Ruhnke, E. E.	J. R. Watkins Co., 231 Johnson Ave., Newark, N. J.	
Rumbel, Edwin	Ringtown	Schuylkill
Runk, J. A.	Huntingdon	Huntingdon
Rutt, B. F.	Hummelstown, R. 2	Lancaster
Rutter, Mrs. Walter R.	New Holland, R. 2	Lancaster
Ryland, Harry	Pine Grove	Schuylkill
Sachs, E. H.	Biglerville, R. D.	Adams
Sahli, Elmer	Gibsonia, R. 2	Allegheny
Salsgiver, Andrew	Indiana, R. 7	Indiana
Sankey, H. S.	New Wilmington	Lawrence
Satterthwaite, Frederick G.	Yardley	Bucks
Schadel, Ethel	Klingerstown, R. 1	Schuylkill
Schantz, Henry	533 Hamilton St., Allentown	Lehigh
Schantz, L. M.	Orefield, R. 1	Lehigh
Schieferstein, Wm.	Leesport	Berks
Schoelkopf, Carl	Wernersville, R. 3	Berks
Schoener, John	New Ringgold, R. D.	Schuylkill
Schonour, Pierce	Gouglersville	Berks
Schoonover, W. E.	Dallas, R. 3	Luzerne
Schrifer, George	Bendersville	Adams
Schrifer, Roy	Gardners	Adams
Schrope, John	Hegins	Schuylkill
Schuldt, J. Carlton	Elizabethtown	Lancaster
Scott, Dr. Kenneth	West Chester	Chester
Seachman, George E.	Windsor, R. 1	York
Searle, Alonza	Honesdale	Wayne
Seibert, Oscar	Sharpsburg, R. D.	Allegheny
Seitz, John B.	Rohrerstown	Lancaster
Sellman, L. E.	547 Frederick St., Hagerstown, Md.	Franklin
Setlemeyer, C. T.	Wilmore, R. D.	Cambria
Seyfert, Andrew	Lebanon, R. 2	Lebanon
Shaffer Bros.	Gravity	Wayne
Shaffer, Chas. N.	Silverdale	Bucks
Shank, H. A.	Lancaster, R. 7	Lancaster
Shattuck, J. H.	Erie, R. 5	Erie
Shaw, R. C.	Stewartstown	York
Shay, Herbert	Franklin, R. 2	Venango
Sheadle, Miss Lydia	Jersey Shore	Lycoming
Sheble, Earl	Hamburg, R. 2	Berks
Shenk, D. W.	Lancaster, R. 7	Lancaster
Shenot, C. P.	Wexford	Allegheny
Shenot, Earl	Wexford	Allegheny
Shenot, Edw.	Wexford	Allegheny
Sheppard, L. P.	229 W. Cottage Place, York	York

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Shirley, H.	Quakertown, R. D.	Bucks
Shull, R. H.	Orrtanna	Adams
Siegfried, A. H.	Selinsgrove	Snyder
Sierer Bros.	Mt. Pleasant Mills	Snyder
Sierer, C. C.	Mt. Pleasant Mills	Snyder
Sierer, Clark	Mt. Pleasant Mills	Snyder
Slade, Joseph	2735 Greenleaf St., Allentown	Lehigh
Simmons, S. L.	Frank St., Box 55, Pittsburgh, 10 Chambersburg	Allegheny
Skinner, H. W.	Biglerville	Franklin
Slade, Martin A.	Gettysburg, R. 5	Adams
Slaybaugh, Glen	Newton Square	Adams
Smedley, Samuel L.	Blairsville, R. 1	Delaware
Smith, Andrew	Blairsville, Box 75	Indiana
Smith, A. Woodward	Pittston, R. D.	Indiana
Smith, B. E.	Utica, New York	Luzerne
Smith, D. B. & Co.	North East	Erie
Smith, G. C.	Bethlehem, R. 4	Lehigh
Smith, G. E.	Bethlehem, R. 4	Lehigh
Smith, James E.	South River, N. J., Box 222	
Smith, Lawrence	Garden St., Mt. Holly, N. J.	Westmore-
Smith, Leonard	Ligonier	land
Smith, Philip S.		
Smith, Robt.	Eastern States' Farmers' Exchange, Springfield, Mass.	
Smith, Roland M.	Marion Center, R. 2	Indiana
Smith, S. A.	Yoe	York
Smith, W. & T. Co.	Geneva, N. Y.	Luzerne
Smith, Wm.	Berwick, R. 1	Lehigh
Smith, Wm. M.	Orefield, R. 1	Lancaster
Snaveley, H. H.	Willow Street	Lebanon
Snaveley, The Misses	Lebanon, R. 5	Lancaster
Snyder, C. B.	Ephrata, R. 1	Schuylkill
Snyder, C. E.	Valley View	Lancaster
Snyder, Elmer R.	Florin	Westmore-
Snyder, Fred	Avonmore, R. 1	land
Snyder, Geo.	Dallas, R. 3	Luzerne
Snyder, John B.	Yoe	York
Snyder, Simon R.	Ephrata, R. 1	Lancaster
Snyder, Victor	Pitman	Schuylkill
Snyder, Fry & Rick	Reading, R. 2	Berks
Spencer, Glenn	Pittston, R. D.	Luzerne
Spessard, H.	Chambersburg	Franklin
Stapleford, Frank	Rushland	Bucks
Stark Bros. Nurseries & Orchard Co.	Louisiana, Missouri	
Statler, Harvey	1220 Wilson Ave., Chambersburg	Franklin
Stauffer Chemical Co.	420 Lexington Ave., New York City	
Stauffer, T. H.	Lititz, R. 4	Lancaster
Stear, F. R.	Saltsburg	Indiana
Steele, Harold	114 W. Wesley St., Jackson, Mich.	
Stegner, Chas B.	Titusville	Venango
Stein, Geo. E. & Son	Wrightsville, R. 1	York
Stein, Henry	Woodville	Allegheny

Name	Address	County
Steininger, Chas.	Coopersburg, R. 1	Lehigh
Stonebraker, H. W.	Indiana, R. 7	Indiana
Stoner, Bertha	Hellam	York
Stoner, H. S.	Orrtanna	Adams
Stoneroad, S. A.	New Providence	Lancaster
Stoudt, Mrs. Lillie M.	Hamburg, R. 1	Berks
Stover, Jacob E.	York, R. 2	York
Strasbaugh, E. F.	Orrtanna	Adams
Straub, W. D.	Middleburg, R. 3	Snyder
Strickler, D. A.	Coudersport	Potter
Strock, Chas.	Springtown	
Strong, T. M.	Blairsville, R. 1	Indiana
Strype, F. C.	103 Lafayette St., New York City	
Swank, Luke H.	Johnstown	Cambria
Swartz, S. Emma	Spring Grove	York
Syling, E. S.	New Castle, R. 7	Lawrence
Tate, Roy	McKnightstown, R. 1	Adams
Taughinbaugh, Bros.	Hunterstown	Adams
Taylor & Co.	West Chester, R. D.	Chester
Taylor, Chas. L.	Biglerville	Adams
Taylor, Ralph S.	West Chester	Chester
Thayer, Paul	Carlisle, R. 6	Cumberland
Thomas, Charles L.	King of Prussia	Montgomery
Thomas, Edwin W.	King of Prussia	Montgomery
Thomford, C. F. B.	Kennett Square	Chester
Thompson, Ivan	Clark Summit, R. 2	Lackawanna
Thompson, Lawrence	New Wilmington	Lawrence
Thompson, L. J.	Piedmont Label Co., Inc. Bedford, Va.	
Tobacco By-Products & Chemical Corporation	Louisville, Ky.	
Townsend, A. E.	Oxford	Chester
Tranter, W. W.	1501 First Ave., Elmwood, York	York
Treichler, Newton	Barto	Berks
Trexler, T. A.	Selinsgrove	Northum-
Trostle, Earl	Biglerville, R. 2	berland
Turner, Frank	Franklin, R. D.	Adams
Turrell, Elmore	Noxen	Venango
Twist, Frank	464 Third St., Northumberland	Wyoming
Tyler, W. D.	Dante, Virginia	Snyder
Tyson, Donald C.	Gardners	Adams
Tyson, Edwin C.	Flora Dale	Adams
Tyson, Ralph	Gardners, R. D.	Adams
Tyson, William C.	Flora Dale	Adams
Vogel, E. H.	Lancaster, R. 3	Lancaster
Vogelaar, Martin	River Ridge Farm, Franklin	Venango
Wagener, D. D. & Co.	Easton	Northampton
Wagner, Charles E.	McClure	Snyder
Wagner, H. D.	222 Main St., Emaus	Lehigh
Walton, R. J.	Hummelstown	Dauphin
Wishard, W. H.	132 W. Main St., Waynesboro	Franklin
Way, D. H.	Port Matilda	Centre
Weaver, Abram	Scalp Level	Somerset
Weaver, E. A.	Fayetteville, R. 1	Franklin
Weaver, J. B.	Terre Hill	Lancaster
Weaver, W. G.	Aspers, R. D.	Franklin
Weaver, W. S.	Macungie	Lehigh

Name	Address	County
Weber, Geo.	748 S. Queen St., York	York
Weber, Harvey	Orefield	Lehigh
Weber, Nelson	Orefield	Lehigh
Weigel, H. M.	Aspers	Adams
Weinberger, J. H.	Zionsville, R. 1.	Lehigh
Weimer, E. A.	Lebanon	Lebanon
Weinman, R. B.	Koppers Co., Pittsburgh	
Welch, H. S.	Mount Arbor Nurseries, Shenandoah, Iowa	
Welshans, M. O.	Jersey Shore, R. 3	Lycoming
Welty, Richard	Smithsburg, Md., R. 2	
Wenger, Benj. G.	Ephrata, R. 3	Lancaster
Wenger, J. H.	Chambersburg	Franklin
Wernig, Charles M.	York, R. 2	York
Wertsch, Edwin	Stevens, R. 2	Lancaster
Wertz, D. Maurice	Waynesboro	Franklin
Westrick, F. A.	Patton, R. 2	Cambria
Wheeler, C. B.	Hunlocks Creek, R. 2	Luzerne
Whisler, Edgar	Etters, R. 1	York
Whitcomb, Paul	York, R. 4	York
White, F. Hayes	Liverpool	Perry
White, J. W.	Supt. Indiana County Home, Indiana	Indiana
Whiting, John	New Bedford	Lawrence
Wickersham, Cliff	East Springfield	Erie
Widders, J. B.	Lancaster, R. 3	Lancaster
Wiggins, A. W.	Clark Summit	Lackawanna
Wilcox, J. H.	Easton, Md.	
Wilhelm, L. J.	Sharon, R. 2	Mercer
Wilkinson, R. R.	703 S. 25th St., Harrisburg	Adams
Williams, Luther S.	Indiana, R. 1	Indiana
Wilson, Chas. S.	Oliver Farm Equipment Co., 58 W. Keller St., Mechanicsburg	
Wilson, Harry	Wilkinsburg, R. 1	Cumberland
Wink, Edwin T.	Lenhartsville, R. 1	Allegheny
Winter, M. L.	Hellam, R. 1	Berks
Wise, Harvey	Commodore, R. D.	York
Wister, John C.	Clarkson & Wister St., Germantown	Indiana
Witherow, R. T.	Punxsutawney	Philadelphia
Witman, John	Reading, Box 316	Jefferson
Wohleber, Stephen	3064 Mt. Troy Rd., N. Side Pittsburgh	Berks
Wolfe, Jos.	Allentown, R. 1	
Wolfe, Chas. O.	U. B. Quincy Orphanage, Quincy	Allegheny
Wolfe, D. E.	Dallas, R. D.	Lehigh
Wolfe, Walter	Dallas, R. D. 2	Franklin
Wolff, F. B.	Lima	Luzerne
Wolfinger, Don L.	Chambersburg, R. D.	Luzerne
Woodward, Norris H.	Mendenhall	Delaware
Worley's Nursery	York Springs, R. 1	Franklin
Worthington, Harvey C.	West Chester, R. 2	Chester
Worthington, H. R.	West Chester	Adams
Worthington, Henry, Jr.	West Chester	Chester
Worthington, Russell	West Chester	Chester
Wotring, Dewey	West Chester	Chester
Wotring, Oscar A.	Schnecksville, R. 1	Chester
Wright, Fred	Orefield	Lehigh
Wright, J. Earl	Harrisburg Hotel, Harrisburg	Lehigh
	New Oxford, Box 41	Dauphin
		Adams

Name	Address	County
Yerger, C. R.	Apollo, R. 3	Indiana
Yocum, A. H.	344 S. 5th St., Reading	Berks
Yohe, George S.	Spring Grove	York
Yohe, Henry T.	Spring Grove	York
Yoder, Ira L.	Middleburg	Snyder
Young, Ed.	Chambersburg, R. 1	Franklin
Young, J. Fred	Ellwood City, R. 1	Lawrence
Young, Junius	Narrowsburg, New York	Wayne
Young, Miles	Narrowsburg, New York	Wayne
Young, R. C.	Chambersburg, R. 6	Franklin
Youngs, A. J.	North East, R. 2	Erie
Youngs, L. G.	North East	Erie
Zeigler, E. Calvin	529 W. Market St., York	York
Zook, Amos F.	Lancaster, R. 6	Lancaster
Zook, I. F.	Curryville	Blair





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Rain and Hail Department

90 John Street

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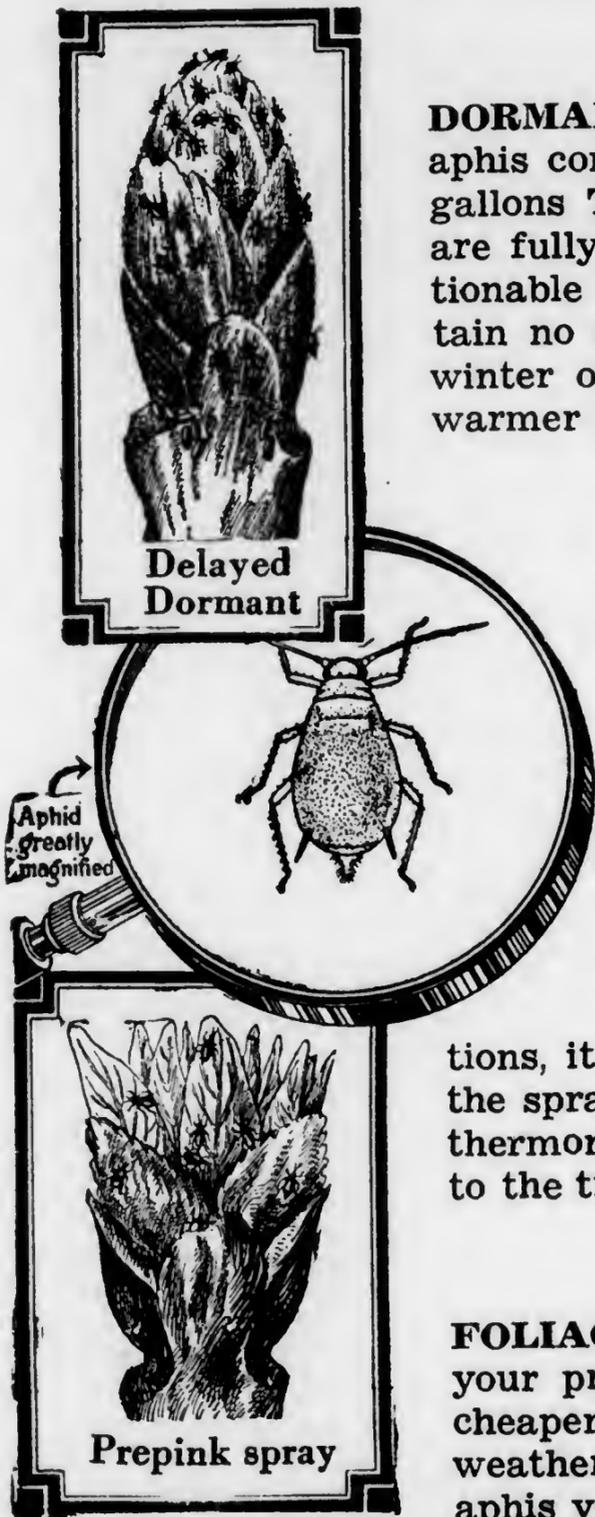
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DORMANT TAR OIL SPRAY. The most certain aphis control is the use of 3 gallons Straitar or 6½ gallons Tar-o-wash to the hundred while the trees are fully dormant. These sprays are not as objectionable as the unstable tar oils, Pratt's tar oils contain no tar acids. Select any day during the late winter or early spring provided the temperature is warmer than 40°.

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