START

Pennsylvania Agricultural Literature on Microfilm

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CONTENTS OF REEL 229

1) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1915
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2) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1916
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3) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1917
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4) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1921
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5) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1922
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6) State Horticultural Association of Pennsylvania
Proceedings of the State Horticultural Association of Pennsylvania, 1923
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7) Pennsylvania State Horticultural Association news, 1937
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8) Pennsylvania State Horticultural Association news, 1938
MNS# PSt SNPaAg229.8

Missing:

1872-1888
1890-1904
1918-1920

Author: State Horticultural Association of Pennsylvania

Title: Proceedings of the State Horticultural Association of Pennsylvania...1915

Place of Publication: Harrisburg, Pa.

Copyright Date: 1915

Master Negative Storage Number: MNS# PSt SNPaAg229.1

<2241048> * *OCLC* Form:serial 2 Input:HHS Edit:FMD
008 ENT: 981124 TYP: d DT1: 1909 DT2: 1958 FRE: a LAN: eng
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037 PSt SNPaAg228.7-228.12,229.1-229.6 $bPreservation Office, The Pennsylvania State University, Pattee Library, University Park, PA 16802-1805
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090 09 SB354 $b.S8 $l+(date) $cst $s+U1909-U1958
090 20 Microfilm D344 reel 228.7-228.12,229.1-229.6 $l+(date) $cmc+(service copy, print master, archival master) $s+U1909-U1923
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245 00 Proceedings of the State Horticultural Association of Pennsylvania ...
246 1 $i52nd-56th have title: $aProceedings of the ... annual meeting of the State Horticultural Association of Pennsylvania
246 1 $i57th-67th have title: $aProceedings of the State Horticultural Association of Pennsylvania for ...
246 1 $i68th has title: $aProceedings of the ... annual meeting of the State Horticultural Association of Pennsylvania for ...
246 1 $i69th- have title: $aProceedings of the State Horticultural Association of Pennsylvania for ...
260 Harrisburg, Pa. $bUnited Evangelical Publishing House.
362 0 1909 (50th)-1958 (99th)
515 Beginning with proceedings for 1924 (65th annual meeting)- published as issues of Pennsylvania State Horticultural Association news
533 Microfilm $m1909-1923 $bUniversity Park, Pa. : $cPennsylvania State University $d1998. $e2 microfilm reels ; 35 mm. $f(USAIN state and local literature preservation project. Pennsylvania) $f(Pennsylvania agricultural literature on microfilm).
580 Continues: State Horticultural Association of Pennsylvania. Report of the State Horticultural Association of Pennsylvania.
780 10 State Horticultural Association of Pennsylvania. $tReport of the State Horticultural Association of Pennsylvania
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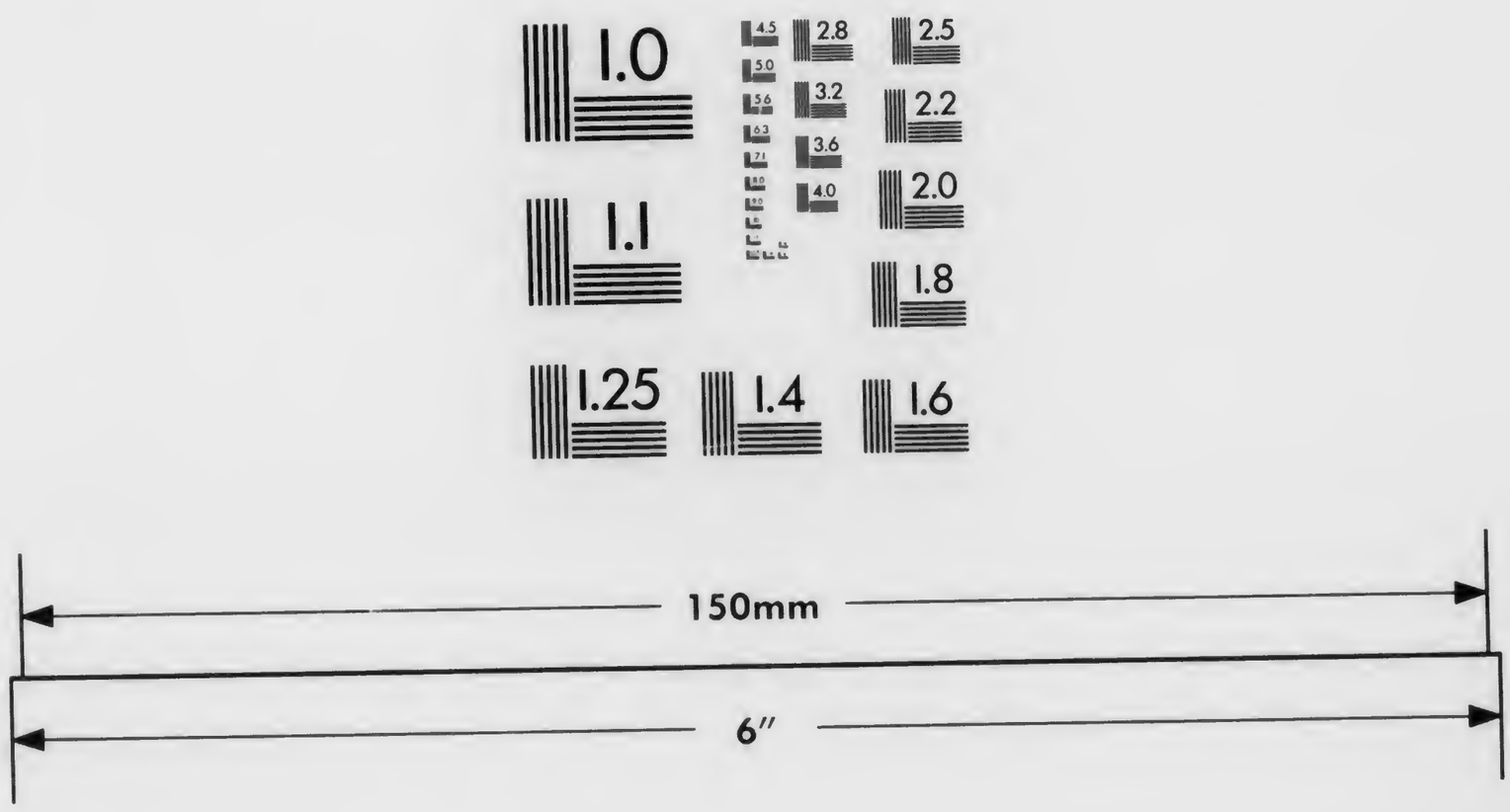

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1915

PROCEEDINGS

OF THE

Fifty-Sixth Annual Meeting

OF THE

State Horticultural Association

of Pennsylvania

HELD IN

Wilkes-Barree, Pa., January 19, 20, 21, 1915

State Horticultural Association of Pennsylvania
Officers for 1915

PRESIDENT.

Chester J. Tyson, Flora Dale.

VICE-PRESIDENTS.

Dr. I. H. Mayer, Willow Street; W. J. Lewis, Pittston; F. H. Fasset, Meshoppen.

SECRETARY.

J. A. Runk, Huntingdon.

TREASURER.

Edwin W. Thomas, King of Prussia.

VICE-PRESIDENTS CERTIFIED FROM COUNTY ASSOCIATIONS.
(Presidents of County Associations for Current Year.)

Adams, Robert M. Eldon; *Beaver*, Paulus E. Koehler; *Bedford*, A. C. Richards; *Blair*, Lynn R. Brua; *Cambria*, Abram Hostetler; *Chester and Delaware*, C. Percy Barnard; *Lackawanna*, A. B. Kilmer; *Montgomery*, Irvin P. Knipe; *Somerset*, D. B. Zimmerman; *Susquehanna*, J. C. Morse; *Washington*, Robert M. Carrons; *Wyoming*, O. M. Treible.

EXECUTIVE BOARD.

All of the above named officers.

STANDING COMMITTEES FOR 1915.

Legislative Committee.

Hon. Ralph Gibson, Williamsport, Chairman.

Exhibition Committee.

Prof. F. N. Fagan, *Chairman*, State College.

C. A. Wolfe. Aspers; H. S. Hershey, Harrisburg, R. 2; R. H. Bell, Williamsport; G. W. Kessler, Tyrone.

General Fruit Committee.

Dr. John P. Stewart, State College.

Membership in this committee is composed of one member from each county represented in the Association and such others as the chairman may request to assist him.

Membership and Expansion Committee.

One member from each county in the State showing horticultural activity.

MEMBERSHIP

Life Members

NAME	POST OFFICE	COUNTY
Adams, W. S.	Aspers,	Adams
Anderson, H. W.	Stewartstown	York
Anwyll, Harry L.	Harrisburg	Dauphin
Atkinson, D. W.	Wrightstown	Bucks
Atwater, Richard M.	Chadds Ford	Chester
Bauzhah, W. H.	Muncy	Lycoming
Barlow, Thos. W.	Fort Washington	Montgomery
Bartram, Frank N.	1639 Race St., Philadelphia	Philadelphia
Bennett, Eugene B.	Easton, Route 3	Northampton
Blaine, George W.	North East	Erie
Bell, R. H.	Williamsport	Lycoming
Blessing, David S.	4 N. Court St., Harrisburg	Dauphin
Boltz, Peter R.	Lebanon	Lebanon
Boles, McClellan T.	Hanlin Station	Washington
Boyer, John F.	Middleburg	Snyder
Blair, Charles P.	Monaca	Beaver
Brinton, Wm. P.	Christiana	Lancaster
Brinton, S. L.	West Chester	Chester
Cation, Wm. R.	Orrtanna	Adams
Chase, Charles T.	Devon	Chester
Chase, Howard A.	Union League, Philadelphia	Philadelphia
Cooper, C. A.	1000 Highland Ave., Coraopolis	Allegheny
Corcoran, J. Paul	New Albany	
Creasy, Hon. Wm. T.	Catawissa	Columbia
Crouse, E. A.	Gettysburg	Adams
Cummings, Jos. F.	Sunbury	Northumberland
Dickson, B. M.	5711 Elgin Ave., Pittsburgh	Allegheny
Dill, Robert	North East	Erie
Dunlap. Jas. M.	Walnut Bottom	Cumberland
Dunlap, R. Bruce	Walnut Bottom	Cumberland
Eldon, Robert M.	Aspers	Adams
Engle, Enos B.	Harrisburg	Dauphin
Engle, John G.	Marietta	Lancaster
Espe, August G.	Perryville	Allegheny
Fassett, F. H.	Meshoppen	Wyoming
Filbert, R. J.	Fox Chase	Philadelphia
Fox, Cyrus T.	Reading	Berks
Freed, A. J.	Racine	Beaver
Freed, W. A.	Racine	Beaver
Garrahan, R. H.	Kingston	Luzerne
Garrettson, Eli P.	Biglerville	Adams
Good, C. W.	Waynesboro	Franklin
Griest, C. A.	Guernsey	Adams
Griest, Frederick E.	Santa Lucio, Oriente, Cuba	
Grove, W. E.	York Springs	Adams
Haddock, John C.	Wilkes-Barree	Luzerne
Hall, L. C.	Avonia	Erie
Hartman, D. L.	Little River, Fla.	
Hartman. George R.	Biglerville	Adams
Hartman, L. E.	Etters	York
Hartman, Wm.	Etters	York
Haverstick, Paul E.	Lancaster	Lancaster
Hawkins, Chas. A.	York	York
Heard, R. E.	Buffalo, N. Y.	
Hershey, H. F.	Harrisburg	Dauphin

NAME	POST OFFICE	COUNTY
Hill, William D.	North East	Erie
Hoopes, Abner	West Chester	Chester
Hostetler, Abram	Johnstown	Cambria
Huey, S. R.	Newcastle	Lawrence
Huff, Burrell R.	Greensburg	Westmoreland
Huff, L. B.	Greensburg	Westmoreland
Hull, D. W.	Waymart	Wayne
Johnston, Mrs. F. C.	Dallas	Luzerne
Jones, J. F.	Willow Street	Lancaster
Jones, S. Morris	West Grove	Chester
Keller, H. M.	Gettysburg, R. 5	Adams
Kessler, Geo. W.	Tyrone	Blair
Kister, U. G.	Etters	York
Koehler, Paulus E.	Monaca	Beaver
Landis, D. M.	Lancaster R. 1	Lancaster
Landis, Israel	Lancaster	Lancaster
Large, Miss Katherine S.	Orrtanna	Adams
Lightner, Wm. A.	Landisburg	Perry
Loop, A. I.	North East	Erie
Lord, John	Wyoming, R 1	Luzerne
Macneal, Wm. H.	Parkesburg	Luzerne
Maffet, Miss M. A.	264 S. Franklin St., Wilkes-Barree	Luzerne
Martin, J. O.	Mercersburg	Franklin
Mayer, Guy S.	Willow Street	Lancaster
Mayer, Dr. I. H.	Willow Street	Lancaster
McClelland, J. B.	Canonsburg	Washington
McCormick, James	Harrisburg	Dauphin
McFarland, J. Horace	Harrisburg	Dauphin
McKee, J. M.	Washington	Washington
McLanahan, J. King	Hollidaysburg	Blair
Meehan, S. Mendelson	Germantown	Philadelphia
Mendenhall, J. Howard	Glen Mills	Delaware
Metzger, Dr. A. H.	Millersville	Lancaster
Mitchell, Ehrman B.	Harrisburg	Dauphin
Moon, Henry T.	Morrisville	Bucks
Mueller, Adolph	Norristown	Montgomery
Myers, Levi M.	Siddonsburg	York
O'Connor, Haldeman	13 N. Front St., Harrisburg	Dauphin
Pannebaker, Wm. M.	Virgilina Virginia	
Pierce, H. W.	Wilkes-Barree	Luzerne
Rankin, Chas. C.	West Chester	Chester
Reist, John G.	Mount Joy	Lancaster
Rick, John	Reading	Berks
Rinehart, E. S.	Mercersburg	Franklin
Roberts, Horace	Moorerstown, N. J.	
Robinson, A. Blaine	North East	Erie
Rohde, Wm.	Johnstown	Cambria
Runk, J. A.	Huntingdon	Huntingdon
Rush, Perry M.	Sycamore, R. 1.	Greene
Satterthwaite, Fred'k G.	Fallsington	Bucks
Searle, Alonza T.	Honesdale	Wayne
Settlemeyer, C. T.	Wilmore	
Shaffner, Jacob	Harrisburg	Dauphin
Shallcross. Frank R.	Frankford	Philadelphia
Shank, H. L.	Lancaster, c | o Conestoga Stage	Lancaster
Sharpe, Miss E. M.	Accotink, Va.	
Smedley, Samuel L.	2242 Bryn Mawr Ave., West Philadelphia	Philadelphia
Snavely, H. H.	Willow Street	Lancaster
Stem, Dr. J. C.	Lemoyne	Cumberland
Stewart, Dr. J. P.	State College	Centre
Strasbaugh, E. F.	Orrtanna	Adams

NAME	POST OFFICE	COUNTY
Swank, Luke H.	Johnstown	Cambria
Taylor, Ralph S.	325 N. Matlack Ave., W. Chester	Chester
Thomas, Chas. L.	King of Prussia	Montgomery
Thomas, Edwin W.	King of Prussia	Montgomery
Trexler, Harry C.	Allentown	Lehigh
Tyson, Chester J.	Flora Dale	Adams
Tyson, Edwin C.	Flora Dale	Adams
Tyson, Wm. C.	Guernsey	Adams
Van Deman, H. E.	3630, 13th St., N. W. Washington, D. C.	
Walton, Robert J.	Hummellstown	Dauphin
Weaver, Abram	Windber	Somerset
Weimer, E. A.	Lebanon	Lebanon
Wertz, D. Maurice	Waynesboro	Franklin
Wertz, Geo. M.	Johnstown	Cambria
Westrick, F. A.	Patton R. 2	Cambria
Whisler, Edgar	Etters, R. 1	York
White, Arthur H.	Pulaski	Lawrence
Williams, Irvin C.	Royersford	Montgomery
Wister, John C.	Germantown	Philadelphia
Witherow, R. T.	Punxsutawney	Jefferson
Wolfe, Chas. A.	Aspers	Adams
Woods, Edward A.	Frick Bldg., Pittsburgh	Allegheny
Youngs, L. G.	North East	Erie

Annual Members

Adams, Harvey S.	Butler	Butler
Anderson, A. J.	214 S. 12th Street, Philadelphia	Philadelphia
Atkinson, Robert E.	Wrightstown,	Bucks
Aurand, Mrs. Chas. M.	Lewistown, R. 1	Mifflin
Baker, H. C.	Tunkhannock	Wyoming
Barnard, C. P.	North Brook	Chester
Bartram, George H.	West Chester, R. 3	Chester
Baugher, H. G.	Aspers	Adams
Bechtel, John	State College	Center
Becker, J. J.	Market St., Wilkes-Barree	Luzerne
Bittenbender, T. L.	60 Church St., Plymouth	Luzerne
Bostwick, D. C.	North East	Erie
Botscheller, A. B.	Dalton, R. 2	Lackawanna
Brace, Paul	Dallas	Luzerne
Brinser, Ephraim	Falmouth	Lancaster
Brinser, E. C.	Middletown	Dauphin
Brinton, Charles	Glen Rose	
Brinton, H. C.	Hanover, R. 3	York
Bronson, C. E.	Alderson, R. 1	Luzerne
Bruner, W. W.	Paxtonville	Snyder
Bucher, I. Reilly	Lebanon	Lebanon
Burgess, N. W.	Wyoming, R. I.	Luzerne
Butt, J. L.	Gettysburg	Adams
Campbell, J. R.	Union Terminal Building	Jacksonville, Fla.
Chandler, W. H.	Scranton	Lackawanna
Chapin, Irvin	Shickshinny	Luzerne
Charles & Sterner	Selinsgrove	Snyder
Clemmer, C. W.	State College	Center
Clouse, W H.	414 Shaw Ave., McKeesport	Allegheny
Comly, E. R.	Bustleton, Philadelphia	Philadelphia
Cope, Francis R., Jr.	Dimock	Susquehanna
Coursen, Frank	30 N. Main St., Pittston	Luzerne
Coursen, I. H.	Wyoming, R. 3	Luzerne
Crago, W. H.	Carmichaels	Greene
Crompton, B. B.	48 E. N'hampton St., W'ks-Barree	Luzerne
Crowell, A. & T.	Avondale	Chester

NAME	POST OFFICE	COUNTY
Dayton, Charles B.	South Montrose	Susquehanna
DeWitt, J. E.	Falls	Wyoming
Deyo Macey Sales Co.	Binghampton, N. Y.	
Dulles, John W.	West Chester	Chester
Elder, George K.	Lewiston, Me.	
Ellis, David M.	Bridgeport	Montgomery
Evans, Wm. H.	Plainsville	Luzerne
Fagan, F. N.	State College	Center
Felty, G. B. O.	Millersville	Lancaster
Fenstermacher, P. S.	Allentown	Lebanon
Finn, A. O.	Clifford	Susquehanna
Fisher, M. O.	Selinsgrove	Snyder
Frantz, Fred W.	175 S. Maple St., Kingstown	Luzerne
Frantz, S. P.	Luzerne	Luzerne
Frazer, Samuel	Geneseo, N. Y.	
Garver, Harvey B.	Middletown	Dauphin
Gay, Arthur	Pittston, R. 2	Luzerne
Gibson, Hon. Ralph	Williamsport	Lycoming
Gould Mfg. Co.	Seneca Falls, N. Y.	
Green, James	Creighton	Allegheny
Grief Cooperage Co.	Cleveland, Ohio	
Haase, Herman	133 Lafayette Ave., Brooklyn, N. Y.	
Haines, Mary M.	Cheltenham	Montgomery
Hale, B. T.	Towanda	Bradford
Harrison & Sons, J. G.	Berlin, Md.	
Harvey, F. L.	Foxburg	Clarion
Hayes, R. W. E.	Galva, Ill.	
Heilman, Dr. R. P.	Emporium	Cameron
Herr, David S.	Lancaster, R. 7	Lancaster
Hibshman, E. K.	State College	Center
Hile, Anthony	Curwensville	Clearfield
Hitz, Cyrus N.	Hackersville	Dauphin
Houck, F. E.	Dallas	Luzerne
Howe, Homer B.	Wellsboro	Tioga
Ives, George H.	534 Wyoming Ave., Kingston	Luzerne
Jennings, Roy	Falls	Wyoming
Johnston, Rev. J. C. M.	New Wilmington	Lawrence
Jones & Son	Allen, Md.	
Kains, M. G.	State College	Center
Keller, C. S.	Gettysburg, R. 5	Adams
Kelly Bros.	Dansville, N. Y.	
Kerr, S. W.	Stony Creek Mills	Berks
Kilmer, A. B.	Springbrook	Montgomery
Kitchen, G. W.	Shaverstown	Luzerne
Krewson, E. W.	White Haven	Luzerne
Kunkel, Jonas	New Ringold	Schuylkill
Kusel, Dr. George C.	1831 Chestnut St., Philadelphia	Philadelphia
Lance, O. M.	Reynolds St., Kingston	Luzerne
Leighton, J. G.	Tunkhannock	Wyoming
Leslie, Wm. H.	Arnold	Westmoreland
Levi, Newton R.	2243 N. 16th St., Philadelphia	Philadelphia
Lewis, H. G.	Pittston, R. I.	Luzerne
Lewis, W. J.	Pittston, R. I.	Luzerne
Linde, J. A.	Orefield	Lehigh
Lippincott, John E.	1125 Stratford Ave., Melrose Park, N. J.	
Loose, H. H.	Menges Mills	York
Luce, D. H.	Harbor Creek	Erie
McDowell, J. M.	State College	Center
McHenry, G. S.	Benton	Bradford
MacPhee, G.	98 N. Laurel St., Hazleton	Luzerne
Marble, L. M.	Canton	Bradford
Mechling, Edward A.	Moorestown, N. J.	

NAME	POST OFFICE	COUNTY
Miller, E. M.	Hanover	York
Mills, Leonard B.	11 Maple Ave., Carbondale	Lackawanna
Moon, R. B.	Morrisville	Bucks
Morse, J. C. and wife	Susquehanna	Susquehanna
Mottier, J. E.	North East	Erie
Myers, C. E.	State College	Center
Peck, Wm. H.	Scranton	Lackawanna
Pershing, Theodore	Pineville	Bucks
Peters, W. V.	Geuernsey	Adams
Pollock, G. B.	Wyoming, R. D.	Luzerne
Pratt, B. G.	50 Church St., New York City	
Price, W. S.	Dallas	Luzerne
Ramer, O. G.	Pitman	Schuylkill
Ratchford, Norman	Nanticoke	Luzerne
Rawding, Henry	Moscow	Lackawanna
Reist, Henry G.	110 Avon Road, Schenectady, N. Y.	
Rennard, George	Alderson	Luzerne
Rice, F. G.	Monroeton	Bradford
Rice, Jacob B.	Trucksville	Luzerne
Reynolds, M. W.	Factoryville R. 2	Wyoming
Roberts, Arthur	Gettysburg, R. 5	Adams
Rosser, David	167 S. Maple St., Kingston	Luzerne
Root, J. W.	Manheim, R. 1	Lancaster
Rozelle, H. E.	Pittston	Luzerne
Ruof, Fred	Hummelstown	Dauphin
Sanford, Mrs. A. L.	245 River St., Kingston	Luzerne
Schell, Walter S.	1307 Market St., Harrisburg	Dauphin
Shoonover, W. E.	Dallas	Luzerne
Shearer, Walter J.	Vinemont	Berks
Shenk, H. H.	Lititz, R, 2	Lancaster
Shoemaker, S. W. % I. C. S.	Scranton	Lackawanna
Siegfried, A. H.	Selinsgrove	Snyder
Siegler, Franklin	320 S. 44 St., Philadelphia	Philadelphia
Silvis, Bert W.	Export	Westmoreland
Smith, C. M.	Lewistown	Mifflin
Smith, J. C.	Trucksville, R. 1	Luzerne
Snyder, C. B.	Ephrata, R. 1	Lancaster
Snyder, E. L.	Avoca	Luzerne
Starkey, S. H.	Bustleton, Philadelphia	Philadelphia
S. Hos. Criminal Insane	Farview	Wayne
Stevens, Mrs. C. J.	91 W. Union St., Wilkes-Barree	Luzerne
Stewart, Wm.	Landisburg	Perry
Stone, H. S.	Clarks Green	Lackawanna
Stover, F. S.	Bowmansville	Lancaster
Strode, A. D.	West Chester	Chester
Strode, Marshall D.	West Chester	Chester
Swartz, Samuel	Spring Grove	York
Templetan, T. W.	Plymouth,	Luzerne
Turk, Jesse C.	Euclid, R. D.	Butler
Vail, C. S.	New Milford	Susquehanna
VanBuskirk, John	Lk. Box 96, Wilkes-Barree	Luzerne
Vantuyle, H. S.	Pittston	Luzerne
Vogel, Adam B.	Lititz, R. 3	Lancaster
Wadhams, Lydia F.	275 S. Franklin St., Wilkes. Barree	Luzerne
Walker, James F.	Westtown	Chester
Watts, R. L.	State College	Center
Wiley, H. S. & Son	Cayuga, N. Y.	
Wilson, Capt. J. L.	Overbrook	Philadelphia
Wingert, J. K.	Chambersburg	Franklin
Woolman, Anna	Lansdowne	Delaware
Work, Paul	% College of Agri., Ithaca, N. Y.	
Zacharias, H. C.	Harrisburg	Dauphin

CONSTITUTION.

ARTICLE 1.—*Name and Object.* The name of this organization shall be The State Horticultural Association of Pennsylvania. Its object shall be to foster and encourage the development of horticulture in the State of Pennsylvania.

ARTICLE 2.—*Membership.* Any person may become an Annual Member of this Association by paying two dollars ($2.00) to the Secretary, such membership to expire on the first day of the following annual meeting, unless renewed. Any one paying twenty dollars ($20.00) to the Secretary at one time shall be entitled to Life Membership. Persons of distinguished merit in horticulture may be elected to Honorary Membership for the *current year*, by a majority vote of the members present at any regular meeting.

ARTICLE 3.—*Officers.* The officers shall consist of a President, three Vice-Presidents, a Secretary and a Treasurer, all of whom shall be elected by ballot at each annual meeting to hold office for one year or until their successors shall be chosen, except that the retiring Secretary shall edit the report of the annual meeting at which his successor is elected. No one may serve as President for more than two consecutive terms. These *elective* officers shall constitute an Executive Board in conjunction with an additional indeterminate number of Vice-Presidents whose names shall be announced by the Secretary at the annual election of officers. These Vice-Presidents shall be the regualrly elected Presidents of any County Associations, organized in Pennsylvania for horticultural purposes, whose Constitution is approved by the Executive Board, and whose income from annual membership dues during the preceding year was not less than ten dollars ($10.00.) In order to secure admittance to this Board, the Secretary of such County Association shall certify to the Secretary of the State Association that the applicant has been duly elected to serve as their President for the current year and shall also submit a statement showing number of members and amount of dues paid for the preceding year. All officers must be members of the Association in good standing at the time of their election and shall assume their duties at the close of the meeting at which they were elected.

ARTICLE 4.—*Quorum.* Twenty-five (25) members of the Association and five (5) members of the Executive Board shall constitute a quorum for the transaction of business.

ARTICLE 5.—*Standing Committees.* The following Standing Committee shall be appointed by the President to serve during his term of office: A committee on Legislation, to consist of three (3) members; a Committee on Exhibition, to consist of five (5) members; a Committee on Membership, to con-

sist of one (1) member from each county in the State showing evidence of horticultural activity, and General Fruit Committee, consisting of one from each county represented, with a general chairman of the whole, each member of the General Fruit Committee to have the privilege of appointing two assistants.

ARTICLE 6.—*Annual Meeting.* The Annual Meeting of this Association shall be held during the month of January in each year, at such time and place as the Executive Board shall determine. The regular meetings of the Association shall be closed to all persons, except paid-up members of the Association, speakers, delegates from associations outside of Pennsylvania, all ladies, and the minor sons of members.

ARTICLE 7.—*Amendments to the Constitution.* This Constitution may be amended by a two-thirds vote of the members present at any annual meeting, provided such amendment shall have been presented to the Secretary in writing at least sixty (60) days prior to time of holding the annual meeting, and by him referred to all members in connection with the announcement of said meeting.

BY-LAWS.

ARTICLE 1.—*Duties of the President.* The President shall be the executive officer of the Association and of the Executive Board, and shall preside at all meetings of either body designating one of the Vice-Presidents to serve in his stead when necessarily absent. He shall pass upon all bills and accounts of the Association before they are ordered paid by the Secretary; he shall appoint all delegates to other associations and all special and standing committees of the Association unless otherwise ordered.

ARTICLE 2.—*Duties of the Vice-President.* The Vice-Presidents shall serve on the Executive Board and any one of them may be called upon by the President or the Executive Board to assume the duties of the Chair at any meeting. They shall also actively represent the Association in its various lines of work in their respective counties.

ARTICLE 3.—*Duties of the Secretary.* The Secretary shall be the recording, corresponding and accounting officer of the Association and of the Executive Board; he shall incur no expenditure of a large or doubtful character without the sanction of the Business Committee; he shall secure the written approval of the President on all bills or claims against the Association before drawing his order on the Treasurer for the payment thereof; he shall attend all meetings of the Association and of the Executive Board and shall keep a faithful record of

their proceedings; he shall sign all certificates of membership and all Diplomas and Certificates of Merit, awarded by the Association. All money received by him shall be promptly paid to the Treasurer. He shall have charge of the Association's books and papers and shall be responsible to the Board for all property placed in his charge; he shall be the custodion of the Seal of the Association, and shall have authority to affix same to documents when needful; he shall seek by all suitable means to secure the fullest announcements of the meetings of the Association in this State, as well as in adjacent states, when such shall be found desirable. It shall also be his duty, yearly, to prepare for publication, the Annual Report of the Association, together with such other matter as he shall deem proper, he being aided in the selection of such matter by an advisory committee of the Executive Board. As recompense, the Secretary shall receive all necesasry expenses, and such salary as may be determined by the Executive Board.

ARTICLE 4.—*Duties of the Treasurer.* All the funds of the Association shall be paid into the hands of the Treasurer; he shall disburse the moneys of the Association that shall come into his hands only upon order of the Secretary, countersigned by the President; he shall keep the moneys received by the Association for Life Memberships as a distinct fund, and shall invest the same under the advice and direction of the Executive Board, applying only the interest accruing thereon to the purpose of the general fund. Immediately upon assuming his office and before entering his duties, he shall execute to the Association an official bond with sufficient securities conditioned for the safe-keeping and disbursement of the moneys of the Association, and for the proper discharge of the further duties of his office, in such sums as shall be specified by the Executive Board, the premium on which shall be paid by the Association. This bond shall receive the approval of the President, and shall be deposited with the Secretary. Immediately preceding the annual meeting, he shall submit to the Executive Board a written report showing the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the deposition made of the same. This statement shall be published in the Annual Report of the Association.

ARTICLE 5.—*Duties of the Executive Board.* The Executive Board shall enact all rules and regulations for the management of the affairs of the Association, determine the salaries of its officers, and assume the control and management of its exhibitions; it shall have power to displace any officer of the Association for neglect of duty or abuse of position; shall fill all vacancies by appointment to continue until the next annual election; and shall hold at least two (2) regular sessions during the year, one of which shall occur at the time and place

of the Annual Meeting of the Association. It may hold other meetings when called by the Secretary under the advice or direction of majority of the members of the Board at such times and places as may be deemed most convenient, but in all such cases, each member must be duly notified of the time, place and object of such meeting; it shall carefully guard the interests of the Association, watch over its finances and provide for its necessities as they shall arise; it shall appoint from its own number three members, who shall constitute a Business Committee for the year, and upon which the Secretary and Treasurer may not serve; and it shall submit to the Annual Meeting, through the Secretary, such report upon the conditions, general interests and prospects of the Association as it shall judge necessary or expedient. All important measures shall be sumitted to this board, but may, by the Board, be resubmitted to the Association for recommendations.

ARTICLE 6.—*Duties of the Business Committee.* It shall be the duty of the Business Committee, upon application of the Secretary, during the recess of the Executive Board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess. The Business Committee shall also audit the accounts of the Secretary and the Treasurer just prior to the annual meeting and submit written report of its findings to the Executive Board.

ARTICLE 7.—*Duties of the Standing Committees.* (1) The Committtee on Legislation shall inform itself in regard to such existing laws as relate to the horticultural interests of the State and bring the same to the attention of the Association, at the same time reporting any additional legislaton which in their judgement is desirable; when so directed by the Association, it shall cause to be introduced into the State Legislatiure such bills as may be deemed necessary and shall aid or oppose any bills introduced by others which directly or indirectly affect the interests of the fruit growers.

(2.) The Committee on Exhibtions shall suggest from time to time such methods and improvements as may seem to them desirable in conducting the exhibitions of the Association, as well as other fruit exhibitions throughout the State, and with the assistance of the Executive Board, shall arrange the premium lists, and have charge of all the exhibitions of the Association.

(3.) The Committee on Membership and Expansion, with the co-operation of the County Vice-Presidents, shall bring the work of the Asscociation to the attention of fruit growers throughout the State, and by such means as they deem best, strive to increase the membership.

(4.) The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports.

Such other Standing Committees may be created by the Executive Board from time to time, as in its discretion may seem desirable or necessary.

All Standing Committees shall report to the Annual Meeting in January, any information of value to the Association or its members, that may have come to their knowledge during the year, as well as any scientific theories, deductions or facts that in their opinion may be useful in advancing the object for which the Association is laboring.

ARTICLE 8.—*Nomenclature.* The Association shall adopt the nomenclature of the American Pomological Society.

ARTICLE 9.—*Amendments to By-Laws.* Amendments or additions to these By-Laws may be made by a majority vote of the Executive Board at any meeting, but if objection shall be made, the same shall "lie upon the table" till the next regular meeting of the Board. These By-Laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the Association present and voting. A proposition in the general meeting of the Association for an amendment or addition to these By-Laws shall be referred to the Executive Board for consideration and decision but the Association may submit therewith its advice or request.

PROCEEDINGS

OF THE

FIFTY-SIXTH ANNUAL MEETING

OF THE

State Horticultural Association

of Pennsylvania

HELD AT

Wilkes-Barree, Pa., January 19, 20, 21, 1915

The Fifty-sixth Annual Meeting of the State Horticultural Association convened in the Irem Temple at Wilkes-Barree at 1:30 P. M., Tuesday, January 19, 1915. President Tyson presided.

Fruit Section

PRESIDENT'S ADDRESS

C. J. Tyson, Flora Dale, Pa.

Ladies and Gentlemen:—As Chairman of this meeting, I am glad to welcome you to this beautiful temple. Your Executive Board took some responsibility on itself in breaking away from the time worn custom of meeting at Harrisburg on the legislative year. This departure was decided upon for your comfort and for the good of the Association. You have only to think of the crowded, uncomfortable hotels and the unsatisfactory meeting and exhibit rooms from which we have suffered in the past, to understand just what I mean. It is our hope and belief that none of these objections need mar the success and comfort of the present meeting.

Now, friends, you have not come here to listen to a long discourse from your presiding officer and I have no intention of

burdening you with an address. There are just a few things that I feel must be said early in the proceedings of this convention, and if you will be patient for a few moments it will soon be over.

I think most of you will agree with me that the past year has been a pretty tough one with frost and flood in the Spring, with hail and drouth in the Summer; with the nation's industries in such condition that laboring people, as a class, as well as many other people, have confined their buying to staple necessities. Fruits and vegetables have had limited sale except at low prices. The average for apples in Pennsylvania the past Fall was under 30¢ per bushel for all grades of picked fruit. Peaches were proportionately low. In many cases neither fruit paid the cost of production. These facts are known to all of you. My only point in reciting them is to preface three important lessons that I hope to impress upon you.

A year like this makes us think mighty hard about some things that do not bother us at all in a good year. Here are the points I want to emphasize.

First, we are right up against the thing we have been talking about for years, "Over production" and its consequences. To what extent are we, each one of us, responsible for this over production? Have we spoken conservatively of our business when asked, or have we gone about boosting of the splendid returns and the ease with which we have secured them? As an Association, what has been our policy in this matter, or have we had a policy? I am not making charges, I am asking you. It is an absolute fact that thousands of men have planted hundreds of thousandsof fruit trees for the one reason that they have been unintentionally deceived as to the golden harvest to be reaped. Some of these trees will die of neglect, some of them have died. Many of them are alive and bearing fruit. Let us take this lesson seriously to ourselves, first as individuals then as members of the Association. If we speak of returns, make sure that we speak in terms of net, not gross, amounts.

And this leads up to my second point. What do we know about cost of production? How many of us know what a bushel of apples or a crate of cabbage really does cost? How long would a large manufacturing enterprise continue to live under severe competition without rigidly figuring all costs? In the season just past competition has been keen, business conditions have been dull, and unless we have learned to figure down the cost we have lost money. Let the discussions of this Convention bear in mind the real business end of our business.

My third point has to do with an entirely different matter, and yet it may touch us as closely as either of these. This seems to be the age of legislation. Our legislation mills grind

out a never-ending grist of laws, some good, some bad, but we must be governed by them. Good laws can help our business; bad laws can put us out of business. Let our Association stand firmly for the passage of laws which are just and fair to all. A fruit grading and branding bill will be offered in the present Legislature. Let us see that this bill is shaped to meet the needs of our fruit growers. Amendments will be offered to the weights and measures act of the 1913 session. Let us see that these amendments really improve the act, let us get behind them in no uncertain way.

An employers' liability act will be attempted. Why should farm labor be included in such a law? It can doubtless be exempted if we work together. In all these matters our word as an Association will carry much weight. We have a strong legislative committee who will carry our message to the law makers, and who will watch our interests throughout the legislative session. Let us bear these things in mind, and before the close of this Convention let us put ourselves on record as to these bills in positive and definite terms.

Now as to the meetings themselves; they are yours, make them what you will. Join freely in the discussions; make the Question Box the best part of the Convention, and may you enjoy every minute of your stay in Wilkes-Barree and take home with you loads of enthusiasm and helps for the coming year.

EXPERIMENTAL RESULTS IN YOUNG ORCHARDS IN PENNSYLVANIA.

JOHN P. STEWART, *Experimental Pomologist, State College, Pa.*

As most of you doubtless know, an extensive series of orchard experiments was started by the Experiment Station, in various parts of Pennsylvania, in 1907—1908. The results from some of these experiments, especially those on the fertilization of mature orchards, have been published from time to time in bulletins and reports of various organizations.. In the meantime, results have been accumulating in a number of other experiments, some of which differ considerably in subject from those already reported. The latter results for the most part are coming from young orchards which were planted expressly for use in the present series of experiments. Neither experiments nor results are regarded as complete in any sense, but they are presented at this time to show the trends of affairs for the first seven years, and to furnish some additional definite data in a field and period of development that is now relatively bare.

The first bit of data to which we would call attention is upon the comparatively old question of the relative merits of

different methods of proparation for young apple trees. Which is the best type of tree to plant, one propagated on the whole root, by budding or grafting? or is one developed on a piece rot, or without any seeding root at all, equally good or superior? This was a very live question some 15 or 20 years ago, and a number of experiments were made on it, chiefly at the Kansas, Pennsylvania, Oregon and Alabama Stations. The last three of these experiments were practically identical, the grafts being made by the Federal Divison of Pomology in 1895 and the resulting trees sent to the Stations for planting in 1897.

Those sent to Pennsylvania Station consisted of 10 varieties of Hungarian apples, with two trees of each variety grafted on whole roots, two on top pieces and two on bottom piece roots. They were planted on April 15th and 16th by the late Professor Butz, and cared for uniformly until the date of measurement by the writer in April 1908, exactly 11 years after planting. Two trees were out on the latter date, one each in the 1st and 3rd groups, and one additional tree in the bottom piece group was so dwarfted and "runty," as a result of defective union, that it was excluded in the final averages. The average growth made in the various groups, in 11 years, is shown in Table 1.

Table 1—Influence of Method of Propagation Upon the Growth of Apple Trees.

(Average Size and Height of Trees, after 11 years in orchard, 10 varieties of 6 trees each.)

Kind of Graft	No. of Trees	Av. Trunk Girth in.	Average Height ft.	Gain in Girth %	Gain in Height %	Rank
Whole Root	19	15.85	13.86	0.2	0.4	2
Top Piece	20	16.12	14.10	1.9	2.2	1
Bottom Pc.	18	15.82	13.80			3

In this case it will be noted that the trees propagated on the top piece roots are slightly in the lead in all respects, with those on the whole roots coming second. In the experiment in Alabama, as reported in their Bulletin 98, the trees on the bottom pieces were showing a slight superiority at the close of the second season, with those on the top piece second and the whole roots third. In the Oregon experiment, as stated in their Annual Report for 1901, pp. 38 and 39, the trees on the whole roots were slightly ahead at the close of the 4th season, in the single variety remaining at that time, with those on the top pieces again second.

In the Kansas experiments, reported in their Bulletins 65 and 102, 64 trees grafted on whole roots averaged just one-tenth of an inch larger in trunk diameter, at the end of ten years' growth in the orchard, than 30 trees that had been budded in the usual manner on whole roots. They in turn averaged

a fifth of an inch larger than 102 trees, involving some additional varieties, that had been propagated on piece roots. No differences in growth or vigor were observable in the orchard. In another experiment in the same state and reported in Bulletin 65, 3 varieties of 400 trees each, on whole roots, were compared by Judge Wellhouse with an equal number of trees of the same varieties propagated on very short piece roots,—2-inch lengths. In the latter case, the young trees had developed a very considerable number of roots directly from the cions above the seedling pieces, thus giving trees on their own rocts to a considerable extent, while none were developed on the whole root trees. At the end of 19 years of growth in the orchard the only difference observed had been in the much greater number of sprouts that had come up from the whole root trees. No other noticeable difference, either in growth or fruiting had appeared.

From all this data it is obvious that no one of the present forms of progpagation has any material advantage over any other. It may be of distinct advantage to get rid of the seedling root altogether, either by using the shortest cions practicable and then cutting them off entirey during the process of transplanting after roots have developed above, or possibly by a direct rooting of the cions by the use of a method that is rumored as soon to appear from the Federal Bureau of Plant Industry. This elimination of the seedling root at least would relieve us of the numerous ill-effects of poor unions. It would also reduce the opportunity for crown-gall infection, eliminate the possibility of harmful influence of the variable seedling stocks upon the cions, and would furnish us with really standard roots, as well as tops, with which the injures from root-aphis and kindred difficulties might well be greatly reduced or eliminated entirely. This is plainly an important array of advantages, and all of them practical and by no means impossible of attainment. Who will be the fortunate one to carry this matter through?

On the Value of Cion Selection.

The next question is somewhat related to the one just considered but is much more recent in origin. It bears upon the value of cion selection, including the so-called "pedigreed" trees, and also incidentally including the existance of the so-called drone trees. In this question we are seeking to determine whether or not it is possible to materially affect the yield, or any other important quality in an apple tree, by selecting the cion which produces it from a tree which is known to possess the desired qualities to an unusual degree.

Various theories and observations have been advanced on this question and a few experiments have been conducted, most of which are summarized by the writer in the Annual Report of the Pennsylvania Experiment Station for 1910-11, pages 493-500 and 505-6. The net results of all this observa-

tion and discussion, however, have merely shown that important variations do exist among mature trees, in almost any direction desired, but thus far none of the variations within a variety have been actually proved to be heritable, with the apparent exception of color. In addition the most fundamental and generally accepted theories are all against such inheritance, without excepting color.

With this situation in view, we started a preliminary test in 1908 on the influence of cion selection in improving yields. The individual trees in this case were merely chosen on the recommendation of commercial growers for the most part, and without any definite and comparative records covering several years, which is the only satisfactory basis for making the primary determination of which are really superior individuals. This defect is being remedied in another much more comprehensive test that we have recently started.

In the present test, however, the cions from the supposedly superior individuals were top-grafted chiefly on Northern Spy stock, and ordinary nursery trees of the same varieties were planted alongside for comparison. It is naturally much too early to draw any conclusions from this work as yet., but the results to the close of the 7th year are now given so that the present status of the experiment may at least be known and later and more conclusive results may be anticipated. The relative yields from the two classes of trees are shown for 8 varieties, in Table 11.

Table II. Influence of Cion Selection on Yields of Young Apple Trees. Expt. 334 and 335.

(Yields of Eight Varieties in pounds, 1914, 7th year)

Variety	Nursery Trees			Trees from Selected Cions		
	No. of Trees	Yield lb.	Aver. lb.	No. of Trees	Yield lb.	Aver. lb.
Grimes	9	0.0	0.00	26	14.5	06.5
Rome Beauty*	4	16.0	4.00	13	132.5	10.15
Smokehouse	4	31.0	7.75	4	51.0	12.75
R. I. Greening	5	0.0	00.0	4	6.0	1.50
Tompkins King	5	0.0	0.00	16	0.0	0.00
Esopus	5	0.0	0.0	4	0.0	0.00
Sutton	5	0.0	0.00	3	0.0	0.00
Jonathan	5	8.25	1.65	16	5.75	0.36

*Five trees from W. J. Green omitted here.

In the first 4 of these varieties, a slight superiority is now being shown by the trees produced from the selected cions. In the Rome Beauty comparison also the selected cion group has consistently shown much more blossoming for the last 3 years, but this is the first year that any appreciable quantity of fruit has set. In the next three varieties no advantage is shown in either group, although the cions for these trees were secured from one of the most prominent advocates of the

present practice, and in the last variety the slight advantage shown is on the side of the unselected nursery trees.

These results are evidently insufficient either to approve or condemn the practice of cion-selection. There is some indication of a possible advantage in it, in the upper portion of the Table, but neither this nor any other data now available is sufficient to warrant anyone in paying any materially higher price for the so-called "pedigreed" trees. Such trees probably have more certainty of trueness to name, where the cions have recently come from mature trees of known bearing habits, and one is naturally on the safe side of the question in using them, when they can be obtained without material increase in price. This, however, is all that can be said in favor of the practice at present, and much further data are needed.

Relative Value of Certain Stocks in Top-Grafting.

In case any of the experiments on cion selection should definitely prove the practice to be advisable, it will evidently be well to know something of the relative values of different stocks available for use in top-grafting. Some desirable varieties also should regualrly be top-grafted to secure better and healthier trunks. To secure data on the relative merits of certain well-known varieties for stock purposes, a test was started in 1908, using 4 trees each of 3 varieties on 5 different stocks, with the results shown in Table III.

Table III. Influence of Different Stocks on Growth of Young Apple Trees.

(Average increase in trunk-girth 1908-1914, Expt. 334.)

Plat Stock	Aver. Gain in. (JONATHAN)	Aver. Gain in. (TOMPKINS KING)	Aver. Gain in. (GRIMES)	General Aver. Gain in Size in.	Gain over Lowest %
1 Northern Spy	7.99	6.71	7.25	7.32	1.14
2 Tolman	6.79	6.82	8.60	7.40	1.26
3 Wolf River	6.25	6.37	7.09	6.57	——
4 Paragon	9.22	8.56	8.75	8.84	34.5
5 Champion	7.39	6.78	7.83	7.30	11.1
6 Nursery Trees	8.33	6.62	6.09	7.01	6.7

One rather unexpected result here appears in the fact that in all cases except one, the trees top-grafted on known stocks, have made a better growth than those grafted on seedling roots in the nursery. In the case of the Grimes also, all the top-grafted trees are now in the lead. Among the different stocks the trees developed on the Paragon are now distinctly in the lead, with those on Tolman coming second. With the Grimes and Tompkins King, which are the only ones of these three that really need top-working, the superiority of these two stocks is very marked so far as

growth is concerned. On the smoothness of unions, the Tolman and Champion are probably best, with the Paragon next, if the Jonathans be excepted, as in that variety the Paragon stock has tended to outgrow the cions. Incidentally the reverse is the case with Grimes on Wolf River.

The Northern Spy stock has averaged third in growth and is now running about equal to the Paragon in unions.

It also usually makes an excellent trunk and root-system, but in at least one respect, it is considerably less desirable than either the Tolman or Paragon for stock purposes, and that is in its unusual tardiness in starting growth in the spring. This tends to make the cions of most varieties more active than the stock, which is naturally the reverse of the condition desired when the grafts are being started. From the present results, either the Paragon or Tolman appears to be distinctly preferable to any of the others for Grimes at least, with the Champion coming in third, if the Jonathans are omitted.

Some further interesting relations between certain stocks and cions used in top-grafting have also been reported orally to the writer by Samuel Fraser, of Geneseo, N. Y. He finds for example that the Twenty Ounce top-grafted on Baldwin makes from 50 to 100% better trees in 5 to 8 years than when worked on Northern Spy. Similarly he finds that the Wealthy does very poorly on R. I. Greening, while the latter does very well on the Wealthy. Hubbardston cions top-grafted on Ben Davis, N. Spy, and Tolman resulted in such peculiar changes in twig color,—some becoming red, some purple etc,—that they could not be used with safety, for further cion wood until they had proved their identity by coming into bearing.

These and similar facts indicate that many of the common variations in size and vigor so frequently shown by the same variety of trees, both in their nursery and later growth, are due to differences in congeniality between the cions and the variable seedling roots on which they were worked. Moreover, the very remarkable effects of certain types of grafting, which results in the plant chimeras and graft hybrids, (See Journal of Heredity for December 1914, pp. 521-546) also indicate that there is still a vast amount to be learned about all these matters, which again brings us back to the desirability of reducing all variable factors, such as seedling stocks, to the lowest terms possible.

On the Value of Dynamiting of Apple Orchards.

This question was naturally not considered of fundamental importance but there was so much agitation and so many inquires about it, that it seemed desirabl to get some definite data on it also. For this purpose 4 experiments were started in the Western part of the state, on a Volusia silt loam which had a typical hard-pan subsoil at an average depth of about 10 to 14 inches. Two of these experiments were on orchards

just being planted, and two on 25 year old Baldwins, which had become more or less sod-bound. They were started in the spring of 1912, by W. R. White of the College and all the records have been taken by him under the general direction of the writer. The net results in the young orchards at the close of the 3rd season are shown in Table IV.

Table IV. Influence of Dynamiting on Growth and Vitality of Young Apple Trees.

(Average gains in Trunk-girth, etc. in 2 Expts. 3 years, 1912-14)

	White Orchard	Johnston Orchard
Experiments in:		
No. of Trees Dynamited, (A)	34	25
No. of Trees not Dynamited, (B)	19	10
Depth of Explosions	2 to 4 feet., by 6 inches intervals	Same
Aver. Gain in girth, A	20.1 in.	2.491 in.
Aver. Gain in girth, B	1.98 in.	2.486 in.
Benefit to growth in A	1.5%	0.2%
Total Trees dead, A.	8 or 23.5%	0
Total Trees dead, B.	2 or 10.5%	0 (1 weak)

In both these cases we find a very slight superiority in growth in favor of the dynamited trees, but nothing of any importance. In fact the difference is so very small that it is necessary to go to the 3rd decimal place to find it in the Johnston orchard, and in the other orchard the much higher death rate among the dynamited trees, much more than offsets the slight superiority in growth. In fact, the difference in death rate seems to be the only definite effect that has appeared here so far, as the growth differences are so small as to be directly chargeable to normal variations. Similar results on the apple are reported from the New Hampshire and New Jersey Stations, and the general absence of effects in the thorough, mechanical, subsoiling test that was starrted at the Missouri Station in 1895 and reported in 1900, in their Bulletin 49, should all lead to the conclusion that nothing important is likely to be gained in this direction.

In the mature orchards, the results to date are shown simiarly in Table V.

Table V. Influence of Dynamiting on Yield, Growth, Color and Average Size of Fruit on Mature Apple Trees.

(Total yields, growth, etc. in 2 Expts. 3 yr, 1912-14.)

	Boak Orchard	Johnston Orchard
Experiments in:		
No. of Trees Dynamited, (A)	5	5
No. of trees not Dynamited (B)	5	5

Depth of Explosions	2 to 4 ft., by 6 inches intervals.	Same
Total Yields, in A.	3986 lb.	5654 lb.
Total Yields, in B.	5136 lb.	5332 lb.
Benefit to Yield in A.	-22.4%	6.0%
Benefit to Growth, A.	4.9%	-0.7%
Benefit to Color of Fruit, A.	0.4%	-12.4%
Benefit to Av. Size of Fruit A	-7.3%	10.1%
No. of Fruit in Samples.	1189	939

Here again the results are so variable as to cause one to suspect that the dynamiting has had little or no definite influence at all. The net effect in both experiments is rather against the shooting instead of in favor of it. At any rate, none of the present results would indicate any special value in the practice of dynamiting in apple orchards at least, and the same is true of the definite experimental results elsewhere, so far as the writer is aware. Incidentially, there is plenty of really definite and profitable uses for dynamite to make it unnecessary to try to force it into a field for which it is not fitted.

On Methods of Handling the Soil in a Young Orchard.

The next three experiments bear upon the various methods of handling the soil in an apple orchard from date of planting up to the age of 7 years. The first and third experiments are chiefly concerned with the relative values of different cultural methods and covercrops while the second also furnishes some data on the relative values of different fertilizer combinations.

The data shown in Table VI are obtained from the Experimnetal Orchard at the College. In this experiment the area now covered by plats 2 to 6, was plowed in the fall of 1907 and prepared about as for corn in the spring of 1908 when all the trees were planted. Since then the different methods named in the table have been followed annually.

In the meantime, in plats 7 to 9, no tillage of any kind has been given. The trees were merely planted in the rather thin sod in holes dug with a spade, and then were mulched with about 100 lb. of straw per tree. Since then the growth between the trees has been out at least twice annually, and the material obtained in the first cutting has been added to the mulch, while the second is left where it falls. In addition, the initial mulch of outside materials has been repeated about every other year. The results at the close of 7 years are shown in Table VI.

Table VI. Influence af Cultural Methodas on Moisture, Growth & Yield in a Young Orchard.

(Results from Expt. 331, first 7 years, 1908-14.)

PLAT TREATMENT	MOISTURE CONTENT 1913	RELATION TO OPT'M CONTENT	AV. GAIN IN GIRTH	GAIN OVER TOTAL TILLAGE YIELD		GENERAL RANK
	%	%	in.	%	lb.	
2 Tillage	10.6	53.0	6.84	——	1.5	8
3 T. & Intercrop	5.5	27.6	7.69	12.4	21.6	6
4 T. & Covercrop	8.5	42.7	6.84	——	7.0	7
5 C-crop & Manure	9.2	45.9	8.31	21.5	135.4	3
6 C-crop & Fertilizer	9.4	47.2	7.76	13.5	18.9	5
7 Mulch	17.1	85.6	8.29	21.2	38.5	4
8 Mulch and Manure	18.2	90.8	8.76	28.1	300.5	2
9 Mulch & Fertilizer	18.1	90.4	8.93	30.5	390.1	1

In the first place, it will be noted that the least growth is being made in plats 2 and 4. The annual covercrop, which consists of a mixture of red and crimson clover, has therefore shown no benefit to the trees as yet. The use of a tilled annual intercrop, in plat 3, followed by a late covercrop of rye, has not only resulted in no apparent injury, but the associated trees are actually making about 12½% more growth than those under either of the more usual treatments in plats 2 and 4. Similar results are observable in the experiment shown later in Table VII, and similar results were also obtained by Emerson at the Nebraska Station and reported to the close of the second year in 1903, in their Bulletin 79, pages 14 to 17.

The financial returns from the intercrops in our Experiments, with such crops as potatoes, have usually run from $40 to $50 per acre even on the very poor soil involved. The intercropping method therefore is evidently by far the most practical of any of those involving tillage, and no important injury should result to the associated trees, so long as proper intercrops are used. By proper intercrops we mean those involving some early season tilliage each year. If in addition the trees themselves can be kept mulched with a good coat of strawy stable manure, such benefits as those shown in plat 5 can be secured.

Where tillage and intercrops are not feasible however, the mulch system is available and has proved very effective, as shown in plats 7 to 9. The results there also are in accord with those in the following table, and with those reported from the Ohio Station in their Bulletin 7. The special success of the mulch is evidently due to its unusual effectiveness in conserving moisture. As shown in the second columns, the roots of the mulched trees were still surrounded with 85 to 90 of the best possible moisture content in September, 1913, after fully 6 weeks of very unusual drought, while the soil around the roots of the tilled trees had been reduced to a dust-dry condition in most cases.

The addition of plant food in plats 8 and 9 has resulted in some gain over the mulch alone, but from the relative growth made, it would seem that the conservation of moisture is fully twice as important as applications of plant food, at least in the case of young trees. The latter applications however, have apparently had considerable influence on the yields, which is rather surprising in view of the fact that the trees are so young. Incidentally the usual correlation between yield and growth is especially prominent here, and this again emphasizes the fact that early bearing cannot be secured on young healthy trees without an extra amount of growth.

In Table VII, we have results from another experiment started at the same time as the last, on Volusia silt loam in the western part of the state. This experiment differs slightly in the fact that the cultural methods and fertilizer treatments are entirely separated, and the latter treatments are so enlarged that the relative value of the different fertilizer elements can be determined to some extent. Just at present however its chief value is in the general corroboration that it gives to the results in the preceding table.

Table VII. Influence of Fertilization and Cultural Methods on Growth and Yields in a Young Orchard.

(Average Increase in Trunk-Girth, first 7 years, and Yields in 1914, Expt. 337.)

Plat Treatment	Average Gain in Girth	Gain over Normal Growth	Yields 1914**
	in.	%	lb.
1 Check	6.64	——	32
2 Nitrogen & Phosphate	7.59	11.8	62
3 Nitrogen & Potash	6.96	0.3	10
4 Check	7.09	——	0
5 Phos. & Potash	7.69	6.2	17
6 Complete Fertilizer	8.67	11.4	28
7 Check	8.18	——	37
8 Manure	8.77	10.0	23
9 Lime (& NPK, 1912-)	8.18	5.3	17
10 Check	7.56	——	10
11 Tillage & Covercrop	7.38	1.5*	19
12 Tillage & Intercrop	7.79	7.2	50
13 Clean Tillage	7.27	——	23
14 Sod Mulch	8.11	11.6	109

*Gains over lowest in the Cultural Method section.
**Reduced to equivalent plats throughout.

In the cultural plats 11 to 14, the greater growth and bearing in the mulch and inter-crop treatments are again quite evident. In the fertilizer portion of the experiment. the growth has been improved somewhat more than usual by certain elements, viz., nitrogen and phosphorus. This is probably connected with the fact that this particular soil type is

usualy deficient in these two elements. In general also, it is very well supplied with moisture, which probably accounts for the relatively smaller effect of the mulch in this case.

Relative Value of Covercrops.

When these experiments were started, we naturally expected the tillage and covercrop method to rank high among the soil treatments, and especially was this expected in young orchards. To get some data therefore, as to which overcrops were best for this purpose, the experiment shown in Table VIII was started. Along with the comparison of annual covers used in plats 1 to 12, a single permanent cover was included in plat 13 and the material annually produced between the rows was used as a mulch around the trees. The results to the close of the 7th year are shown in Table VIII.

Table VIII. Influence of Covercrops on Growth and Yield of Young Apple Trees.

(Results in Experiment 333. 1908-1914.)

Plat Treatment	Av. Incr. in Girth	Gain over Lowest	Est'd Bloom 1914	Yield 1914	General Rank
	in.	%	%	lb.	
1 Med. Red Clover	7.60	13.1	0.3	0.00	8
2 Mammoth Clover	71.7	6.7	0.0	0.00	11
3 Alsike	68.5	1.9	0.2	0.00	12
4 Crimson Clover	7.77	15.6	0.2	1.25	7
5 Hairy Vetch	8.07	20.1	0.5	0.50	3
6 Cowpeas (Black)	6.72	0.0	1.0	0.00	13
7 Soybeans (Hollybrook)	7.98	18.8	0.2	0.00	5
8 Oats & Canada Peas	7.93	18.0	1.5	0.00	6
9 Rye	7.52	11.9	0.2	0.25	9
10 Millet	8.02	19.3	0.3	1.25	4
11 Rape & Turnips	7.29	8.5	0.2	0.50	10
12 Buckwheat	8.15	21.3	0.1	0.50	2
13 Alfalfa used as mulch	8.83	31.4	1.5	8.75	1

In this case also it is a notable fact that the mulched and untilled trees associated with the permanent cover of plat 13 are again in the lead. In addition to this, the alfalfa has produced all the mulching material required and some surplus besides, especially in the earlier years. The mulching moreover, has always been heavy enough to keep down practically all growth immediately above the majority of the feeding roots of the trees, and this is probably essential for best results with this plant as the permanent cover, because of its special affinity for both moisture and soil nitrogen.

In a good alfalfa soil, however, it is quite possible to get an abundance of this sort and still have a considerable surplus

of good hay besides. In other words this particular method gives us both a mulch and something of an intercrop at the same time, without any tillage and without any apparent injury to the trees, where the mulching and protection against mice are both sufficient.

This, it will be observed, is a relatively new idea in orchard development, and the present method, or some modification of it, is evidently very well adapted for large acreages, or for places where tillage and intercrops are not available.

A similar new idea is suggested by the results in the adjoining buckwheat plat Its trees are now showing the best gains of any of the annual tillage treatments. This may be due partly to a slight advantage that it apparently has in location, but without that advantage the buckwheat would evidently still rank high. It is also probable that the general good effects of this plant are not dependent in any way upon the returns of the grain to the soil. It therefore could well be harvested by heading or high cutting and thus give us the unusual example of a combined cover-crop and inter-crop, which also exerts no apparent ill-effect on the trees. This crop moreover is especially good where an orchard is being developed on so-called new ground, and a crop is desired to keep down the second growth of sprouts and underbrush.

The vetch continues to show a better effect on the adjacent trees than any other of the annual, legume covers. This is not surprising when its introgen-fixation, its shading habit of growth and its very low moisture demands are recalled. This plant also has considerable promise for use as a permanent cover and mulch producer. It usually forms an abundance of seeds by the middle of July or earlier, after which it can be cut and left where it lies for awhile for reseeding, and then be brought up around the trees as a mulch. Running over the loose vetch with a roller or similar implement before raking it around the trees may assist in shelling the seeds out where they are needed, and a light discing or harrowing after the raking should be helpful in increasing their germination.

Among the non-leguminous plants the high rank of the millet and buckwheat is still evident, and the same is true of rape when used alone. We are unable to give any very satisfactory explanation for this, but the facts themselves are sufficient to attract favorable consideration to their use as covercrops, and this is especially true when their relatively low seed cost is considered. The buckwheat is probably best from the economic standpoint as noted above, but the millet is very satisfactory where this use of buckwheat is not available.

The seeding rates, relative cost in 1914, and general dates and methods of seeding that we have followed in the annual covercrops are shown without further comment in Table IX.

Table IX. Rate of Seeding and Cost of Covercrop Seed in 1914.

CROP	RATE OF SEEDING lb. per A.	COST OF SEED PER POUND	COST OF SEED PER A.	DATE OF SEEDING	METHOD
Crimson Clover	20	6½¢	$1.30	July 15-30	BROADCAST & HARROWED
Medium Red Clover	12	15¢	1.80	"	"
Mammoth Clover	15	15¢	2.25	"	"
White Clover	5	30¢	1.50	"	"
Alsike Clover	6	17½¢	1.05	"	"
Sweet Clover	25-30	25¢	2.25 to 7.50	Jan. to May	"
Hairy Vetch	40	7 to 12½¢	2.80 to 5.00	July 15 Aug. 15	DRILLED OR BROADCAST "
Canada Peas	60-90	——	——	"	"
Cowpeas (Black)	50-60	5¢	2.50 to 3.00	June 25-30	DRILLED
Soybeans (H'ybrook)	40-50	4½¢	1.80	"	"
Rye	90	1.3¢	1.17	Sept. 1-Oct.15	DRILLED OR BROADCAST
Oats	75	1.5¢	1.13	July 15-Aug. 15	"
Millet	20	4¢	.80	"	"
Buckwheat	1 bu.	3¢	1.50	July 4-10	"
Essex Rape	8	6¢	.48	"	BROADCAST & HARROWED
Cowhorn Turnips	4	25¢	1.00	"	"

PRUNING APPLE TREES.

WENDELL PADDOCK, *Columbus, Ohio.*

If one were to study the literature of pruning he would find a mas of material, largely contradictory, some of it good, but most of it worth less. It will be found, for the most part, to consist of a series of don'ts, don't-do-this and don't-do-that, till one is thoroughly bewildered. Some of our successful apple growers do almost no pruning and none at all when the trees are small. One Experiment Station publishes a bulletin on orchard renovation. The accompanying cuts show numerous large stubs left in the tops of the trees, showing how the tall limbs were cut back or "dehorned." Tables of yields show that these trees produced abundantly for two or three years, but the sequel has not been publishes and doubtless never will be for the trees soon began to fail and the orchard is now a thing of the past.

Another authority says that large limbs should never be cut off as the resulting wounds fail to heal. He also objects to much pruning at any time, but fails to tell us how to prevent trees from becoming too tall or the branches from becoming too thick.

Then in the training of young trees, the directions are equally vague and contradictory. For instance, if yearling

trees are to be headed low, say 24 inches above the ground, usually one will be advised to cut the whip back to a stub 24 inches in length. This means, of course, that there can be but little distance between scaffold limbs at best and practically none if the head is actually to be 24 inches from the ground. Still others tell us not to cut back the branches on two-year-old trees at planting time, since the terminal buds are the strongest and so are needed by the young tree. But the practical man knows from experience that the top of a newly transplanted tree should usually be headed back severely and he invaribly finds that if the trees are vigorous they are much benefifited by the operation. If they are weakly from any cause, the terminal buds may pull them through, but often to prolong a miserable existence.

In spite of the fact that some of my best friends are most successful fruit growers, though they violate nearly all of the principles of fruit growing, I am still firmly convinced that in the majority of instances a fairly vigorous, but well planned system of training and pruning of fruit trees will give the best results.

Some of the things which are likely to follow a lack of training and pruning may be mentioned as follows:

First, newly transplanted trees many be badly stunted or even killed if the tops are not headed back, suitable scaffold limbs are not developed, the height of head is not controlled, bad crotches are formed and the shape of the tree is uncontrolled.

A lack of subsequent pruning allows trees to become too tall and the branches to become many times too thick. Tall trees are difficult to spray and the fruit is expensive to pick.

A case in point will illustrate the latter assertion. A friend has an old orchard rented on shares. The trees were unpruned for many years, consequently much of the bearing wood is over 20 feet from the ground. Last season many of these trees produced a light crop and the apples scattered. The fruit, however, was fine, but a man could pick scarcely 20 bushels a day under these conditions. This made the fruit expensive and at the prices received did not pay the renter, but the owner of the orchard had to have his share.

Where unrestained, the apple tree will produce a multiplicity of branches. These in turn produce quantities of fruit spurs which tax the vitality of the tree in bearing blossoms even if no fruit is set. In case the tree sets a crop of fruit a large amount of thinning must be done if size is to be maintained. Even then some varieties as the Winesap, Grimes and Jonathan will almost invariably produce small fruit when the trees are mature unless the bearing wood is renewed by pruning.

The only valid argument I have ever heard against the training and pruning of young trees is that such treatment delays the bearing period. No one can deny the truth of this

statement since the thinning out of branch buds reduces the competition for plant food and naturally the fewer buds that remain make greater growth. All know that vigorous growth and fruitfulness do not go together as a rule in young trees. I know of no valid argument against pruning mature trees, that is rational pruning. Any one may well hesitate to cut large limbs out of a tree, but if a rational sysetm of pruning has been followed each year such treatment will rarely be necessary.

Looking toward the greatest and longest use of a tree one cannot avoid the conclusion that pruning is necessary in the apple orchard. If this be true, a system of pruning should be devised, but it is scarcely possible to follow a definite plan unless the beginning is made when the trees are small. This plan will, of course, be ideal and all know that one's ideal is seldom attained. This is especially so with trees since they often are erratic in branching or in not branching, then each tree has an individuality of its own and each variety has it charactecristic growth. The beginner will no doubt be sorely disappointed in his failure to attain the ideal, but for all that a general plan may be made to work.

In the first place it may be said that no one need hope to ever become a successful pruner until he thoroughly understands the purpose of the various buds that are to be found upon trees. Some buds develop into branches with leaves upon them and they may be either long or short. These short branches may or may not develop into fruit spurs. The terminal bud upon a short branch of the apple or pear may not be a fruit bud. Lateral buds on these fruits are usually branch buds, but may occasionally be fruit buds. All of the leaves that trees produce in any one season are borne on the previous season's growth. There is really no such thing as a leaf bud as these so called lateral leaf buds develop into branches with leaves upon them. It is therefore, impossible to cause a leaf to develop into a branch. Similar it is impossible to cause a fruit bud to change into a branch. It is not our purpose to attempt to give one an understanding of the function of the various buds which are to be found upon trees, but simply to cause the hearer to think about the subject and if this is accomplished the average person will soon conclude that so far as he is concerned his knowledge of the subject is limited. One must then make a thorough study of buds as a prerequisite to an understanding of the art of pruning.

We also believe it is essential to understand the training of the young trees if one is to be successful in pruning older trees, so we will begin the discussion with the trees as they are planted in the orchard. This brings up the discussion of the age a tree should be when planted. It is interesting to note the change that has come over the minds of fruit growers in

this respect during the last few years. For instance eight years ago one of my friends tried to place an order for 2500 two year old apple trees. He tried in vain to find that number of trees in our state, but was unable to buy them. He did, however, receive quotations on quantities of three year old trees together with much unsolicited advice on the general subject. The writer took up his residence in Ohio five years ago and coming from the west he was naturally imbued with the idea that the yearling tree was the best one to plant. They were neither used nor produced in the state at that time, and his recommendations on this subject were received with scant consideration for a time. At the present time yearlings are largely used and Ohio nurserymen find they can produce them, with a fair degree of success. What is true in Ohio is also true to a large extent the country over. However, if two year old trees are preferred or must be used low branched ones should be specified. With such trees to start with good scaffold limbs can usually be found, but the younger trees will usually stand transplanting better as there will be less loss of roots and the roots being smaller and younger the wounds will heal more readily and new roots will form more easily.

The yearling apple and pear tree will be an unbranched whip, so the training at planting time will consist in cutting back the top so as to leave a stem of 34 to 36 inches in length. This heading back will not only reduce the number of buds and so make a better balance between root and top, but will also cause most of the side buds to develop into vigorous branches. Most of these branches should be allowed to grow during the first season, but some of the lowest may be rubbed off, particularly if they grow too vigorously near the ground. Others may be removed or cut back if they interfere in any way with the ones that are to become scaffold limbs.

Sometime during the dormant period following the first season's growth, the first real step in the training of the tree is begun. Pruning, by the way, may be done at any time during the winter, but preference as to time should be given to late winter or to early spring. As a result of long experience of many men it has been found that no fruit tree of any kind needs more than five main limbs, while three will often suffice. The exact number must depend upon the arrangement of the branches upon the trunk; for instance if four are to be chosen they should point toward the four points of the compass, north, south, east, and west, or if three or five are used they should be evenly distributed about the trunk as possible, at the same time remembering to secure a horizontal space of several inches between any two limbs.

Long experience has also shown that these first limbs should be about fourteen inches long as this is about the right length to accommodate two secondary scaffold limbs. These first limbs must be stout and the tree should be compact, and

in order to secure these ends the secondary limbs must be near the main trunk. Suppose one of these first limbs make a growth of four or more feet during a season, as is not infrequently the case. If now four or five inches are cut gingerly from the ends of such growths, usually three or four buds near the end will push onto vigorous growth. This only intensifies the long willow growth which is a nuisance when young and if they do not break under a load of fruit when mature they usually become bare of bearing wood except for a small fringe at the end.

The cutting back of the scaffod limbs tends to cause them to become stocky and stout and it will assure the development of most of the buds into vigoros branches.

As a general thing two sub-scaffold limbs will be allowed to grow on each one of the oiginal scaffold limbs, one at the end and one lower down, but both pointing in a suitable directionso as to leave no open spaces. This process should be repeated through three successive seasons. Building up the frame-work by allowing two limbs to grow on each scaffold and sub-scaffold limb. This training will result in a stout, compact frame-work which stands up well under the heavy loads of fruit.

After one or two year's growth one should begin to think about possible fruit spurs, so not all of the lateral branches that start aside from the two that are to form sub-scaffold limbs should be destroyed, but some of them may be cut back to spurs of one or two buds in length, and others may be left intact, depending upon their position and growth. Some of the less vigorous growths will eventually form fruit buds and if the new growth can be pinched back in June, fruit bud formation will be hastened.

After the frame-work of the tree is established the future pruning is a simple matter. All that will be required is to thin out branches when they become too thick, to remove cross limbs, or those that rub or those that will form bad crotches and to head back the very vigorous growths. But annual pruning must be insisted upon for if neglected for even one season it will be something of a study to get the trees back into shape.

As a general thing we much prefer a tree with an open center, but if a tree with a leader is desired the method of traning is much the same. The top of a newly transplanted tree should be cut back as before and a leader is developed from the top-most scaffold limb. Then at a suitable distance above the first whorl of scaffold branches, a second set is developed. All of the frame-work branches should be headed in somewhat if long limber limbs are to be avoided.

When two year old trees must be used low branched ones should be specified. With such trees to start with good scaffold limbs usually can be found. However, with the ordinary run of two year old trees not one in a hundred will be

found that will be properly headed. In the majoirty of cases its branches come out so close together that they will apparently all come from the same plane when the tree is mature. The training, however, is practically the same as has already been described. The best selection possible of scaffold limbs is made and they are cut back to fourteen inches when planted. Or if these branches are too short they may all be cut back to spurs of three or four buds in length, and the selection of scaffold limbs and the training may be begun the year after planting. If the two year old trees are headed too high there is no practical recourse since none of the buds that have remained dormant can be depended upon to grow.

Particular emphasis should be placed upon the desirability of having suitable distance between the first scaffold limbs. Some people are attempting to meet this need by developing one or two scaffold limbs well up on the second year's growth. By this means an exceptionally good distribution can be secured and it apparently is a scheme of much merit. If this plan is practiced some of the lower limbs that have been selected will need to be removed later when it is finally found what form the tree will take.

The after-pruning of a tree so trained through the first three or four years is very simple. But let it be neglected for even one season and it will be a most dismal failure, for this only intensifies the long willowy branches which we are trying to avoid.

Most Horticulturists succeed in getting the first scaffold limbs etsablished in fairly good shape. But any notion of after-training appears to be most vague and the practice is extremely haphazard. It is for this reason that we insist upon having an ideal in mind.

The subsequent pruning of a well trained tree will consist merely in heading back the longer growths, in thinning out branches where too thick and taking out cross growing branches, and in so pruning to avoid the formation of crotches. It would hardlly seem necessary to insist wherever a branch is cut back the cut should be made above a good lateral branch. A good deal can be done in this way in influencing the shapes of trees. Different varieties have different characteristic growths. Some are up-right, some are spreading with many variations between. The up-right kinds may be spread somewhat by cutting to outside buds or branches, while the spreading kinds may be contracted by cutting above inside growing buds or branches.

One should always have in mind the fact that it does not take a tree very long if planted in good soil to reach the height of 20 feet. A tree will also spread rapidly, so it will not be long, unless extreme care is taken, before a large per cent. of the wood will be devoid of fruit spurs. They will be killed out by the shade. The fruiting areas are confined to a small space at the outer parts of the branches.

Where orchard land is expensive it will pay better to plant trees rather closer than common and practice the repressive system of pruning; making an effort to have fruit produced all through the trees as they do when they are young.

In the case of the neglected orchard no general system of pruning can be devised since every tree presents an intricate problem in itself. The usual plan one sees the country over is the haphazard cutting off all the lower branches that can be reached, leaving long stretches of naked limbs enclosed with a thick tangle of bearing wood at the outer ends.

If the outer ends of the limbs were as easy to reach as the lower we imagine that the system would often be reversed, since it is a poor rule that does not work both ways. We would then see bare poles sticking out from our trees in all directions with a mat of tangled brush in the center. It is easy enough to see that no one would be so foolish as to attempt to prune a tree in this manner, but after all this would be but little more absurd as is the common practice.

We always like to advise the beginner who is going to attack a neglected tree to begin at the outer ends and work inward. In this way fewer mistakes are liable to be made. The first thing will be to cut out any of the larger limbs that can be spared, for invaribly there will be too many. After this has been done one should begin at the outer ends of the remaining larger limbs, head them in if too long, then thin out the remaining branches. This will consist in taking out a branch here and there along the entire length of the limb, but leaving bearing wood as low down on the trunk as possible. After this has been done it will probably be necesasry to thin out the multitude of fruit spurs with the hand shears. The main features to be remembered are not to make too large wounds, never to leave stubs and to leave the fruit bearing wood well distributed throughout all parts of the tree.

UTILIZING VACANT SPACE IN THE YOUNG APPLE ORCHARD.

S. H. FULTON, *Sleepy Creek, W. Va.*

In planting a permanent apple orchard with trees 35 to 40 feet apart, the orchardist is confronted with the question of how to utilize the vacant space while the trees are coming to maturity. Several plans will come up for consideration among which are the following: varieties of apples of moderate tree growth and early bearing habits may be used as fillers, peach trees may be inter-planted, strips may be worked about the young trees and the centers of the rows seeded with clover to be cut

for hay, or some hoed crop such as corn, tomatoes or potatoes may be used. The following discussion of the question of interplanting and intercropping the young apple orchard is based mainly upon the personal experience of the writer covering the past twelve years in the mountain section of eastern West Virginia.

Apple Tree Fillers.

Let us consider first the use of apple tree fillers. Within the past five to ten years hundreds of acres of apples have been planted in the eastern pan-handle of West Virignia with apple tree fillers using three fillers to one permanent tree. The varieties used have been Duchess, Wealthy, Wagener, Grimes Golden, Yellow Transparent and a few other kinds. The trees are set from 18 to 20 feet apart leaving from 36 to 40 feet of space between the permanent trees. This plan provides for the use of all the ground almost from the start and the quick maturing varieties used as fillers give early returns. The trees being all of one kind lend themselves to uniform treatment better than if stone fruits are used as fillers among the apples. The principal fault to be found with this system lies in the fact that on good ground the trees meet at about ten years of age and the fillers must be cut out when they are just coming into their prime. To obviate this difficulty we have adopted the quincunx plan, setting one tree in the center of four permanent trees, in recent plantings in our Sleepy Creek orchards. We are using trees of one variety only, that is the permanent trees and fillers are both of the same kind. The centre tree has plenty of room for a long period of time. It may be regarded as practically permanent and yet may be cut out if crowding ever takes place and the trees left will all be a uniform distance apart. This plan gives practically twice as many trees per acre as if no fillers were used. Intercropping may be combined with this plan if desired during the first four or five years in the life of the orchard.

The writer has never had any personal experience with dwarf apple trees as fillers but has seen them tried out in a number of instances in Maryland and New York State. As a rule dwarf apple trees are a disappointment. Only a very limited number of varieties of apples thrive on the dwarf stock and these do not yield fruit much earlier than do early bearing varieties on standard stocks. The quantity of fruit born is very limited and the dwarf trees are not well adapted to the same line of treatment given the standard trees among which the dwarfs are interplanted.

Peach Tree Fillers.

For many years it has been a common practice in some orchards sections to use peach fillers in the apple orchard. This plan is much used in the eastern pan-handle of West Vir-

ginia and and our first planting of 200 acres at Sleepy Creek was made in this way. We set our apple trees 36 feet apart with three peach trees to each apple tree, leaving 18 feet of space each way between trees. Our main reason for planting both peach and apple upon the same land aside from utilizing all the land from the start, was to guard as much as possible against loss in case the peach trees should be destroyed by yellows. Peach trees were really our first consideration and we regarded the apple trees mainly in the light of an insurance in case the peaches should be lost through disease. Peach yellows is a very common and troublesome disease with us and we were afraid we might not be able to control this trouble. This orchard is now in its twelfth year and the result of interplanting peach and apple have on the whole been satisfactory. The peach trees have paid for the land, for the care and development of the whole orchard including the apple trees and have paid a fair rate of interest on the investment. As to the yellows, we lost from one to one and one-half per cent. of our peach trees annually from the disease, from the third to the seventh year in the life of the orchard. Since the seventh year we have lost only about one-fourth to one-fifth of one per cent. annually. Aside from a few spots in the orchard, the disease has done us but little harm which fact we attribute largely to a rigid system of inspecting and cutting out diseased trees twice each season. Most of our pach tree are still sound and vigorous and look as if they would be good for several years to come. Early varieties of apples have been bearing among the peach trees for the past four years and winter varieties have been bearing for the past two years. The apple trees have been somewhat stunted by the peach trees but are not permanently injured as we have kept the peach trees headed back and have not allowed them to overtop the apple trees. In portions of the orchard we have cut out some of the peach trees where they were encroaching upon the apples. With both peach and apple upon the same land we have been put to some inconvenience in caring for the trees in that peach and apple to a certain extent require different treatment. In spraying for scale for instance, we find that we must spray our apple trees each year while every other year serves to keep the scale under control on our peach trees. In spraying apple trees alone the peach trees are considerably in the way. Furthermore in a mixed orchard of peaches and apples the soil often cannot be given the treatment best suited for the development of the apple trees. Apples require a a moist rich soil to do their best. If this condition of the soil does not exist naturally it must be brought about by the use of some cover crop such as clover. Usually stable manure in any considerable quantity cannot be obtained for use in the commercial orchard. If apples are planted alone, one can resort to the use of any or all of the clovers to build up the soil. If crimson clover sown in the

summer does not take well common red, mammoth, or alsike may be sown in early spring and the land left without cutlivation for a year or two. No great harm results to the apple trees under this treatment and the soil is much improved. By this treatment we have succeeded in getting the soil into condition to take crimson clover when other lines of treatment failed. Peach trees must have thorough annual cultivation which precludes the sowing of clover in the spring and letting the land lie undisturbed throughout the season. Among the clovers one is restricted to the use of the crimson variety and this often fails. Upon light soils we find it very difficult to build up the land while planted with peach trees and in mixed plantings of peach and apple, the apple trees are bound to suffer to some extent. Another drawback in mixed planting is that the peach trees are apt to to be left too long before they are cut out and permanent injury to the apple trees results. On the whole, while our experience in growing peach and apple trees upon the same land has proven profitable we have reached the conclusion that we would rather plant each kind of fruit seperately. In all our younger plantings we have followed the latter plan.

Inter-Cropping With Clover.

The third plan suggested, that of working strips and seeding the centers of the rows with clover to be cut for hay, cannot be worked to advantage except possibly on very good ground where sufficient tree growth can be secured in spite of the retarding effect of the clover. Trees worked by cultivating narrow strips on either side of the tree row do not grow as thriftily as trees worked by tilling the whole surface of the ground.

Hoed Crops.

For several years we experimented at Sleepy Creek with a variety of hoed crops with the hope of finding some crop that would prove profitable and aid in defraying the expense of developing young apple orchards. The crops tried were strawberries, okra, squash, pumpkins, sweet corn, tomatoes, cantaloupes, potatoes and field corn. We found our soil was not adapted to the growing of late varieties of strawberries. Early varieties grew to perfection but ripened in the season of the Virignia and eastern Maryland late fruit so did not prove profitable. Furthermore, letting the land go untilled during the ripening season of the berries proved detrimental to the growth of the young trees. Okra was planted for seed but we found that in our latitude the crop would not mature properly before frost comes. For two years we grew squash and pumpkins for seed to advantage and the trees thrived well under the fertilizing and cutlivating given these crops. The seeds were grown on a contract for seedsmen. The third year a slump came in the seed market and we could not get

contracts at prices which would return a profit from the growing of these crops. The same conditions prevailed the fourth year and we dropped these crops. Sweet corn on our land did not yield sufficiently to prove profitable. We grew the crop two years for seed on a contract. Cantaloupes did not yield well on our red shale soil and we dropped this crop. Where cantaloupes can be grown to advantage the crop is ideal in a young orchard. Potatoes gave a light yield under our conditions and we found the blight very troublesome. Furthermore the prices we received were low and we did not find the potato venture profitable. Field corn did well particularly on the new land we had planted with apples. The trees interplanted with corn grew thriftily and we had to look no further than to our own stables to find a market for the crop. Our working stock, mainly mules, thrive well on corn and fodder. In planting corn in the young orchard plenty of vacant space should be left on both sides of the tree row so that the trees will not be shaded and smothered by the corn. For ten years we have grown tomatoes to advantage and we find this low growing crop ideal in the young apple orchard. The abundant use of fertilizers and frequent cultivation are necessary to produce a good crop of tomatoes and this treatment is fine for the apple trees. We grow the tomatoes for the local canneries receiving from 25 to 30 cents per bushel. We have sometimes done our own canning seasons when the fruit crop was short. Tomatoes are not hard on the land and crimson clover can be sown to advantage at the last working of the crop.

Conditions of course differ in the various fruit sections of the country and plans for utilizing vacant space in the young apple orchard which work well in one section may not prove desirable in another. It seems necessary for best results that each fruit grower should do at least a limited amount of experiming for himself. After a good many years of experimenting at Sleepy Creek we have adopted the quincunx plan of setting apple trees coupled with the use of corn and tomatoes as intercrops for the first three to five years.

ADVERTISING OUR FRUIT AND PRODUCE.

L. WILLARD MINCH, *Bridgeton, N. J.*

The accepted definition of the word advertisement is the publication of something to sell. Of course, such announcement may be by printed page, or by the spoken word. The medium may differ, but there must be the diffusion of the knowledge of something one has to offer the public. It is not sufficient that we talk to each other about our Fruit and Produce; we must talk out loud. Convincement in our own minds is good, but confidence is better that makes us bold to declare

we have the "summon bonum" of Fruit and Produce. Many of our friends and acquaintances have journeyed across the Continent and after sampling the apples, pears and grapes of the Western States, have returned to their own states declaring there is no resting place like that afforded by "their own vine and fig tree." As to the flavor of the fruit of their own orchards in comparison with what they have sampled elsewhere, they declared, "there is none better." We are not surpassed in the excellency of the flavor of our fruit, but we are outclassed in advertisement. The states of Oregon and Washington spare nothing to place their fruit before the public; Florida is constantly reminding us of the citrus fruit produced in her confines. Eastern Shore white and sweet potatoes are known the country over. This advertising wave is fast reaching New Jersey and Pennsylvania. Surely the hour has arrived to spend more time and money in extolling the merits of the Fruit and Produce grown in Pennsylvania and adjoining states east and west of the Delaware River.

The Kind of Advertising.

Any advertisement which represents good form is for us. We have a business that deserves the best. My purpose is to limit this discussion to phases that are peculiar, and which cad be turned to our special profit.

It Must Arrest Attention.

We deal with a class of people that is hard at work. Few that are really wealthy constiute the consumers. The wage earners have normal appetities and must be fed. In their scramble to make a living they know little of what we call leisure. We have no right to hold them up, unless we can offer a good apology. It is greatly to our advantage that we are identified with a vocation that is being popularized. "Back to the Farm" has created a yearning to return to pastoral life. The speel of city life is broken. The time is opportune to link our offerings of Fruit and Produce with the memories of those who have been farm bred and with the aspirations of the would-be husbandman. If the farm has some association with past history, it should be turned to material avdantages for the future. From the known to the unknown is both good logic and profitable psychology. We have farms and estates in Pennsylvania and New Jersey that are famous; why not use this reputation in the publication of their offerings of Fruit and Produce. In my State of New Jersey we have The Old Oak Farm, years ago far famed for its hospitality, now famous for its fine poultry. Banquets and dinner parties are not complete without its milk-fed birds. Pork products of this farm are much sought after. For generations this has continued. The recital of the history of the farm secures a hearing, with opportunity for Fruit and Produce addenda.

Families have become prominent as horticulturists. "A good name is rather to be chosen than great riches." There is no better backing for an advertisement of the products of farm and orchard than established reputation of a family running through several generations. Do not understand me as saying that illustrious parentage is sufficient. There are no automatons in our vocation. A good start, then the momentum is for the individual to continue. A member of a famous family was told of the deeds of his father and grandfather and then was asked, "What are you doing to perpetuate the family name?" "Oh," he said, "we are resting now." Life is not a resting, but a moving. "Let thy life be deed on deed."

If you will pardon a personal reference, the Minch family, of which I am the sixth generation, in Cumberland County, New Jersey, has never missed a generation in the production of farmers or fruit growers. The excellency of their fruit, corn and potatoes are far-famed and I have noticed the eighth generation making mud pies, which is prophetic of the election of soil tillers as their future occupation. While this incurs responsibility, it also makes for opportunity. This is valuable by way of advertiisng. The family tree should be interwined with the story of the growing of Fruit and Produce.

The right kind of advertising makes use of photographs. In nothing can the artist attract attention as by a reproduction of a farm scene. Perhaps you have seen the California shipments stacked high on the New York docks. On the boxes are scenes depicting an orchard, a vineyard, a river or a general landscape, while some boxes are graced or disgraced with photographs of the growers. It is wise to secure a photograph representing the potato, the beautiful eastern apple, the luscious strawberry, or a photograph showing the rich color of the peach, the wealth of a cluster of grapes and the high heaps of yellow corn. All can be turned to material profit.

We began the growing of potatoes several years ago. Our marketing was left to others. Finally we determined to eliminate the joint account method. In the accomplishment of this task we used a few photographs of our potato fields. These were soon exhausted and we were confronted with the expense of a photographer. Finally we enlisted a member of the family. We bought a good camera, with complete equipment, and so secured our "official photographer." With specially prepared post cards and photographs we took our customers on a trip over our farms in a series of views portraying the potato business as conducted by Minch Bros. This method, in conjunction with the printed page, has contributed to the securing of a trade which consumed last year over one hundred cars of white potatoes. Next to personally conducted tours over the farms with our friends, we are confident that it returns us manifold to interest the dealers and consumers in the farms on which their fruit and produce are being grown. It is the advertising that lingers in the memory that makes for future business. A pictorial representation can not be easily effaced from the mind.

The right kind of advertising assists market men and dealers in making sales. Middlemen are not all thieves and robbers. The high cost of living is due as much to the luxury of the consumer as to anything else. When peaches are cheap they want grapes. When strawberries are good quality and low in price they want Bartlett pears. It is expensive to deliver a small order of sweet potatoes to a residence several squares away and then have them sent back to be changed for onions. The cost of the transaction is not the only thing to be considered. Bad bills and poor collections deduct from profits. Until such times arrive when the people will help themselves it is no business of ours to worry about the so-called high prices.

Neat packages help the trade and are good advertising. They should be clean and well filled. "Honesty is the best packing policy." Fruit and Produce should be as represented and uniformity should be observed. The marking of packages is a fine art. Carlisle said, "You can lie to the public, but it can't be repeated." A buyer who pays his good money wants value. "Eyes are not his market; your reputation is his market." The best pledge that he asks is that you give him goods which will keep faith with his consumer.

I obsereved a dealer displaying apples to a customer. He opened a barrel with this remark, "This brand always turns out good." While standing in a New York market a few weeks ago, I saw a barrel marked on the head, "Fancy Hand Picked Apples," bearing the four X mark, and graded according to the laws of a certain state. I took the liberty to examine the stock and found the truth only two layers deep. Of course, none of you would do such a thing. No dealer could work the price up on such false representation. The presence on the market of an article of quality is a good advertisement. Keep your market supplied so customers can get acquinted with you Fruit and Produce. You can help the dealer by securing the testimony of satisfied cutomers. The spoken word is the best medium of advertising your goods. People can talk you up or talk you down. Practice on your own fellow townsmen.

The most difficut people to please are your own neighbors We commenced a few years ago to supply Bridgeton, a city of 15,000 inhabtants, with potatoes. Formerly they bought their winter supply from Pennyslvania, Maine and New York. We simply went after the business and satisfied ourselves and our own families that we had good quality. We furnished a few families and in turn they gave us personal testimonies. We have doubled and tripled our business because of pleased cus-

tomers, and have secured personal testimony of our neighbors' neighbors. Why not feed 15,000 with Jersey grown spuds? We use locals papers by way of announcement and find our customers waiting for our pruduce. To live in Bridgeton and not to know the quality of Minch Bros.' potatoes is to admit you are a new arrival. Again, we need to advertise the good value of our Fruit and Produce. Joseph Campbell Company, of Camden, furnish in their advertisement in recipes for preparing palatable dishes from the farm products with which they deal. This wise course increases the demand for the products of the farm and reveals also the comparative value of food qualities to be found in farm produce. The reading of Campbells' advertisements created a passion for taking a course in Domestic Science to enable one to obtain the full benefits of their formulas. The question of meat substitution is receiving deserved consideration. When you can only buy a piece of sirloin steak the size of a man's hand for a dollar it is something to think about when one considers that spinach, which can be bought for fifty cents a bushel, has almost equal food value. Unfortunatey, last winter I ignored nature's laws with the result of developing a severe case of bronchitis. When beginning to convalesce, friends began to send eatables. The bill of fare included squab, chicken, best chops and steak. But the physicin said, "Better live on vegetable diet. Eliminate all meats and try spinach, baked apples, celery, lettuce and cabbage with milk and libatum." I seem to be alive today and sufficienty strong to testify the wisdom of following this course.

You perhaps may have seen the folder entitled "Village View Apples," grown in Lovingston, Virginia. It is a somewhat lengthy declaration of the food qualities of the apple, speaking of it as "The Food of the Gods; the Magic Reviver of Youth." There follows an appeal to the lovers of nature in a description of the wonderful Blue Ridge section of Virginia, with a photograph of the Village View orchard. Then the price is no shock, although it is four and five cents apiece by the hundred. This advertising is a good illustration of an effort to sell direct from orchard to table. The right sort of advertising will induce the people to buy more. By stimulating the mass of folks to consume more fruit, we increase the demand. But whether we sell direct or through middlemen, it is necessary to furnish goods and advertising methods that will make easy sales.

Is there such at thing as *cooperative advertising?* Yes, there is. The cattle men have clubs, or organizations. These issue publications declaring the many excellent qualities of certain herds; for instance, the American Jersey Cattle Club extols the merits of the Jersey cattle, while at the same time their advertisement declares the Club has none to sell. Their purpose is to create a general demand. In this manner they employ the best of advertising agencies and the use

of best papers, which no individual could or would attempt. This is an illustration of an organization working for the good of the several constituencies. Other cattle dealers do the same thing. We have Fruit and Produce associations, or exchanges, which give special thought to advertising. Sometime our State will contribute more directly to the heralding of the importance of its wonderful farm products. The middle West sends champion corn and vegetable growers on long trips. Newspaper exploit their achievements and give the news wide scope. The East should stand preeminent in Fruit and Produce. Every dollar appropriated for the development of horticulture is wise advertisement. Every school of agriculture erected is an attestation of the value the State places upon this indusry. This exhibition of Fruit and Vegetables associated with this assemblage is a visible demonstration of what we can do. We need more advertising of our natural resources. Greatly favored are we, in having thousands and tens of thousands of tourists passing through our State. The regret is that the highways to the coasts are so frequently over long stretches of sandy tracts. The Railroad Corporations are aroused to the vital importance of advertising the soil possibilities of our State. They find it is a missed opportunity to allow the erection of high fences for advertising quack notions, when fertile fields lie just beyond. It is well for us that our State roads and thoroughfares are linking up our productive lands and reaching the extensive farms and high class orchards. Let us make them veritable show places. Let us hope the time is coming when the Horticultural Society will have more means with which to announce their resources; in advertising the tempering ocean breezes of the Atlantic States as seen in the blush of the apple and the health of the corn; in advertising the richness of her natural soil as seen in the strength of her trees and in the abundance of her vegetables; in advertising the easy access to market as seen in the condition of manifold fruit in the markets of Philadelphia, New York and Boston; in advertising that she possesses young men and maidens of born ability to work out the problems of soil difficulties; to conquer the insect pests, to successfully work out the possibilities of marketing Fruit and Produce.

The Individual Elements in Advertising.

Cooperative advertising treats the subject in a general way. It is a wholesale representation of what we have to sell; it needs the individual to tell where it can be secured. A letter addressed to the Horticultural Society, Pennsylvania, is not complete. It must be directed in care of some local grower. We do this as individuals. When the thought of this enters our minds, it makes us careful of our soil methods, develops pride in our packing and makes us ambitious to excel on the market. When one marks his State on his fruit pack-

ages, he links himself in with the whole State and takes on a community repsponsibility. When he marks the name of the farm, he becomes a part of the circle of Horticulturists and pledges himself to contribute something to the general reputation of his industry. When he marks his name and local address, he then localizes and individualizes and on this depends his profit or his loss. Independence must not lose to inter-dependence. Truer to thyself; less false to another.

THE EASTERN OUTLOOK FROM THE WESTERN VIEWPOINT.

A. E. MASON, *State College, Pa.*

From time immemorial it has been the custom of fruit-growers, upon convening for any purpose, to discuss the relative merits of the fruit grown by the different sections represented, with the results that no one is satisfied with the decisions of the body, because all, down in their own hearts are convinced that there is no fruit like their own fruit, all opinions to the contrary notwithstanding. Without doubt our famous ancestors, when they harvested that first and most notable crop, in the garden of Eden, felt a jealous pride in the forbidden fruit, and ventured a few remarks to the effect that there was none other like it on the face of the earth. And best of all, there were none there who would dispute them.

So it is today. We meet to take up the various phases of horticulture, and the question is put up time and time again: "Is not the Eastern fruit better than the Western fruit?" Or if you are in the West, the growers rub their hands, and congratulate themselves upon the fact that they can successfully compete with the Eastern fruit in the latter's own market. The public is convinced that it would rather have a box of fruit from Hood River than from Massachussetts, Pennsylvania, or Maryland.

Beyond a question of doubt such a prejudce exists, in favor of the Western fruit. If it did not exist, how could thousands of carloads of apples, peaches, pears, prunes, grapes, and cherries find a ready market in all of the big markets of the East, while the bulk of the Eastern crop goes for lower prices, or does not move at all? If it did not exist why would the Pacific growers continue to set out vast plantations with the express intention of putting the fruit before the consumers on the Atlantic, and even across the Atlantic. Those men are not imbeciles. They are as careful of their capital as is the United States Treasury. They are not in the business for their health, but for the round hard dollar, and it

comes just as hard out in the West as it does here in the East. Let us look over a few of the factors influencing fruit growing, and see if we can discover the reason for this anomaly.

In the first place, it is the market? Looking at it from all sides it would seem that the market has very little to do with it. In fact, if it had any influence, it would work against the Western growers. Take for instance the great handicap the shippers on the Pacific Coast must overcome to get their produce before the Eastern consumer. The East is their only market. The census statistics will show that Greater New York can boast of as many inhabitants, as can that immene area west of the Rockies, and between Canada and Mexico. Surely there will never, in this decade, be a market for even a small part of the fruit raised in that country. Look at the area in fruit. It is startling, especially when it is considered that only a half of it is in bearing, the reminder of it coming into full bearing during the next few years.

		BEARING TREES	YOUNG TREES	PRODUCING
APPLES	California,	2,483,000	1,054,000	43%
	Oregon,	2,030,000	2,240,000	110%
	Washington,	3,009,000	4,836,000	160%
	New York,	11,248,000	2,829,000	25%
	Pennsylvania,	8,000,000	2,501,000	31%

All of this is being planted and grown for the Eastern market and the latter will take it because it will be put before it in such a way that it cannot refuse. The Western shippers must pay an exorbitant freight rate., the railroad taking as its share almost half of the total coast of the box of fruit when it is placed on the stand. Every box of fruit that comes from Hood River on the stand pays 60¢ to the railroad. Wenatchee Valley contributes 55¢ to the carrier. Yet in Wilkes-Barre it costs but 12¢ to place a bushel box in Philadelphia, and 7½¢ to deliver it in car lots. Then, in addition to the cost there is the great strain on the fruit from the bumping and knocking it received. It goes from 55 feet at Hood River, to almost 10,000 feet elevation, to get over the Rockies, and it is raised in the sunny, mild west, and stored in the warehouses, under various conditions, and then placed on a market entirely different, as far as climatic conditions are concerned, perhaps remaining there weeks before finally disposed of to the consumer. No, the market is decidely adverse to the Western growers, and very much in favor of the Eastern producers.

Is it the fruit? Here lies an opening for much discussion, but we will waive that for the time being, by trying not to tread on any toes. In considering the apple, it is an apple whether grown in Australia or North America. It is perhaps the most cosmopolitan fruit we have. The same varieties will grow in the East as will thrive in the West. Variety is not any consideration, because the public has not yet learned to distin-

guish between a Ben Davis and a Delicious, between a Fallawater and a Staymen. Why, gentlemen, on the train out of Pittsburgh last week the news agent passed through the car crying his wares, featuring his fine Winesap apples. A mere glance showed the fruit to be Gano, yet the public, unsuspecting, swallowed them with relish. The news agent, himself, was ignorant of the difference. In Chicago at Christmas time, in passing through one of the biggest fruit stores in the city, I saw Winsaps being sold as Jonathan, Spitzenburg as Delicious, and even Rhode Island Greenings being palmed off as Grimes Golden. I asked the clerk about it, and he said that the custom did not differentiate, but merely wanted apples with color and taste, so he gave them to it.

Apples the world over run with approximately the same chemical content, differing only a little in varieties. They thrive on the limestone soils of the Piedmont Region, in the rocky fields of Massachussetts, as well as in the sandy-loams of California and Colorado, the red-shot of Oregon, or the Volcanic ash of Montana. The West has never boasted that it could grow a sweeter apple than the East. The West has never claimed that it could grow a larger apple than the East. The West has never stated that it could raise a prettier apple than the East. But what the West has stated, absolutely and unreservedly, is that it could *sell* a better apple than the East. And the West has made good its boast.

Then the difference resolves itself into a question of marketing. In 1906, after a long period of legislation, a pure food and drugs act was passed by Congress, standardizing our staples. It was at that time that the West was trying its hardest to make its infant industry a success. It was fighting eastern competition. The only means of transportation was owned and operated by the railroad magnates, who charged exorbitant rates. The only men who could change these rates were congressmen, also owned and operated by the railroad magnates. Therefore a solution must be found through some other channel. The Pure Food and Drugs Act was merely the first great expression of the keynote of the day. *Standardization.* The Western growers had seized that keynote and we are using it to sell their fruit for them. It is standardization today that is keeping the western product on the Eastern market. If it were not for the fact that the consumer knows that when he buys a box of western apples that he will get 100% apples, and not half culls, the Eastern fruit would drive it from the market. The East can grow as fine fruit as can be grown any place in the country. You can see it in any well kept orchard. It can be marketed just as well, but it is not done. If it were done, the Westerners would go bankrupt.

Standardization is merely a reduction of all the fruit sold under one common label to a common or uniform grade. This is accomplished in many ways, but in the West it is the result

of cooperative marketing, the associations fixing the standards to which all members must conform. As the fruit is sold under one distributing agency, the latter must oversee all of the processes through which the fruit must go before actually reaching the consumer. In the East the bulk of the crop is moved directly from the farm to the market. In the West practically the entire crop passes through the hands of the California Fruit growers' Association, the North Pacific Fruit Distributors, the Northwest Fruit Exchange of other similar organization.

If you will allow me to confine a few typical lillustrations to apples, I will say a few words about the Hood River Fruit-Growers' Association, affiliated with the North Pacific Fruit Distributors. Early in the summer the association sends out letters to all members, asking estimates of the crop, with the varieties. Later in the summer a more thorough estimate is made. In the early fall a packing school is opened by the association, in town, to which all men and women who expect to pack apples must go, before they will be allowed to put up any of the fruit to be shipped by the association. This school lasts three weeks. When the crop is ready, these packers are divided up into squads, with a foreman, and each goes from one packing house to the other, putting up the crop as it is ready. The Foreman is responsible for the fruit and for the pack. If any fruit is below grade, the foreman and the grower suffers, because the association refuses all boxes which do not measure up to standard. When the fruit is packed and delivered to the central distributing house, random samples are taken, and broken open, and if any are found to be imperfect, a repack is required. Each packer has a number, given him by the association, and he places that on the lower left hand corner of his box, while the variety, and number in the box and tier are also placed on the box. A Field-Inspector is placed in every district, and it is his duty to get around to each house several times during the season, and inspect the equipment, the fruit, and the general methods on the place, and to advise with the grower about any points which come under his observation.

As for the fruit, it is pooled. The pool is usually a seasonal pool in the apple disricts, the entire crop being sold and each grower receiving his pro-rata share when the crop is finally disposed of in the Spring.

With the citrus-growers in Southern California the system is a little different, and a little more organized still. The fruit is even taken from the tree by association pickers. The grower does not touch any of his fruit. He merely signifies when he is willing for it to be picked, and all of the work from that time on is handled by the organization.

Their method of management is complex. The central association is made up of districts, which in turn are made up of associations, which in turn are made up of the individual growers.

The central association receives the market reports from their agents in the east, stating how many cars will be in demand on such a date, with the price. The central association notifies the districts, which in turn notify the associations, and these communicate with their members, and if a man wishes to go into the ten-day pool, he has his fruit picked. Oranges differ from apples in many ways, one of the most important being that you do not have to pick the fruit at a certain time but can let it hang for a considerable time till the market picks up. The association then sends out its own pickers, with their own equipment, and the crop is harvested. It is hauled directly to the association ware-house, on a railroad siding, where a plant with equipment costing from fifteen to fifty thousand dollars, is located. They do all of the washing, grading, packing, and bleaching, load the cars, and send it off to market, and the fruit-grower gets his money in a few days, instead of waiting for it for a whole season, as is necessary where the seasonal pool is used.

Not only do these associations handle the crop, but they also buy a great part of the supplies needed by their members, getting much reduced rates. These organizations, too, get the advantages of better freight rates, and can put up better plants than could the individual grower, thus saving in the cost of the marketing.

Standardization has not been confined to the apple and orange industry alone. The raisin-growers of the San Joaquin Valley in California, the prune-dryers of both Oregon and California, the grape-growers, the walnut-growers, the melon-growers, in fact, all of the western fruit-growers, are now cooperating to put up a uniform grade of produce. Why, gentlemen, in Oregon during the past winter, the Willamette Valley Logan-berry growers have met and standardized the fresh, berry business, and have fixed the sugar and water-content of the dried berry industry.

Personality is perhaps the next most important factor in successful marketing. If you have something to sell, do not be ashamed to make it known all over the markets of the world. The West is doing that with its products, by gigantic advertising schemes, by cooperation with all of the western railroads, by magazines, and by the quality of their output. Perhaps you all have seen the "Skookum" Brand Apples, advertised in all of the cars in New York City, by the Northwest Fruit Exchange. It advises in great letters, "Eat the right apple at the right time," and then list the various varieties, with the proper season in which they will be best. Everybody has become familiar with "Sunkist Oranges," the official label of the California Fruit Growers' Association. Brilliant lithographs on the box and barrel ends, individual wrappers printed for peaches and apples, and vegetables, and judicious advertising calls attention to the grower and his wares. No one thinks of Hale without seeing a peach; no one

thinks of Delicious apples without remembering Stark; no one thinks of Flordia without a mental picture of grape-fruit, and everytime Secretary Dniels mentions grape-juice you know that Welch is happy. Your fellow member, C. J. Tyson, is doing it down in Floradale, and is certainly making a success of it. He has not felt a ruinous push of hard times and a crowded market. Lewis—any number of men in his state are reaping the benefits of standard-grade fruit, and careful extensive advertising.

In conclusion, gentlemen, let me sum up what I have said in just a few words:

1. The East has all of the advantages of markets, transportation, and freight rates.
2. The East has some advantages in production costs, in the way of cheaper costs.
3. The East has just as many climatic and soil advantages as the West has.

BUT

4. The East is a decade behind the west in arising the fruit.
5. The East is a decade behind in handling and marketing the fruit-crop.

The needs of the East are:

1. A bigger force of men to help the fruit-growers solve their problems.
2. More rigid standardization laws.
3. Extensive cooperative organization, so that the growers may buy supplies, hanlde the crop, and market the fruit more efficiently.
4. A few sticks of dynamite under it, to wake it up, to drive the western growers into prune-raising.

THE IMPORTANCE OF BETTER GRADING AND PACKING OF EASTERN APPLES.

H. B. KNAPP, *Ithaca, N. Y.*

It seems a little strange at first thought that a New Yorker should presume to speak to the fruit-growers of Pennsylvania in regard to the importance of better grading and packing of Eastern apples. The day would appear to have passed when one must have his own dooryard clean before he chides his neighbor concerning the appearance of his dooryard. However, if fundamental to a treatment of this subject is a knowledge of how poorly fruit may be packed and still find a market, I can imagine no one better qualified to discuss such matters than a man from New York State.

The growing of apples and other fruits has within the last two decades undergone a transformation that amounts almost to a revolution. Fruit growers' organizations, the Horticul-

tural press, agricultural colleges, experiment stations, and every agency whose motto is progress in country affairs has urged and aided the production of more and better fruit. We are now reaping the results of this educational propaganda, in Pennsylvania, in New York, and everywhere, and the problem of the present and the future, which the fruit-grower must surely face, is the marketing of his product. Upon the solution of this problem depends the whole future outlook of the apple and the material destiny of its grower.

Evidence is not lacking that with present methods of marketing we have neared the crest of high prices for apples. The production of all farm crops moves in cycles of varying periods of time. These cycles seem to be fairly uniform for the individual crops, and production is directly correlated with prices. This is true of hay, of cattle, of hogs and of potatoes. It seems to be just as true of apples except that the period between high and low production and low and high prices is longer. It is probable that with increasing production the crest of high prices for apples will soon be reached and the pendulum will swing back toward and beyond the normal.

If we consult the prices of apples on the New York market we find that they have increased in price less than ten per cent. in the ten year period from 1903-1912 over the price for the previous ten year period. It is doubtful if this offsets the added cost of production. During the same period cotton has inreased 64%, hay 33%, oats 38%, corn 42%, potatoes 28%, and wheat 37%.

We are all familiar with the enormous plantings in recent years, plantings that have by no means reached the maximum of production, but the results of which we are now beginning to feel. A consideration of these things may well make us pause and ponder as to what the future holds for us.

A calm survey of conditions indicates that disaster must inevitably overtake us unless we can find markets not now open to us and widen those we already have. The alternative is the experienec of the growers of '96.

We may well inquire, then, into the possibilities of further extending our markets. What are the prospects in our own dooryards? In my home state of New York, it is practically impossible to buy an Eastern grown apple on fruit stands or from high class grocers in New York, Albany, Troy, Schnectady, Utica, Syracuse, Buffalo, and even in Rochester in the heart of one of the world's greatest apple belts. You ask for an apple and you get a Western apple. Is the case any different in Philadelphia, Pittsbugh, or in your capital city?

Last winter the College of Agriculture at Cornell held a school in domestic science at Lockport in Niagara County, one of the banner fruit counties of the Ontario District. The ladies desired to make an apple pie. They went to the grocers

to secure the fruit and were compelled to accept Western apples.

In the markets of the world the story is the same. Box apples are gradually eliminating our barrel apples from continental Europe; Canadian apples packed under the Fruit Marks Act sell for a premium of fully fifty cents a barrel over the same varieties grown on this side of the St. Lawrence. Why should this state of affairs exist?

The answer is so plain that even in our blindness to existing conditions we can not fail to see it. With a protective tariff of two hundred dollars per car over fruit from the Northwest, we have stood idly by and allowed the Western grower to invade our markets and usurp our trade. The Western grower packs and ships fruit that corresponds to our finest No. 1 grade, not primarily because he is more honest than the Eastern grower, but because none other shows a profit. The fruit is packed subject to inspection by the association through which it is sold and diseased fruit is under the ban. In the East every man is a law unto himself in the matter of packing, and no two men pack alike. It is not higher moral sense, but plain business sense that actuates the Western grower—he can do nothing else and live. It would be better for us in some ways if our markets were not so accessible.

Canadian fruit is packed under the Fruit Marks Act, which through its provisions of grade and markings guarantees to the consumer an article worth his money. The European buyer has a choice between an article of certain and an article of uncertain value. It is a credit to his business sense that he prefers the Canadian pack. Our consuls have repeatedly stated that we can not hope to widen our foreign markets so long as our pack is unchanged. It is a sad commentary upon our judgment as growers that we have not yet recognized and complied with the fundamental law of trade.

Let me approach the subject in another way. The Association for the Improvement of the Condition of the Poor secured the wholesale and retail prices of the principal varieties of apples on the New York market during the month of November, 1913. The apples were sold out by the grocers by the peck and retail prices have been computed by allowing twelve pecks to the barrel. The figures follow:

	No. 1 Grade		No. 2 Grade	
	Wholesale	Retail	Wholesale	Retail
Northern Spy	$5 50	$10 20	$4 50	$9 00
Baldwin	5 00	9 00	4 00	6 00
Tompkins King	5 50	11 40	4 75	7 20
R. I. Greening	6 00	10 20	5 00	9 00
Ben Davis	3 75	6 00	3 00	4 80
Average	$5 15	$9 36	$4 25	$7 20
% of retail price to retailer where sold by peck	45%		41%	

On this basis let us see how the money that the consumer pays for the average barrel of apples is distributed among the different agencies that handle the barrel. The average barrel brings two dollars and eighty-six cents wholesale in November in New York City. We may assume that it is shipped by the grower from Monroe County in Western New York, nearly four hundred miles, and that it is sold through the commission man to the grocer. The distribution of the money paid by the consumer follows:

Distribution of Money Paid by Consumer for Barrel of Apples Sold Through Commission Man for $2.86, November 1.

	Amount Paid	% of Retail Price
Grower	$2 27	45.0
Freight	.23	4.5
Carting and Misc.	.07	1.4
Commission	.29	5.8
Retailer	2.16	43.0
Price paid by consumer	$5.02	

When we remember that the grocer does business on the basis of twenty per cent. of his gross sales, this forty-three per cent. in the case of apples appears to be an exorbitant charge. Let us place ourselves in the grocer's position. We buy apples every day in the week to supply our trade. Five days in the week we get a good lot of fruit with no waste, but the sixth day we pay good money and get junk—cider apples and culls. In such a case we would do just as the grocer does. We would put the price on all our fruit high enough to protect ourselves in any emergency, a price which is prohibitive to the great middle class of people. This has been and still is the history of the marketing of Eastern apples. Fundamentally it is the pack that is at fault. We may trace the matter back until the responsibility becomes a personal one and a recognition of this responsibility is essential to the salvation of our fruit industry.

The situation is not peculiar to New York State alone or to Pennsylvania alone—it is common to the entire north eastern United States—the industrial strife is between the East and North and the East and the West. Fruit growers of Pennsylvania, it is our problem and your problem. Let us deal with it in a spirit of mutual assistance and understanding.

We must face the situation as it exists before we can remedy conditions. We must recognize that the motive power of the wonderful commercial development of our age is confidence between man and man—that it is the center of a trade movement that knows no limit of countries, continents or of hemispheres; that it is only set at naught when man gives his brother the lie. Without such confidence an industry can flourish only so long as the product can be secured in sufficient quantities from no other source. When an industry

has reached the stage that the apple industry has reached, the article that we offer for sale will be judged not according to its bulk, but according to its merits, to its points of superiorty over the article offered by our competitors. We must stand or fall by this standard.

The government reports published November 23rd give the following estimate for the state of Pennsylvania:

Baldwin	784,000	Barrels
Northern Spy	500,000	"
York Imperial	330,000	"
Ben Davis	264,000	"
R. I. Greening	242,000	"
Stayman Winesap	129,000	"

How many thousand barrels are going out to the consuming public to dim the already dull reputation of Eastern apples, to congest a market already strained to the breaking point and to blast further the future of an industry whose welfare is our welfare and whose ruin is our ruin? It avails us little to devote our lives to the upbuilding of an industry that we have very much at heart if our neghbor through lack of foresight, reason or honesty is as assiduously bent on its destruction. The moral conscience of man is slow to work and the span of life is short. Should we not accelerate the workings of that conscience in some way in order to render the coming of the golden age of honest packing more speedy and sure? Does not history indicate that a spur to the conscience of our erring brother must in the interest of humanity in the aggregate often be applied, and is the careless and dishonest packer any exception to this principle? If the evil he does were confined to himself and were interred with him, we might let him go his way, but this we can not do when he is sapping public confidence and gnawing out the heart of an industry whose success is our success and whose doom is our doom.

The only effective deterrent is legislation, specific in nature, and thorough in application. We have the Sulzer Law passed by the United States Congress, it is true, and the law represents the first real attempt to standardize a food product in this country But the Sulzer Law provides for only one grade of fruit, is permissive in nature and provides no system of inspection. Not five per cent. of the growers in New York State ever packed their fruit in accordance with its provisions. We have in Maine, in Michiagn and in New York measures dealing with this subject. The New York measures dealing with this subject. The New York Law is the most drastic packing law that was ever passed in America. I shall take up with you its nature and influence on the New York pack at another hour.

THE INFLUENCE OF THE NEW YORK GRADING AND BRANDING LAW ON THE NEW YORK PACK,

H. B. KNAPP.

The New York Apple Grading and Branding Law went into effect July 1, 1914. Only the present seasons's crop has been packed under it. The law is distinctly a fruit-growers' measure. It had the endorsement and active support of the New York State Fruit-Grower's Association, the Western New York Horticultural Society and the International Apple Shippers' Association. It was conceived and drafted by committees from these organizations and passed through pressure brought to bear by them. It represents the best thought of able and mature men who derive their living from growing apples and the calm judgement of men who understand the marketing side of fruit-growing from A to Z.

The law asks no more of fruit-growers than farmers have asked for years of feed and fertilizer manufacturers and the makers of patent medicines, namely, that the label shall disclose the true contents of the package. It places no restrictions upon the kind or quality of fruit that may be sold—it simply requires that the fruit be sold for what it is, instead of what it is not. It aims, therefore, to give a barrel of New York apples a constant and uniform rating in the business world and to guarantee to the buyer an article worth his money.

The law applies to all apples grown in the state that are packed in closed packages with the exception of those packed under the Sulzer Law. It provides for three different grades of apples and for an unclassified pack. The grades are known as New York Standard Fancy, New York Standard "A" and New York Standard "B." In order to be labelled New York Standard Fancy, according to the provisions of the law, the barrel must contain "apples of one variety, which are well-grown specimens, hand-picked, properly packed, of good color for the variety, normal shape, free from dirt, diseases, insect and fungus injury, bruises and other defects except such as are necessarily caused in the operation of packing." In other words, this grade calls for first class apples in all respects, the kind that we find in the western box labelled "extra fancy" or "fancy," the kind that we would expect to take a prize at the State Fair at Syracuse or at the Industral Exposition at Rochester. It provides a pack that can compete with the best western box fruit or with the best pack under the Canadian law. We will see a little later that one of the marks that must go on the outside of every closed package of apples the minimium size of the fruit in the package. The only tolerance or variation allowed in the fancy grade is that five per cent. of the apples may be under the size branded on the outside of the barrel.

New York Standard "A" grade shall consist "of apples of one variety which are well-grown specimens, hand-picked, properly packed, of good color for the variety, normal shape, practically free from dirt, diseases, insect and fungus injury bruises and other defects except such as are necessarily caused in the operation of packing; or apples of one variety which are not more than ten per centum below the foregoing specifications on a combination of all defects or five per centum on any single defect."

In other words, the "A" grade apple is the apple that in other years we have packed as a good No. 1, not the kind of a "No. 1." apple that has sometimes gone into the barrel in years of light crops and high prices. A tolerance of ten per cent is allowed on a combinaton of all defects, size included, and not more than five per cent on any single defect. This does not mean that the packer may fill the barrel up to within ten per cent. of being full and then run in anything they chooses, cider apples, wormy apples or culls. The limit of tolerance is provided simply to safeguard the man who has a great deal of packing to do and who must depend upon hired help to do most of it for him. Enough poor apples will get into a barrel under such circumstances if we do not intentionally put them there.

New York Standard "B" grade "shall consist of apples of one variety which are well matured, hand-picked, properly packed, practically normal shape, practically free from dirt, diseases, insect and fungus injury, and which may be of medium or less than medium color for the variety; or apples of one variety which are not more than ten per centum below the foregoing specifications on a combination of all defects or five per centum on any single defect."

The only real difference between the "A" grade and the "R" grade apple is in their color. A "B" grade apple is intended to be a good No. 2. "Apples not conforming to the foregoing specifications of grade, or, if conforming, are not branded in accordance therewith, shall be classed as unclassified and so branded." The unclassified brand provides a pack in which apples may be put which in themselves are good enough for the grades before mentioned, but which have not been sorted out and graded up to meet the requirements for the grades. More than that, it provides a class in which any and all kinds of apples may be packed but after the limit of tolerance of the "A" and "B" grades has been reached, the barrel marked "unclassified" must state in just what respect the apples are deficient as hereafter noted.

Now, as to the essential marks which must go on the outside of every closed package of apples. They are as follows: the name and address of the packer or the person by whose authority the apples are packed, the true name of the variety, the grade or class of apples contained therein and the minimum size of the fruit in the package. This is the only refer-

ence to size that we find in this law. It does not state that an "A" grade apple must be two and one-half inches in diameter, a "B" grade two and one-fourth inches in diameter, etc. So long as the apple measures up to the specifications of the grade on other respects, the size does not bar it from any grade, it simply requires that the size of the small apple be branded in the barrel.

In addition to the foregoing requirements a barrel containing fruit which is not hand-picked, which is wormy, scabby, diseased or defective in anyway, must if such fruit is present in greater amounts than provided under the limit of tolerance, be marked in such a manner as to indicate this fact. Of course, such a barrel must first be labeled "unclassified," but the packer must go further if more than ten per cent of the fruit is defective and state in just what respect it is defective.

The law specifies that the package must be plainly marked with letters not smaller than one-half inch. The enforcement of the measure rests with the Commissioner of Agriculture, and penalties are attached for violation. Other points can be brougt out in the discussion later if you desire.

Such a law if properly enforced could not fail to have a profound influence on methods of packing. It is one thing to pack a barrel of fruit dishonesty, it is quite another to advertise the fact to the whole world by putting your name on the barrel. In the main, the law has been obeyed and we feel much encouraged with the progress made in so short a time. Just how profound the effect has been may be judged by the following extracts from letters written by men with whom many of you are familiar: Mr. R. G. Philips, Secretary of the International Apple Shippers' Association, says: "There is no doubt that the New York Grade Law has been a godsend this year. It has kept a lot of stuff out of barrels which ought to have been kept out. The result has been that bulk shipments out of this state have never before been as heavy. The law also gave confidence at a time when confidence was needed; and I am convinced that if it had not been for the law the apple situation would have been in a disastrous condition * * * I have heard a great many splendid testimonials to the beneficial effects of the law. I have visited the New York market twice and personal observation convinced me that the fruit was much better packed than usual. That has also been my observation on the shippingend."

Mr. Edward N. Loomis, 119 Barclay St., New York City, says: 'The New York Apple Grading and Branding Law has been of great influence in the advance of the apple indrusty, and will be of increasing benefit to growers, dealers and consumers alike the more thoroughly its provisions are understood and obeyed. * * * The law already has had a great effect, and has had a wider recognition than could have been expected in its first season. As the growers come to realize its

value and its provisions for putting out an honest pack, they will more and more reap its advantages. The consuming public has not yet had an opportunity to fully realize the change. When the buyers come to know the meaning of the various brands, and that each brand describes accurately an honest barrel of apples, the demand for apples will increase throughout the country largely, and particularly in barreled apples * * * I, myself, am a dealer as well as a grower, having 100 acres of orchard in Vermont. I believe that there is no greater danger to the Fruit industry of the East than its present methods of packing and grading. I believe strongly in compulsory laws throughout the Eastern States, which will promote honest grading and better packing, and which will guarantee to the buyer of each individual barrel of apples a square deal." Mr. C. B. Shafer, Gasport, N. Y., wrote as follows: "Your favor of the 24th received asking my opinion of the New York State Apple Grade Law. In reply I beg to state the law created revolution right from the start; at the time of packing and shipping fall apples it was impossible to sell winter apples or even get any of the important Western dealers interested.

"After the Western dealers had received some of the fall apples packed under the New York State Standard "A" Grade they immediately woke up to the fact a great demand had been created by the New York Law.

"The result was all the Northwestern trade representing Illinois, Iowa, Minnesota, Wisconsin and Nebraska sent their representatives into Western New York practically cleaning up the orchards of all the good apples they could obtain under the Standard "A" grade, while at the same time the box apples in Idaho, Oregon and Washington were piled up in the packing houses, stores, homes and orchards, unsold. "A dealer from Iowa informed me he had shipped one hundred car loads of New York apples to his trade and not one barrel was turned down, had it not been for the law the apple crop would be in the growers' hands to-day with no demand. "Our firm is getting inquiries every day asking for quotations on New York Standard "A" Baldwins for export."

"The law will lift the apple industry out of a deplorable rut and create a demand in all the markets of the world and will compel the negligent grower and packer to get in line with his neighbor who has been growing good quality."

"Our company has grown and packed 8000 barrels of apples this season, and can not command words to endorse the law too highly".

John W. Low, of the firm of Wayne & Low, Chicago, writes: "Regarding the New York State 'grading and packing law' will say, that we think it has been of great benefit in marketing this fall's immense crop of apples. We have filled orders for a great many carloads to go to such states as Iowa, Minnesota, Illinois, Wisconsin, and we have not had a single

complaint regarding the packing. We have seen some things in the stock that came to our own premises in the way of packing that could be criticised, but we think on the whole the stock has been the most satisfactory of any that we have handled for years. We thougt when we first heard that New York state had adopted a system of inspection and packing slightly different from that adopted by the United States under the Sulzer law, that it was a mistake, but we believe it is going to work out greatly to the avdantage of New York state, and that it will be of great assistance to the fruit-growers in finding a satisfactory market for their apples."

G. M. H. Wagner & Sons, also of Chicago, write as follows:

"In replyng to your inquiry relative to 'our opinion concering the influene of the New York Apple Grading and Branding Law on the New York pack and price received' would say, in our opinion, his law is one of the best that was ever passed by your New York State Legislature and its enforcement should be not only the duty of your state officials, but the duty of every grower or friend of the apple industry.

"In our opinion, this law in the few months that it has been in operation, done more to elevate the New York apple Business and placed it upon such a plane as will tend to instill confidence in the mind of the buying public and has done more by way of increasing the actual value of the fruit, etc., than all of the political conferences and endeavors of the organized trade, etc. covering a period of the past fifteen years.

"It has been the one thng, in our minds, that has made possible as good an outcome as has been achievedin reference to this year's crop. Without this regulative measure and operating under old condtions, we would have had chaos and disaster.

"In our judgment, a monument should be raised and paid for generally bv the grower and dealer to whomever was responsibe for this measure."

Mr. R. H. Pennington, Evansville, Indiana, president of the International Shippers' Association states as follows: "In my opinion the New York State grading and branding law has been of great benefit to all apple operators this season. We have been able to buy fruit with the assurance that we would get a uniform standard grade on which we could depend."

"Of course prices have ruled low this year on account of the enormous crop that has necessarily been offered, but I feel safe in saying that had it not been for the grading and branding law that the fruit in Western New York would certainly have suffered this season."

"With reference to the influence that the law has had on the packing I am satisfied that the operators generally have tried to live up to the law and the receivers have been argeeably surprised at the improvement in the pack of the New York fruit. After the receivers realized that they could depend on

the pack they have been willing to pay a premium for standard apples and I believe that in the long run the law will be of great benefit to the industry and will have a tendency to increase the market value of the fruit quite materially."

Few measuers have been perfect in their original enactmnt. It is recognized that this law was not. But it represented a constructive effort to better conditions and furnished a basis from which departures can be made as the need for them becomes apparent. One of the changes that is needed is that the measure should be a part of the agricultural law of the State in order that the Department of Agriculture shall have authority to inspect packages at any time or in any place and to confiscate packages or samples as evidence. This weakness will be remedied at the present session of our legislature.

Some complaint has been heard that the term "Unclassified" casts an unfair reflection on the contents of the package and places such fruit at a disadvantage in the market. In my opinion it lodges a just discrimination in the mind of the purchaser which represents the true difference in quailty between a barrel marked "Unclassiefid" and one marked "Standard A" or "B." If such a term will tend to keep the poorer grades of fruit out of the barrel and will induce the owner to dispose of them through the proper channels by bulk shipments, to the evaporators. cider mills, or canning factories, it will be one of the best things that could happen. However, if time shows that a change in the law in this respect is needed, it can readily be made.

Fruit-growers and fruit-growing in New York State have come to a parting of the ways. A step in advance has been taken—a forerunner we hope of better things.

INSPECTION AND QUARANTINE REGULATIONS IN IN THE CONTROL OF PLANT DISEASES.

C. R. ORTON, *Plant Pathologist, State College, Pa.*

It is the purpose of the speaker, in presenting this subject before the Horticultural Association of Pennsy[vania, to call your attention more clearly than before to the great destruction caused each year by the fungous and bacterial parasites of plants. It is my further aim to outline the State need which in the past few years have been forcefully brought to the attention of those inerested in the prevention and control of plant disease in this State.

Recent serious outbreaks of diseases hitherto unknown in the State as well as those which are now threatening our borders from neighboring states have made it seem essential to devise adequate methods of preventing further unnecessary loss to our crops.

At present the insect pests are carefully looked after by

our State Zoologist and his assistances but the quite as important diseases caused by parasitic bacteria and fungi have been allowed for the most part, free transporation without regulation.

The Importance of Plant Diseases.

Most argriculturalists and horticulturists realize that considerable damage may be caused yearly by diseases but how many have ever tried to compute in actual figures the annual loss to the crops of the United States from these causes? In 1898 the loss to our wheat crop from rust, (*Puccinia poculiformis* (Jacq.) Wetts) was estimated at $67,000,000 (1) and this year it must have nearly reached this figure. The bitter rot, (*Glomerella cingulate* (Stonem.) S. & S.) of apples has caused the loss of $10,000,000 in this country some years. (2) The annual loss from brown-rot, (*Sclerotinii cinerea* (Bon.) Wor.) of stone fruits has been estimated at $5,000,000 (3); It is undoubtedlfy much more than this.

The loss to our cereal crops from smut diseases is not known but it seems safe in estimating the annual loss to the country to be at least $50,000,000 and it may be prevented entirely at a comparatively slight expense.

The Secretary of Agriculture in 1912 (4) estimated the value of the crops in this country at $6,137,000,000 and the loss for that year from parasitic diseases at $613,700,000 or 10 per cent. of the total value of the crops. This information is reliable and serves to clearly emphasize my convictions that one of the most important factors contributing to the high cost of food products is the great waste caused by carelessness and diseases.

The loss to cultivated crops from diseases is not, however, anywhere near the whole story. When our forests are taken into consideration we find that a similar condition holds true. The loss of chestnut trees accasioned by the Endothia canker in the year 1911 was esimated at $25,000,000. (5)

On account of the introduction of the white pine blister-rust, (*Cronartium ribicola* Fisch. de Wald.) into the United States from Germany in 1908 and 1909, a large sum has been expended already in attempting to stamp it out by destroying infected trees when found but Spaulding (6) estimates that imported trees valued at $225,000 should be destroyed at the present time in order to effectively eradicate this disease. This disease if allowed to spread, in time would exterminate unquestionably the white pine in North America.

There is going on yearly in our forests throughout the country a loss from various causes which probably reaches the loss estimated for our cultivated crops. Are we going to allow these conditions to continue or shall we take decided steps to protect the welfare of our furture generations? At this point might be well to consult the long experience of

those in the profession of animal pathology. Long ago the workers in that field realized that *prevention* was the keynote to healtiness. The way in which the recent outbreak of foot and mouth diseases has been stamped out in Pennsylvania is a good example of what concerted action and strict quarantine methods can accomplish. Many of our serious plant diseases could be prevented much more easily if the proper methods were undertaken and efficiently carried out.

Plant Parasites Introduced into the United States from Foreign Countries.

The late blight, (*Phytophthora infestans* (Mont.) de Bary.) of potatoes was introduced into the United States, probably from South America about 1840 (7). The average annual loss to the country from this disease is estimated by experts at $36,000,000.

Powdery Scab, (*Spongospora subterranea* (Wallr.) Johnson) one of the most dreaded diseases of the potato in European countries, was introduced into Maine within the past three years. Already the most careful methods have been undertaken, by government officials through the Federal Horticultural Board, to prevent the further spread of this disease. About the same time the Silver Scurf, (*Spondylocladium atrovirens* A. & L.) of potatoes, a parasitic fungus, and Leaf-roll and Curly Dwarf of potatoes, two physiological diseases were recognized in this country and although less important than the first two mentioned, are serious enough to occasion alarm. It seems likely also that potato Wilt, (*Fusarium oxysporum* Schl.) a disease which is probably fully as serious as Late blight, was introduced from European countries. Black Leg, (*Bacillus phytophthorus*, Appel) of potatoes, a bacterial disease which is quite serious in some locaities, is another European disease imported several years ago into the United States.

Asparagus rust, (*Puccinia Asparagi* D. C.) was first known in New Jersey in 1896 and since then has spread rapidly throughout the United States. Its effects upon asparagus culture is well known.

The Endothia canker of Chestnut, (*Endothia parasitica* (Murr.) A. & A.) has recently been demonstrated as a native of China and was undoubtedly first introducted in the vicinity of New York from where it has spread most rapidly and bids fair to exterminate our native chestnuts in the east (8).

Quite recently a serious fungous canker, (*Phoma sp.*) of citrus fruits has appeared in the south and spread rapidly throughout the Gulf States. This disease is the most serious yet to threaten this important crop. Its origin is unknown at present.

Among the insect pests the brown-tailed moth, (*Euproctis chrysorrhoea*) and the gypsy moth, (*Porthetria dispar*) should

be mentioned. Both of these serious pets which have caused the loss of millions of dollars, were introduced from Europe.

The San Jose scale (*Aspidiotus perniciosus*) which came to us from China, annually costs us about $5,000,000 to keep under partial subjection and the yearly loss from this pest equals a similar sum (9).

These are only a few of the most conspicuous examples of introduced plant parasites which may serve as a warning of what we may expect in the future unless strict quarantine measures are maintained between nations constanly interchanging plants of any kind.

The Interstate Exchange of Plant Diseases.

This phase of the problem is perhaps fully as important as that just recounted. The increased facilities for the rapid interstate exchange of plants has brought to us a stupendous problem but one which must be attacked with courage and determination if we ever hope to be relieved of these rapidly in creasing troubles. I shall enumerate only a few of the diseases which are of especial interest to the members of this Association.

The powdery scab of potatoes introduced into Maine has this past year been found in Eastern New York. That it seriously threatens the Pennsylvania potato crop would be stating it midly. A hasty survey of the State made last spring by the speaker failed to find it established within our borders but numerous shipments of potatoes into the State, for table purposes, were found to contain the diease. A careless handling of such potatoes is almost sure to result in the introduction of the disease in our potato crop.

The bitter rot of apples is a disease which was until quite recently unknown in Pennsylvania yet it is evidently getting established here and in certain seasons may be expected to cause considerable loss.

Appple Blotch, (*Phyllosticta solitaria* E. E.) a fungous disease which a few years ago was thought to be restricted to more southern regions has this past year caused severe loss to several orchards in the state. Smith Cider and Maiden Blush are very susceptible to this parasite. An instance of how these diseases are distributed came to my attention in 1913. A party in Centre County brought to me some apple twigs seriously spotted by the apple blotch fungus. After explaining to him that the disease was a very severe one in Missouri and other states of that section he stated, somewhat to my surprise, that the diseased tree was brought from Missouri the previous year.

A serious shot hole disease of peaches has caused considerable damage to young trees this past year and is very similar in appearance to the disease of stone fruits known as bacetrial spot (*Bacterium pruni, etc.*) This malady has apparently come to us from more southern and western fruit districts.

Fundamental Principles of Disease Control.

Aside from the prevention of plant disease by quarantine methods, there are other principles which are more fundamental and upon which depends the success of such measues. These pinciples represent the scientific phase of plant pathology and are concerned primarily with the habits and life histories of the parasites. It is obvious that unless this information is at hand it must be obtained before adequate control measures can be devised. In other words we must know the symptoms of the disease in all its phases, its life history, its host plants and other facts before we can hope to deal most successfully with its control. This means that the various state plant pathologists must be in close communication with each other and with the govenment pathologists, and that they are willing to pass along the information gleaned from their researches as rapidly as such information is obtained and reliable. This question has been brought before the American Phytopathological Society and its members are heartily agreed as to the wisdom of such a procedure and already steps have been taken to carry out this plan. We now feel that the state pathologists are in a positon to give careful information regarding the prevention and control of diseases to the officers who have in direct charge the powers of inspection and regulation.

The Federal Plant Quarantine Act.

The increasing necessity for some radical action by the United States Government in order to prevent the further introduction of plant parasites, resulted in the passage by Congress of the Simmons Bill which became the Plant Quarantine Act, August 20, 1912. This act (10) provides for a system of inspection and regulation of plant importations into this country by the issuance of permits to importers, foreign certificates to exporters from other countries and inspection in the country exporting the plants as well as inspection at the point of destination by state officials. If such permits and inspections are lacking the custom officer refuses to admit the goods to entry. In the instance of special cases arising the prohibition of domestic interstate trade may be effected. Parcel post shipments are specially provided for.

For the violation of this law a fine not exceeding five hundred dollars or imprisonment not exceeding one year, or both may be imposed. Permits may be cancelled and further permits refused to the offenders.

For the enforcement of this Act, the Secretary of Agriculture appointed a Federal Horticultural Board of five members from the Bureau of Entomology, Bureau of Plant In-

dustry and the Forest Service. This board is assisted by a corps of trained experts for the inspection duties.

The results of this Act are evidently bound to be far reaching. Not only do we feel that the future imporation of plant parasites shall be prevented but this law is apparently setting an example to the individual states which should result in adequate measures being taken by the several states to prevent the inter-state exchange of plant diseases.

State Quarantine Laws.

So far as we have records the colony Massachusetts was the first to pass in 1755 what was virtually quarantine law for the destruction of the barberry, a plant which harbors the alternate stage of the black rust of cereals. Her example was followed by other colonies and states for the control of the same disease.

Virginia and West Virginia have within the past two years passed laws of a similar nature with regard to the destruction of the red cedars which harbor the alternate stage of the apple rust.

Our own state in 1911 passed a law giving to the Chestnut Tree Blight Commission the power to quarantine any section of the state for the control of the Chestnut Blight and even to destroy diseased trees.

California has had since March 10, 1885 a general plant quarantine law covering nearly all crop diseases which has proved very effective, and valuable to the horticulturists of the state (11). So far as I have been able to ascertain California was the first state to put such a law into effect and she is far in advance of any ther state in respect to plant disease control.

The State of Maine has been under quarantine by the Federal Government for the past two years and the State has been very active in assisting the Federal officials to stamp out the powdery scab of potatoes within their borders as well as preventing its spread to other states. That the situation last fall looked hopeful is the concensus of opinion of those offiically connected with the work there.

Methods of Quarantine and Inspection.

Several methods may be effective and what may be effective in one state might fail in another. The most important factors to take into consideration are the diseases with which the state must contend. So much depends upon a knowledge of the habits and life histories of the parasites that the assistance and advice of a trained plant pathologis is necessary as an adjunct to the quarantine service.

For certain diseases such as plant rusts which have alternate stages as for example the pine blister rusts, (*Cronartium*

spp.) and the apple rusts (*Gymnosporangium spp.*) the destruction of the alternate hosts may be sufficint to control them. Such diseases as fire-blight (*Bacillus amylovorus*) (Burr.) de Toni) of the apple, pear and quince present a more serious problem and require not only the active cooperation of all orchardists but probaly also strict laws with penalties attached to prevent wilful neglect in destrying the cankers on the part of orchard owners.

For nursery diseases, the inspectors must be trained men familiar with the early symtoms of disease, such as spotting of the twigs, slight gall ormations on the crown and roots such as are caused by wooly aphis (*Schizoneura lanigera*) and the crown gall organism (*Bacterium tumefaciens* S. & T.). The presence of fire blight, or any other abnormal appearance which may suggest the presence of parasites should be ample evidence for failure to certify nursery stock.

State wide quarantine of any crops should be resorted to only in special cases where it is desired to stamp out serious diseases. Generally it would mean only a quarantine of the diseased districts of the state. Such a method has been working satisfactorily in connection with the Maine quarantine for powdery scab of potatoes. It should mean that certificates to the effect that the plants or plant products shipped from place to place have been inspected and are free from all diseases. Inspection of nursey stock as well as of all plants and most plant products should be made in the field during the growing season for the reason that most foliage diseases can only be detected with certainty at that time.

One annual inspection should be made in midsummer for the presence of leaf twig and stem diseases and another inspection of the trees should be made at such time as the trees may be removed for sale in order to detect collar and root diseases.

Certificates of freedom from diseases should be authorized only by the chief inspector or his deputy after the final inspection. It is probable that a certain per cent. of the trees might be affected with some of the diseases of lesser importance without a refusal of certification. In such cases however, the certificiate or permit to sell should contain a statement of the extent to which such diseases were present.

The presence of any blotch or bitter rot of apples, crown gall, the various phases of fire-blight. root rot of apple or other trees; black-knot of cherry and plum; yellows, brown rot cankers, shot-hole of peach and other stone fruits; rust, yellows, double blossom, cane blight and anthracnose of brambles should disqualify them for certification.

The Organization of Quarantine Laws

Inasmuch as the California law (H) is unique it may be of interest to review it in some of its details.

It is to be noted that there is a triple guard in California: first the state laws are enforced under the direction of the Commissioner of Horticulture at Sacramento; secondly, the county ordinances, enforced by county horticulural commissions, entirely independent of the state commissioner, the duties of which are to prevent the spread of diseases within the state; and thirdly, the Federal Plant Quarantine enforced in the Pacific Coast by State officials acting as collaborators of the Federal Horticultural Board. While these organizations lead to a very close watch being kept in the state the system seems faulty on account of the lack of coordiation. It seems probable that the same results might be obtained under one State organization in cooperation with the Federal Horticultural Board and thereby lessen considerably the expense of enforcing the law. A movement is now underway in California to centralize the work of the county commissions and the State Department of Agriculture.

Most states have laws at present which although inadequate in respect to the control of bacterial and fungous diseases, could be so revised or amended as to include inspection service and quarantine regulations for these parasites.

Pennsylvania has had since March 31, 1905 a law (12) providing for the inspection and certification of nursery stock for San Jose scale and other insect pests. The law also provides for the inspection of nursery stock for certain orchard diseases, "such as crown-gall, black-knot or peach yellows," but appears to be limited to these above mentioned diseases. There are now within our state or in other parts of the country where they are in imminent danger of being introduced into the state, many diseases of equal or more importance than those mentioned above. Some of these have been mentioned earlier in this paper.

It would seem advisable to revise the present law and to add to the duties of the State inspectors the work of inspection for all nursery diseases. It is of course very pertinent to the situation that the inspectors be trained men, who are familiar with both the insect pests and plant diseases as they appear in the field or on specimens for shipment.

The expense of putting such an act into operation in Pennsylvania would be slight in comparison with the benefits derived.

The existence of the Federal Horticultural Board, furthermore, would assist the state greatly in carrying out its quarantine regulations for that Board notifies the inspection officials of the State of the entrance of all plants and plant products into the country and give the results of their inspection. When therefore, especial watchfulness is needed on account of threatening new diseases the state officers would be informed at once and special precautions immediately taken. It is very fortunate then that the Federal Horticultural Board

already exists and its work must be necessarily in close cooperation with that of the state.

The plant pathologist of the Pennsylvania State College and Experiment Station who is a Collaborator of the Federal Horticultural Board and who keeps a systematic record of all plant diseases reported in the State is in a position to render valuable assistance to the inspectors.

In view of the great need of thorough inspection for the control of plant diseases it is hoped that prompt action may be taken to place the work on a proper basis.

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THE VALUE OF CHEMISTRY TO HORTICULTURE.

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(Editor's Note—This paper was read by Dr. C. W. Stoddart, at the Summer Meeting held at State College.)

At first thought chemistry seems to have no connection with horticulture. The former apparently is a profession by itself, based on pure science; the latter is a profession based on the practical raising of fruits and vegetables. As a matter of fact, however, the science of chemistry is intimately connected with the art of horticulture, as it is with every other phase of agriculture. To consider the various ways in which chemistry can be applied to horticulture, the latter subject can be considered in respect to the soil which supports plants; to fertilizers which feed plants; and to spray materials which protect plants.

The soil serves not only as a physical home for the plant but also as a source of food to the plant. It is a storehouse of reserve food material and it is also a factory for the production of available plant food. And at this point possibly it would be well to say a word about plant food. It is claimed, and rightly from the scientific point of view, that the mineral compounds which the plant absorbs are not actual foods, but that they help the plant manufacture its food, and also supply the raw material for foods. So far as the grower of plants is concerned, however, soluble mineral substances and fertilizers are plant foods, for they are the only forms of food materials which can be supplied to the plant from the outside, and for our purpose at least it is sufficiently correct to call them plant foods.

The agents in the soil which render soluble and available the various necessary compounds are oxygen from the air, water, and carbon dioxide from decomposing organic matter. It has been customary from time immemorial to cultivate the soil, to plow under or spade under the residues of plants, or to plow under whole crops as in green-manuring, and to apply barnyard manure. It has been customary to desire moisture in the soil. In former times the only way to get it when there

was an insufficient amount was to wait for it, now we have the Skinner system of irrigation, and other means of adding water to the soil when necessary. All of these processes seem natural and are carried on without question. But can not even these obvious methods be improved in quality, be applied much more intelligently, and be undertaken with much more interest if the man who does the work has some knowledge of the actual causes of the benefits derived? Cultivation adds more oxygen to the soil, which oxygen in turn helps to decompose minerals and organic matter. By the decomposition of organic matter supplied from crop residues and manure, carbon dioxide is evolved. Water which goes to the soil by natural or artificial means, is used directly by the plant, but in addition by holding carbon dioxide and other compounds in solution, it attacks minerals and dissolves the valuable salts of pottassium, phosphorus, calcium, and other elements.

Sometimes a soil is worn out and can not supply enough food for crops. Sometimes a soil does not contain enough of one particular food for special crops. At other times a soil may not supply enough food for very large crops, and in this day of intensive farming this fact is of importance. As a result of this lack of food it is customary to add fertilizers, and fortunately it is only necesasry to supply those compounds which contain nitrogen, phosphorus, potassium, and calcium —at least that is the extent of our present knowledge. It is easy enough to follow directions and apply a 1-6-4 fertilizer or a 4-8-10 fertilizer, or what not, and it is possible to obtain paying crops in return, but it is not always necessary to blindly follow empirical formulae. A man can, to a certain extent, use his own judgment if he has had experience and a knowledge of the chemical effect of these food elements on the growth of crops. For example, the function of nitrogen is to stimulate the vegetative growth of plants. It gives large succulent leaves and stems,—just what is wanted in such crops as celery, lettuce, spinach, and cabbage. On the other hand, too much nitrogen makes a plant weak-stemmed and renders it less resistant to plant diseases. While large quantities of nitrogen are desirable for leaf and stem crops, large quantities are highly undesirable for grain crops, causing lodging and delaying markedly the development of seeds. The function of phosphorus is to promote the development of seeds. It offsets the undesirable effects of extensive amounts of nitrogen. The function of potassium is to aid in the development and transportation of carbohydrates in plants, being especially important for potatoes which contain starch, beets which contain sugar, and fleshy fruits which are also largely composed of starch and sugar. The function of calcium is to help in the movement of carbohydrate material within the plant and to neutralize poisonous acids. These are the principal functions of the elements mentioned. Each one has its role to play and

undoubtedly each serves some further purpose than we have any present knowledge of.

In addition, a man who is mixing his own fertilizer should know something of the effect one compound has on another—for example, ammonium sulphate should never be mixed with basic slag because there is a loss of ammonia. It is a knowledge of chemical principles which prevents this loss. Moreover, the effect of individual fertilizing compounds on the soil should be known. Sodium nitrate has a tendency to neutralize soil acids because of the way the compounds breaks up in the soil and the way in which the nitrogen is absorbed by the plant. On the other hand, ammonium sulphate makes soils acid.

In this connection a word about the use of barnyard manure is important. Its function is to supply organic matter to the soil. to supply bactreia to the soil, to supply plant food to the soil. The benefits to be derived are improvement to the physical condition of the soil both as regards texture, moisture-holding capacity, and temperature, besides the addition of fertilizing material which it contains. Chemistry gives us a knowledge of the way in which manure decomposes, how fertilizing material may be lost, how it is possible to retain the fertilizing constituents; why it is desirable to compost manure for some purposes, and why under other conditions it is better to use fresh manure. Chemistry tells us that manure itself is an unbalanced fertilizer, being a highly nitrogenous material, and for that reason its excessive use supplies a soil with more nitrogen than is good for crops or at least with more nitrogen than is economical. For we learn that (to put it in round numbers) it is a 2-1-2 fertilizer whereas, if I mistake not, one of your basic fertiliers is a 4-8-10 combination.

A knowledge of compounds employed in the various spray materials is of help in the preparation of insecticides and fungicides for the orchard or garden. A knowledge of the decomposition of coumpounds, the influence of water and carbon dioxide on various spray materials will help to solve and remedy burning difficulties. For instance, in the case of Bordeaux Mixture it is free copper sulphate which causes leaf burning and this is produced from even a well-made Bordeaux by the action of water and carbon dioxide of the air under certain climatic conditions. Some knowledge of reactions which may take place when two spray materials are mixed may help in the popular practice of putting together in one spray both an insecticide and a fungicide, the desire, being of course, to kill two pests with one squirt. In the use of lead arsenate it has been found by chemists that ordinary processes of manufacture may produce the acid arsenate of lead as well as the neutral arsenate of lead. Under some conditions the acid arsenate of lead is soluble, producing free arsenic acid which injuries foliage. This does not happen in the case of the neutral arsenate of lead.

Before we leave the subject of spray materials I want to say just a word about the use of hydrocyanic acid. Apparently this is an insecticide which is exceedingly valuable in the treatment of certain pests and being used quite commonly, considerable carelessness is apt to arise in the handling of it. It is produced, as you know, by adding potassium cyanide to sulphuric acid and the volatile hydrocyanic acid gas penetrates to the various recesses of the room or building in which it is evolved. Now, hydrocyanic acid, or prussic acid, is one of the most powerful poisons known to man. It takes but a grain and a half of the liquid to kill a man. Although the acid is a liquid, it volatizes very readily at ordinary temperatures and very small quantities of the vapor will overcome and kill human beings. It must be remembered that the use of hydrocyanic acid is attended with great danger unless special precautions are taken. Great care should be exercised in producing the gas, in providing a way out of the greenhouse after the cyanide is added to the sulphuric acid, and in thorough ventilation before the room or greenhouse is entered after the fumigation is accomplished.

To get the best results from agricultural chemistry there are needed horticulturists with a knowledge of chemistry, not chemists with a smattering of horticulture. There are needed men who are familiar with the practical side of raising vegetables and fruits and also have a good thorough understanding of the principles of chemistry as applied to plants, soils, and fertilizers. There is need today for more knowledge of the effect of the different fertilizing constituents on the growth of crops. We need more accurate data as to the influences of various amounts of nitrogen, for example, in raising our stem and leaf vegetables. We already know how to feed animals intelligently; a balanced ration for animals is properly applied on every well regulated farm, but do we ever pay much attention to a properly balanced ration for plants? It is true we have empirical fomulae for fertilizers, but we have no definite scientific knowledge as to the value of these formulae. Pennsylvania State College has for animal husbandry, Dr. Armsby who has developed the science of animal nutrition, but what is needed for horticulture is a Dr. Armsby who will develop the scientific feeding of plants. This is not an easy matter. A respiration calorimeter is used for plants, but it has not been developed to any great extent. I do not even know that it is altogether feasible in this connection, but I am very strongly of the opinion that it is possible to increase our knowledge of plant feeding and thereby be able to apply fertilizers more economically, to produce larger and better crops.

Agricultural Chemistry may be a profession by itself, but its greatest value to the gardener and fruit grower lies in the aid it can give him in the intelligent solution of his problems. Agricultural Chemistry is only one of the many cogs in the machine of efficient Horticulture.

Vegetable Section

A separate program was carried on during the day sessons by the Vegetable Growers, the evening sessions being held jointly with the Fruit Growers.

PRINCIPLES AND PRACTICE OF PLANT BREEDING.

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(This address was delivered with lantern slides.)

Every organ is the result of two forces, environment and heredity. By environment is meant that which has to do do with immediate surrounding of the individual as soil, air and water, and by heredity is meant those factors which determine the specific nature of the individual in question.

Each of the factors mentioned are of primary importance to the complete development of every individual. They are independent, and the highest degree of perfection is seldom reached unless they work in harmony.

In the past most of our efforts have been directed to the improvement of plants and animals by changing and improving their environment, and the work has not been done without a considerable degree of success. However, improvements which arise because of superior environment are of short duration, and are usually accompanied by considerable expense, while improvements due to heredity, though possibly expensive, are usually more or less permanent. Thus we may increase the yield of our corn or wheat crop several bushels per acre by the application of a fertilizer rich in available plant food but the result will be for the year only, while if the increased yield be due to a superior strain of seed which produces a larger crop because of heredity, the high yielding character will be transmitted from one crop to another through succeeding years.

It is probable that more systematic attention has been devoted to the improvement of plants since the year nineteen hundred than was done in all the previouus history of the world. Doubtless the greatest impetus to the work was the rediscovery of Mendel's law of which we shall speak in more detail later. Much interest has been aroused in the subject of plant breeding thru the work of Luther Burbank until at the present time his name is a common household word. The

work of Burbank has served to bring the subject before the general public. Unfortunately, however, due to the efforts of over-zealous journalists, many persons have been led to consider his work as magic, or else that he was running opposition to the Creater, and that his "creations" were of economic importance to an extent scarcely within the bounds of the most fertile imagination. As a matter of fact it is nothing of the kind. Practically all of the results obtained by Burbank or others, when carefully scrutinized are relatively simple and conform quite closely to well known principles. Much of the success of Burbank is due to the fact that he works with immense numbers. It is possible that some of you have heard of some of the beautiful varieties of lilies he has developed, but doubtless you have not heard of half a million plants only fifty where retained for further propagation, the others being destroyed. Likewise many of the positive results in plant breeding, about which the public hears so much, have been obtained only after an immense amount of painstaking work about which the public hears nothing. The practice of reporting only one side of the story has led many persons to become interested in plant breeding, later to give it up in disgust, when they found that their efforts were not crowned with immediate success.

Variations in an inherent fact of all organisms. No two individuals are exactly alike. Thus the passerby looking at a field of wheat may say that the plants are all alike, but the careful observer will find that while in most instances there is a general resemblance between the plants, yet no two are exactly alike, and at infrequent intervals a plant may be found which is distinctly different from any of its neighbors. We thus have two kinds of variation, *continuous*, that in which they occur but rarely such as would be illustrated by the distinctive wheat plant. By some this last type of variation is designated as *sports* or *mutations*. The fact that variations occur makes improvement possible: however, the manner and extent to which they occur is of fundamental interest to the plant breeder, and to a large degree is dependent on the method of reproduction.

All plants are reproduced by one of two methods. In one, the *sexual method*, the plant goes through the seed stage previous to which the flower or blossom performs an important function. It is this type of reproduction which is most common in the general farm and garden crops with the exception of potatoes. In the *asexuel method*, of reproduction, the characters are transmitted from one individual and generation to another by parts separated from the parent plant as in the case of grafting fruit trees or in potatoes when tubers are used.

The plants which are reproduced by the sexual method are further sub-divided into those which are self-fertilizered and cross fertilized. In the first class the same blossom contains

the essential male and female organs, and are so constructed that fertilization with foreign pollen is almost or entirely impossible as is the case of the wheat plant. In the second class the plant bears two kinds of blossoms, male and female as in the case of the squash or the respective blossoms as regards sex are born on separate plants, as may be observed with respect to asparagus. Again the plant blossoms may contain both the male and the female organs but the construction is such that fertilization with other blossoms is essential to seed development as is the case with cabbage. Wherever foreign pollen is essential to the development of seed the plant is said to be cross fertilized, of which the examples cited are typical. It will readily be appreciated that variation will be much greater in individuals which are reproduced sexually than those which are reproduced asexually. This may be illustrated by the Baldwin apple which was found as a chance seedling in Eastern Massachusetts in 1742, and which has since been propagated by budding and grafting until the number of Baldwin trees doubtless runs into the millions, yet the general Baldwin characters are present whether the tree be grown near its ancestral home or hundreds of miles away. It is true that there will be some slight variation due to local environmental conditions but in general the Baldwin characteristics predominate. Likewise in the case of plants which are self-fertilized as wheat, the variation is relatively slight, and once having selected a superior strain or plant which is superior because of heredity, no further attention need be given to maintaining its purity. On the other hand, plants which are cross fertilized as corn or cabbage produce marked variations in succeeding generations because of the mixture of other plants each of which has a different parentage.

With the foregoing facts in mind it is evident that when undertaking the improvement of any crop one of the first points to receive consideration is that of the nature by which variations arise, and the extent to which they may be utilized to secure the end desired. Obviously plants which are reproduced asexually are less variable than are those in which the sexual method is involved. Therefore, once having discovered a promising variation, it may be rapidly multiplied in many instances by division of the parent plant as was the case with the Baldwin apple, the Concord grape and the Seckel pear, each of which originated as a sport or mutation and were later progagated. The same may be said with respect to the Gano and the Northern Spy which was discovered as a chance seedling more than one hundred years ago. Also the Roxbury russet and Johnathan, each of which have added materially to the apple industry of the country. Sometimes a branch of a tree differs materially from the general type of the parent tree and thus arises a new variety as is said to have been the case with respect to the Gano and Black Ben Davis, each of which are said to have originated as bud sports from the well known Ben

Davis. Also the Red Gravenstine originated as a bud sport from the regular Gravenstine.

Plants which are self-fertilized are quite satisfactory material with which to work in the attempt to produce improved varieties or strains. By isolating and propagating the chance variations, commonly called sports or mutations, new or improved sorts may be developed. It is this method of plant improvement which has given to the world the Fultz wheat. This variety was first discovered as a plant possessing striking pecularities in a field of Lancaster red by Abram Fultz of Mifflin County, Pennsylania, in 1862. The plant was saved and from these selected heads was developed the Fultz which at one time was quite popular. The same method was involved in the development of the variety Gold Coin, which was found as a sport in a field of Hybrid Mediterranean by Ira W. Green of New York, who by five years of selection and propagation increased the yield about ten per cent.

In the field of the vegetable gardener considerable improvement has been made by the selection and propagation of chance sports. It is said that many of the varieties of tomatoes originated by the Livingston Seed Company were found as variations in their fields of well known varieties which were being grown for seed. Likewise the variety Enormous was found as a variation in a field of Stone by Mr. Meese of Lancaster, Ohio. Again the Earliana is the result of competition on the part of truckers living in the vicinity of Sweedsboro. New Jersey, who tried to excel each other in getting on the market with the first early fruits. At State College we have made some progress along this line of selecting for earliness and yield, at the same time taking into consideration the general character of the fruit. The result of this work with Earliana is shown in the following table. It will be seen that with respect to both earliness and productiveeness we have made considerable improvement when compared with the commercial seed used as a check, and which in this case was the best obtainable as was shown by our previous strain tests.

Average Test of Earliana.

REC. NO.	AV. WT. OF FRT.	YIELD PER A TO SEPT. 2.	YIELD PER A TO SEPT. 12.	CORRECTED YIELD PER ACRE	PERCENT MARKED
Check[2]	.28 lb.	9.73 T.[1]	11.04 T.	11.43 T.	83
Check	.18	9.03	13.03	15.75	88
1-[3]	.25	12.09[2]	13.49	14.55	88
1-12[2]	.21	11.17	13.71	14.37	93
1-12-12	.16	9.02	13.32	15.23	90
3-	.22[3]	12.94[2]	15.03	16.75	87
3-18	.20[2]	11.75	15.48	16.21	91
3-18-26	.17	7.83	12.83	16.87	95
No. 3	.20	7.37	11.66	15.25	95
4-	.27[2]	12.65	11.99	12.93	86
4-15	.21[2]	9.63	11.72	14.40	92

4-15-17	.20	8.78	12.24	14.60	96
40-a	.24[3]	8.91[2]	9.92	11.89	85
40a-15	.22[2]	9.22	12.11	14.21	89
40a-15-4	.19	7.68	11.88	13.65	97

The Department of Agronomy has been conducting some experiments with wheat with respect to selection to improve the strain as may be seen by the next table.

Comparison of Parent Varieties of Wheat With Best Selection

Pa. Exp. Sta.

	Av. Yield 1913-14
Reliable	33.1 Bu.
" Selection 19-09 — b	37.6 "
" " 38-09 —	38.8 "
Dawson's Golden Chaff	37.1 "
D. G. G. Selection 25-08	44.0 "
" " 120-09	45.5 "
Fulcaster	30.1 "
" Selection 44-9	40.2 "
" " 50-09	36.5 "
" " 63-09	35.8 "

From the above table it will be seen that the selection of Fulcaster has given an increase over the parent of nineteen percent, while the other selections have yielded slightly less.

Potatoes are a desirable crop with which to engage in plant improvement. The method usually employed is generally known as Tuber Unit. In it the tubers are cut in four pieces as nearly uniform as possible and planted one piece to a hill, each four hills being designated as a unit. At harvesting time the yield of the respective four hills are thrown together and the result compared with that of other units. In an experiment of this kind now in progress by the Department of Agronomy, there has been an average increase of 45 per cent. for the best five selections grown the past season, as may be seen from the following table.

Gain from Tuber Selections of Potatoes. Twenty Selections from two hundred and seventy-four selected tubers in 1912.

	1913	1914
	Ten hill plats	Rows sixty-two feet
Yield of parent variety	10.3 lbs.	91.8 bu. per A.
Av. Yield of selections	14.5	118.7
Average gain	42%	27%
Highest gain	103.4%	47.4%
Average gain of the best five in 1914	60.2%	44.3%

Pa. Exp. Sta.

Plants which are cross fertilized are usually very difficult material with which to work. From the fact that two individuals are concerned in fertilization and seed formation, and that the same has been the case indefinitely, it is easy to see that the individual plant is really a collection of the characteristics of many plants to a greater or less degree. The difficulty of controlling pollination is not a small one, and this having been accomplished frequently with pollen of the kind desired, and in case fertilization does take place the plant may or may not show the desired combinations. It is true that in some cases of cross breeding, we get a blending of the characters of the respective parents, while in others only one parent shows its influence on the progeny.

It was not until 1900 that anything definite was generally known concerning the method by which certain characters are inherited. At that time the work of Gregor Mendel an Augustinian monk was rediscovered. He did this work with peas and reported it to a society in 1865 but it attracted little or no attention at the time and was almost forgotten until 1900 when it was rediscovered. Mendel as a result of his careful work, which extended over a period of eight years, showed how peas possessing certain distinct characterics when crossed will produce in their progeny certain characters with mathematical accuracy. His work has done much to place the science of breeding on a firm basis, as well as to stimulate interest in the subject so that to-day we have Mendelian characters and ratios for both the animal and every gradation from snails and mice to man, including both the animal and the vegetable kingdoms. The work is fascinating and its results will ultimately be of inestimable value since to a large extent it makes possible the conducting of breeding work with a considerable degree of mathematical certainty.

Another fertile field of plant breeding is that of breeding for disease resistance. For example, it is estimated that the leaf blight of the potato diminishes the value of the crop more than $36,000,000 annually. Associated with this is the indirect expense due to preventive measures as for machines, fungicides and labor. Again it not infrequently happens that the disease reaches such proportions that it becomes necessary to abandon the industry as was the case with respect to the rust on asparagus. It was introduced into this country in 1896 and in a few years had spread from the Atlantic to the Pacific, in many localities completely destroying the industry. Sprays of various kinds were tried but without positive effect and many growers gave up in despair. A few growers more observant than their neighbors, noticed that sometimes a plant would be found in the infected field free from the disease. These were later isolated and through the cooperation of the Bureau of Plant Industry of the Department of Agriculture, have been used as the basis of developing resistant strains.

This work has been effective to an extent almost beyond the expectations of the most optimistic.

The history of the grape industry here and abroad is rich in inspiration for the plant breeder. Early settlers attempted to introduce European varieties but almost invariably they were overcome by either the phylloxera, which attacked the roots or the mildew on the leaves. The native varieties had become immune to these parasites but they were generally undersirable from the standpoint of the horticulturist. In some way, however, these pests were introduced into France and threatened to destroy the wine growing industry because of the ready susceptibility of the European varieties, and it was not until someone discovered the possibility of grafting the European varieties on American roots that the inqury due to the phylloxera was overcome. It was also found practicable to hybridize with the resistant American varieties and thus successfully combat the downy mildew. Thus was the grape growing industry in both Europe and America first placed on a firm basis.

Within recent years the truckers of Wisconsin have suffered great loss from the attacks of a disease known as the "yellows" on their cabbage. Spraying is impracticable, but with the aid of the scientists of the Agricultural Experiment Station they have succeeded in developing an immune strain. Sometimes plants are found which are resistant to disease but are not desirable from other standpoints, but they may be used for hybridizing and their disease resistant properties transmitted to the progeny where it is sometimes possible to combine it with other desirable characters. This was done by Biffen an English plant breeder when working on rust resistant wheat. At State College, we have in progress an experiment with cabbage in which we are attempting to produce a disease resistant strain of Danish Ballhead by combining it with a rather inferior variety, but which is resistant to disease.

In conclusion we may say that plant breeding will not have reached it fullest development until the general farmer and gardner as well as the scientists become interested in the work. In the past much of the work of economic value which has been done has been carried on by persons other than professional scientists. Riley the Indiana farmer who bred the Boone County white corn, was an ordinary farmer and not a scientific experimenter, yet the one variety he developed is today being grown extensively over a dozen corn states and has added thousands and thousands of dollars to the corn crop of the world.

Much has been said and written concerning the tendency of boys and girls to leave the farm. Let them become interested in plant improvement, the boys in field and orchard crops and the girls in vegetables and flowers and the difficulty will largely be overcome. At the present time probably no

field of human activity offers greater opportunity for interesting work and reward than does the field of plant breeding. The surface has scarcely been skimmed, and when pursued with intelligence and energy, success is almost sure to follow.

FERTILIZING THE VEGETABLE GARDEN.

Maximum yields are seldom secured in the home garden. The vegetables produced are often not of the high quality desired for the home table nor of the attractive appearance required by the city market. Ordinarily little judgment is used in treating the soil of the garden. Too often manure is depended on entirely; often it is applied in excessive amounts; in other cases organic mstter is not supplied but commercial fertilizer is used alone; while not infrequently serious injury may result from the excessive use of ashes, salt, lime and refuse products of many kinds. Certainly there is great opportunity to secure, through more intelligent fertilization, larger yields of the varioua crops, and at the same time have them more attractive in appearance and more appetizing when served.

There are certain basic principles in the fertiliztion of truck crops that are well established. These differ materially from those for the general farm crops. The general farmer has to deal almost entirely with quantity, while the gardener or even the trucker, not only considers yield, but also earliness, appearance and quality. His soil must be so treated that it contains in available form at all times during the growing season the right amounts of plant food to produce rapid growth, for this is one great essential in the production of early vegetables of high quality. The system of cropping is intesive: the returns justify expensive soil treatment. Ordinarily liberal amounts of the various plant foods can be supplied in the form of manure and complete commercial fertilizers. The producer of such general farm crops as corn, oats, wheat and grass, on the other hand, must depend on utilizing the plant food already in the soil when found in sufficient amounts, rather than purchasing an additional supply in the form of complete fertilizer. Consequently a chemical soil analysis may be of great importance in connection with the economic production of general farm crops, but of little real value in vegetable gardening. The vegetable garden should receive liberal fertilization irrespective of the soil composition. This fertilization should supply for the various vegetables plant food for maximum yields of first class quality. While it is essential that plant food be supplied in amounts to give the maximum rate of growth, it is possible to cause serious inqury by excessive applications of various materials to the soil. Many garden soils, once very productive, are today unproductive though not "worn out." While the true nature of this

unproductive condition isnot entirely understood in all cases, it is known that it results from improper soil treatment. The examination of samples of many of these unproductive soils reveals the fact that they universally have a high organic content, contain large amounts of wood or coal ashes, are carbonaceous in character, and not infrequently contain excessive amounts of soluble salts. Such soils are often spoken of as being "toxic," in a condition "unsanitary for plant growth," or as causing "malnutrition," of the plant. There may be various causes of the unprouctiveness, but it can be prevented by intelligent crop rotation and systematic manuring and fertilization.

It is much more difficult to remedy this condition than to prevent its occurrence. Certainly there are few better examples of the old adage, "an ounce of prevention is worth a pound of cure," than an unproductive garden soil. First, of course, the cause or causes should be located and removed. The indications are that in a great majority of cases excessive amounts of such materials as ashes, lime, garbage or other refuse have been applied. Coal ashes should never be applied to garden soils, and wood ashes only in moderate amounts, not over one and one-half pounds per square yard for vegetables. In using wood ashes the tendency has been to apply too large amounts. A green manure crop is desirable in vegetable gardening and should prove of material value in restoring productivity. Crimson clover or a mixture of rye and vetch are excellent crops for this purpose. In case of greenhouse soils, sterilization is frequently practiced. When the trouble is of a biological nature that is, caused by the accumulation of injurious vacteria or protozoa-sterilization is beneficial. Where large amounts of soluble salts or of carbonates have accumulated, underdrainage is advisable. The removal of any crust that may form on the surface in dry weather will aid in reducing the excess of soluble salts. Unproductiveness may, of course, be due to the lack of plant food or even to the unbalanced proportion of the different foods in the soil. Intelligent soil treatment will prevent the garden becoming unproductive —special treatment for the case in queston is necessary to reclaim productiveness.

In the fertilization of garden soils, there are three main points to be considered. In the first place, lime should be used in sufficient quantities to prevent the soil becoming acid. Secondly, animal or green crop manures must be liberally applied in order to maintain the high content of organic matter so essential for the various vegetables. Then, lastly, plant food in the form of commercial fertilizer should be used in amounts and of the composition known to be suited to the different classes of vegetables.

Practically all the commercial vegetables are benefited by conservative liming; excessive liming may injure many of them. Cranberries and watermelons grow best in acid soils.

Strawberries ordinarily respond very little to lime and it is a well known fact that potato scab develops most rapidly when a soil is well supplied with lime. On the other hand, it is especially beneficial to such crops as lettuce and spinach. Any of the common agricultural forms of lime can be used for gardens. The initial rate of application will depend on the acidity of the soil; while after the acidity is once corrected, the application every three years of 1000 pounds of burnt lie, 1500 pounds of hydrated lime, or 2000 pounds of ground limestone per acre is recommended. These acre applications are equivalent to 1, 1½ and 2 pounds respectively per five square yards.

Stable manure is so universally used in the fertilization of vegetable gardens that it is commonly considered the one essential material that must be applied. Certainly, it gives results that can seldom be secured permanently by other materials. It not only furnishes plant food in a readily available form, but it also adds organic matter to the soil, which benefits the physical condition and at the same time carries with it large numbers of beneficial bacteria. While manure is a complete fertilizer, containing, as it does, nitrogen, phoshoric acid and potash; it is not a well balanced one for the average soil, or for many crops. The average fresh mixed manures contain approximately ten pounds of potash per ton. Manure from the cities is composed almost entirely of horse manure which contains less water and consequently more plant food than mixed cow and horse manure. It is called dry manure, and decomposes very rapidly. Unless carefully handled, there is apt to be considerable loss because of overheating. Manure is deficient in phosphoric acid. It is primarily a nitrogenous fertilizer and can easily be used in too large amounts for such crops as potatoes, causing them to "go to top." Fresh manure in particular, hinders the desired development of root crops such as beets, radishes, turnips, carrots, parships and salsify. It is commonly considered that well rotted manure is more desirable for most of the garden vegetables. Manuring should always be accompanied by liberal fertilization with phosphoric acid and potash. Continued excessive applications may bring about undesirable biological conditions in the soil with resulting injury to our vegetables. A safe application for ordinary soils is 20 to 25 tons per acre. This is equivalent to one ton for approximately 2100 to 1700 square feet. The initial application may be twice this amount. Satifactory results will accompany lighter applications when commercial fertilizers are used liberally.

The large commercial truckers are gradually replacing stable manure with green crop manures. The practicability of this will depend on the cost of manure applied to the soil, compared to the cost of producing and turning under green mnaure in sufficient amounts to give equivalent results. In case of the small home garden where the space is limited, ma-

nure will ordinarily be found to be the cheapest source of organic matter. Still there is a chance in practically every garden for a winter cover crop. Crimson clover, or rye and vetch are excellent for this purpose and will aid materially in maintaining soil conditions congenial to the vegetable crops.

In considering the fertilization of the vegetables, we must keep in mind the fact that there are three distinct classes of crops represented the root and tuber crops, the legume crops, and the non-legumes other than root and tuber crops. The fertilizer manufacturers commonly do not distinguish between these classes, but put out fertilizer brands claimed to be equally adapted to all truck or garden crops. The average composition of a large number of brands of truck and vegetable mixtures on the market in 1914 shows 2% of nitrogen, 7.3% of phosphoric acid and 7.2% of potash. The nitrogen content varies in the different mixtures from ½ to 3½% nitrogen, the phosphoric acid from 5 to 8% and the potash from 4 to 15%. Still these various mixtures were claimed to be especially compounded for vegetable crops in general. For the best results the character of the individual crop must be considered. The composition and amount of fertilizer applied will also depend somewhat on previous treatment of the soil as well as on the accompanying application of green or stable manure.

The rate of application will vary with conditions, but it is safe to apply as much as 3000 pounds per acre and advisable to use at least 1500 to 2000 pounds. An application of one pound per square yard is equivalent to approximately 1000 pounds per acre. It is safe to apply fertilizer in the row up to about 1000 pounds per acre, but when heavier applications are used, at least in excess of 1000 pounds, the fertilizer should be broadcasted and thoroughly mixed with the surface soil.

For the root crops relatively large amounts of potash should be used. The nitrogen content should be not over 4% the phosphoric acid from 8 to 12% and the potash 8 to 10%. A 4-8½-10 mixture is well suited for this class of vegetables. It can be secured by mixing the following materials:

Nitrate of soda	200 lbs.
Dried blood	300 lbs.
Acid phosphate (16%)	1100 lbs.
Muriate or sulphate of potash	400 lbs.
Total	2000 lbs.

For the legume crops peas, beans and peanuts a mixture containing 2% nitrogen, 11 to 12% phosphoric acid, and 6 to 8% potash is suggested. This can be secured as follows:

Nitrate of soda	250 lbs.
Acid phosphate (16%)	1400 lbs.

Muriate of potash	350 lbs.
Total	2000 lbs.

For the remainder of the common vegetables found in the home garden a mixture containing 4 to 6% nitrogen, 8 to 10% phosphoric acid, and 6 to 8% potash, is most admirably adapted. This can be secured as follows:

Nitrate of soda	250 lbs.
Dried blood	400 lbs.
Acid phosphate (16%)	1000 lbs.
Muriate, or sulphate of potash	350 lbs.
Total	2000 lbs.

In all the recommended mixtures it is assumed that little or no manure is being used. When manure is applied the nitrogen content of the fertilizer should be cut down and the phosphoric acid increased proportionately. For such crops as lettuce, cabbage, celery, and the like, where crispness is especially desired, one or two top dressings of nitrate of soda to the growing crop is desirable. The rate of application should be very light—from 100 to 200 pounds per acre.

The student gardens at The Pennsylvania State College furnish an example of a systematic and standard fertilization that is giving excellent results. A similar treatment could well be more universally used in vegetable production. The treatment consists first of an application of 10 to 15 tons of partly rotted stable manure broadcasted and plowed under. The furrows are edgedup so the manure is not left in a continuous mat under the seed bed to interfere with the free movement of the soil moisture. After the first harrowing 1700 pounds of fertilizer consisting of 350 pounds of nitrate of soda, 1000 pounds of 16% acid phosphate, and 350 pounds of muriate of potash, is applied broadcast per acre and thoroughly mixed with the surface soil by several subsequent harrowings. This is approximately equal to a ton application of a mixture analyzing 3-8-10. A top dressing of nitrate of soda 100 to 200 pounds per acre is frequently applied to such crops as lettuce, spinach, cabbage, cauliflower and celery, but this is at the option of the individual student. These gardens are intercropped with rye and vetch. With such treatment excellent results are obtained the yields are larger, the quality excellent, and the appearance satisfactory for the most exacting market. This treatment is conservative, it tends towards soil improvement, and there is absolutely no danger of the development of soil conditions unfavorable for vegetable production. This method of treatment is universally applicable. If every home garden could be similarly treated, soon we would no longer hear of the "unproductive garden soils."

Mr. Starkey: "Experience in the use of Stable Manure."

For more than a generation Stable Manure has been the main source of Plant food and supply of humus, on our farms. Since the price of stable manure has become so high, the quality so poor, and the supply so limited, we have been compelled to find a substitute.

Our present system is to plow under a green crop at least once in three years, use plenty of lime at least every third year and supply the plant food by use of commercial fertilizers, some of which we mix ourselves. Do not understand me that we do not use stable manure at all, for we do use quite large amounts on some crops.

Mr. Starkey: "Experience in use of lime for radishes."

Before we began using lime on our land, which is a heavy clay loam, radishes were very uncertain; very often they would become black and wormy. Since we have been using large quantities of carbonate of lime, which has been three years, we have never had a failure with radishes. Mr. Evans: We have always treated radishes as we would cabbage or turnips and have found lime beneficial. We have grown radishes between cabbage for a number of years and limed heavily, and always had good crops.

CELERY AND OTHER MUCKLAND CROPS.

D. W. HULL, *Waymart, Pa.*

I have been asked to talk on Celery and other Muckland Crops, and as celery is our most important crop, I will give our methods with that first.

We grow the Golden Self Blanching almost entirely, as we find that this pays us much the best, and we try to get the very best strain of French grown seed that we can find. As this French seed has been quite scarce and high in price for the last few years, we have made it a practice to buy our seed as soon as possible, even before the catalogs for the year were out, so as to be sure and get French seed of the type that we have succeeded best with. To guard against possible loss by fire, the seed is kept in our safe until sown. We want to experiment with a little of the best American grown seed that we can find this season, with the hope of finding something as good as the French. We begin sowing this seed in green houses the first of March, making successive sowings there until the first of April perhaps. Muck makes the nicest greenhouse soil, although we have used a mixture of loam, sand, fine cinders, muck, and manure, with very good success for plant growing. We have grown good plants in both benches and beds, although now we are using beds, which we believe are proferable. This soil is fertilized with about ½lb.

of bone meal, and ¼lb. of wood ashes per sq. ft., worked separately through the soil. The beds are then leveled off very thoroughly, so that in watering we can get the moisture to soak into the ground evenly, and not leave the slightly higher spots to dry out. This is pressed down sufficiently, yet with the aim of leaving the surface slightly roughened, so the seed may more easily push through. The beds are then very thoroughly soaked with water, putting on all they will hold.

Seed is generally sown broadcast, although we sometimes sow in rows 3 inches apart, aiming to thin to about ½ inch apart in these rows. We try to have about 100 plants to the sq. ft., but are pretty apt to leave them thicker than this. The seed is covered by sifting nearly an eighth of an inch of fine soil over the beds. This is done by having a small, fine meshed sieve on a 3 ft. handle. The beds then are sprinkled a little very gently, so as to moisten the soil screened on the beds without washing the seeds.

Calico curtains are then stretched over the beds, so that the sun cannot shine on any part of the soil and dry the seed up. This curtain is placed about 18 inches above the surface, or perhaps more.

We like to have it far enough above the beds so the warm air can get under the curtains nicely, and then we can water without sliding the shade off. These are watched very carefully, and every spot that is drying out is gently watered. The plants should begin to appear in about two weeks, more or less, depending on the heat, etc.

These are weeded and thinned as soon as large enough, and the soil is kept stirred around them, but not deeply. We usually spray in the greenhouse a few times, using about a 3-3-50 strength of Bordeaux. As soon as the plants are 4 inches high they are clipped, and then clipped again once or twice before setting. By this method, there is no transplanting in the greenhouse, but just the one setting as they go into the field. The the seed is sometimes sown more thickly, and as soon as the seedings are large enough to handle, we set in rows 3 inches apart, with plants about ½ inch apart. When the plants are well set, we like this method as well as the other, but we usually use the broadcast, thinning method.

The soil on the reclaimed swamp where we grow our celery is usually plowed in the fall, unless it should be too wet. And every three or four years, we plan to use about one ton of burned lime per acre there, much preferring to put this on in the fall, so it will take the acidity out of the soil, and not out of the acid phosphate that we put on in the spring.

In the spring, this muck is thoroughly disked with a cutaway, then 5600 lbs. of 14% acid phosphate is spread over the ground, two men using shovels and spreading from a stoneboat. This is well disked in, and then 1400 lbs. of muriate of potash is sown on the ground, and worked in with a planker. The amounts of fertilizer mentioned are for one acre, as 8 tons

of acid phosphate, 2 tons of muriate of potash, and about 2½ tons of nitrate of soda, are used each year on our three acre celery plot. We know that this is more fertilizer than is usually used for celery, but we have found by our experience that this amount has given us a more profitable crop than a lesser amount has. Right here I might say that we are in partnership with a neighbor in growing celery on his muck about 2 miles from ours, and last season he used only about a quarter of the amount of the same materials that we used and a good crop was produced amounting to $3,500.00 from three acres. I do not understand just why this plot yields so well with so much less fertilizer than we use on our own plot. It is drained deeper than ours, and of course this would enable the roots to work through more soil, and probably use up the fertility much more closely. While I am speaking of yields, I might say that our three acres has produced over $1,000.00 worth of celery per acre each year from 1907 to 1911, inclusive, or to be more exact, an average of $1,081.33 per acre. Since then we have irrigated, using a Skinner overhead system, and in 1912, our three acres yielded $3,780.00 worth of celery, and in 1913, $3,900.00.

1914 was nearly a complete failure on our plot, as we had only $900.00 worth of celery there. It started off in the most promising shape, but the hail and excessively wet weather last July was too much for it. Our ground is verv hard to drain as deeply as we would like to because of the outlet, but this last fall, we widened the ditches some, and used this extra soil to raise the cultivated portions somewhat, and also improved the slope, so we believe we can withstand a wet spell again without nearly so much loss.

Going back to preparing the ground for the plants, after planking in the muriate we are ready to irrigate until the soil is in fine shape for setting the plants. We weigh the planker down just about right, so we can press the plants in well, without pushing them below the surface. We press them in enough so a leaf will tear off before the plant will pull up. A light marker is run along a garden line, so that the rows will be straight and parallel, and 2½ ft. apart for the first and last settings, and 3 ft. for the other. As we begin blanching the first before it gets fully grown, the narrower distance does for this, and the later, that goes into the storehouse to blanch can be 2½ ft. apart also. The other gets large enough to about reach across the 3 ft. rows, and if the rows were closer, we could not get the boards in well to blanch them.

We set plants about 5 inches apart in the row, and are very careful not to let any soil get over the heart. If a shower should cover some a little, we go over them and uncover. After setting, a light irrigating is given, so the plants hardly know that they are set.

In about a week after setting, we begin putting nitrate of soda on in the dissolved form. We dissolve it when the

plants are small, because we want the nitrate to feed and not shock them.

A little to much nitrate applied at a time would stop the growth for a while, or until the plants could get over the shock. And the dissolved nitrate is weaker than the dry form would be. It is dissolved by suspending sacks in tubs of water, and each gallon holding about two pounds of nitrate in solution. This is put within reach of the tiny root system by using a sprinkling can that has an extra long spout soldered on it, the rose nozzle taken off and a wooden plug inserted, which has about a $\frac{3}{16}$ hole bored in the center. By using this after a little careful practice, the solution can be placed over the roots on one side, without getting it on the leaves.

After two or three applications of the dissolved nitrate, we begin putting it on in the dry form, smashing it up very fine while the plants are small. We apply nitrate every week increasing application as the plants grow using about 1600 lbs. per acre since irrigating, although we have used 2000 lbs. per acre before. The dissolved nitrate is also applied to plants in the greenhouse, but we dilute much more there, and sprinkle it over them. Perhaps we use ¼ lbs. per gallon there.

We aim to keep the soil well stirred around the plants in the field, using horse cultivators if the soil is dry enough so that a horse does not need mud-shoes, and wheel-hoes at other times, also hoes and long handled diggers. As soon as the first planting is 15 inches high, we begin blanching, using about 10 inch boards at first, but as soon as the celery is larger, we use the 12 inch boards. These are held together by hooks made of No. 9 *unannealed* wire, using longer noes as the celery gets larger. We always hoe a little dirt against the bottom of the boards so that no light can get under. We try to blanch very thoroughly, and we generally paint new boards a dark color so they will not reflect light, and so blanch more quickly and thoroughly. We trim this celery very thoroughly, because we find that our customers had rather have only the white, well-blanched stalks left on. These are washed in clean spring water, and tied in round bunches of about three plants each. We make the bunches uniform in size, putting in more or less stalks to do this. So a great many bunches of our best yields have been two stalks each, and at times one stalk goes as a bunch with a string tied around the top. For tying the bunches we use red tape with our name and address printed on it. We pack in strawberry crates, and sell right from the wagon to grocers in two or three nearby towns, and express to others just beyond these.

We get $1.20 per doz. or 10 cents per bunch, and if we wish to vary the price with the season, we reduce or enlarge the size of the bunch, as the case may be, but the price remains the same.

As soon as the weather is too cold for blanching outside, we store in a double-walled, concrete store-house. This is 50

by 150 ft. and has a moist dirt floor. It was too wet at first, because of small springs, so we had to use 400 or 500 feet of sewer pipe with patches of small stone buried under this floor to get it about right. We set the celery up on this soil as straight as possible and close enough together so it will not fall over, yet with as much space between the plants for air circulation as we can. It is quite an art to pack in storage well, and careful work pays wonderfully here. This celery-house has the roof ceiled under the rafters, and this 8-inch space is packed with hay or straw. The gable ends are double, and the north one is packed. Two sets of double ventilators are in the ends up close under the roof. These are 12 feet long and 20 inches wide. An opening a foot wide on one side of the peak the whole length of the roof, is covered with a series of double doors, one set opening inside and the other outside, as on the ends.

The 16 double sash windows are opened by sliding horizontally, one sash each way, both on the inside of house and on the outside. Both doors are large enough for a term and wagon to drive through, and are double walled. These open by raising up, having balance boxes to hold them. A stove in here helps hold the temperature during continued zero weather, also tempers the water for washing in cold weather.

This celery-house cost about $2,700.00. Our irrigating rig cost about $775.00. We use a gasoline engine, 4 or 5 h. p., and pump into the irrigating lines direct from the spring which normally flows about 10 gallons of water per minute, and has a reservoir holding about 8000 gallons. A steam type of safety valve lets extra water back into the spring, if not enough nozzle lines are opened to take the flow from the pump, which is a 5x5 inch double acting type. We generally irrigate with 30 to 40 pounds pressure. We also have 100 feet of 2 inch pipe connected to a race coming from a creek above to use when the spring is insufficient. This pipe is above ground, excepting where it goes under roads, and like all the irrigating pipes, is drained at the lowest points, so it will not freeze in winter.

We might say that in 1902, we sold $3,780.00 worth of celery from our three acres, and we found that about 60% of this was expense. About $1.550.00 was used for team work and labor, (including the work of my brother and myself at foreman rates), and about $365.00 for fertilizer, $200 or more for expressage, $100 or more for shipping packages, and less than $10 for gasoline for the engine and lighting, besides a few other incidentals.

Last season, with fairly good success, we grew some lettuce, bunch onions, early peas, beets, carrots, turnips, radishes, etc., on the muck where we expected to set the later plantings. We were so well satisfied with the plan that we will try it again this year, modifying it somewhat. Lettuce is a crop that we are having quite a demand for, so we will push this more.

We are now growing lettuce, also a few bunch onions and radishes on muck in the greenhouse, and we believe it is the very best soil there. We mix some manure in the bottom of the beds, but are not sure that we need to with this muck. We fertilize for lettuce the same as for celery plants under glass, applying the fertilizer before we set each crop. We grow Grand Rapids almost entirely, and set 7x7 inches apart and tie in bunches of one to three plants, depending on the age, and sell at stores at 60 cents per dozen. We fumigate with tobacco stems twice a week to control the aphies, and are very careful about watering after the plants are large unless it is sunny. We fill the beds full of water before the plants are set and use a little nitrate in the dry form around the plants.

Mr. Comly: Have you tried the double row system of planting celery?

Mr. Hull: Very little. We do not like it because we could not shut the light out of this double row in blanching, and it pays us to blanch well. Even for storage blanching, we believe we can grow more weight by giving a little more room.

Mr. Comly: Have you ever been troubled with the mold on celery in the trench during January and February?

Mr. Hull: We never store in trenches, and the bulk of our celery is all sold by first of December. Golden Self Blanching is the hardest celery to keep in storage, and we often lose more or less, but by packing well, and ventilating all we can, we reduce this loss.

Mr. Starkey: What causes pithy celery?

Mr. Hull: Poor seed will sometimes, and then unfavorable growing conditions will too. Since we get good Golden Self Blanching seed, we have less than $\frac{1}{5}$ of 1% pithy. Other sorts are more apt to be pithy with us.

Mr. Hale: When do you begin blaching celery?

Mr. Hull: About two months after the time the plants are set into the field, or soon after the 4th of July.

Mr. Hale: Are you troubled with frosts in the spring?

Mr. Hull: Yes, sometimes we have to re-set several times. We find that if the plants have had time to get rooted, an ordinary frost will not hurt them much. We would not set just before we think it will be cold enough to freeze. We have used our irrigating system to ward off the injury of frosts, but it is not of much help, because one or two of us cannot keep the water going over all of the plants often enough. Perhaps if we had the handles all connected together, or partly so, we could provide better protection, but such a scheme would not work well as we would have to disconnect for irrigating, because each plot is different, and needs watering differently.

Questions: How is your muckland drained?

Mr. Hull: By open ditches. We would not dare risk tile on our muck, because during a wet time, our horses might displace them, even with mud-shoes on. We can keep open

ditches clear much better than we could tile. Tile might be alright for a better drained muck.

Mr. Garrahan: When do you plant the early crop in the field?

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Mr. Garrahan: Does it pay to spray celery for blight?

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Seed selection is now attracting more attention than anything else about potato growing. Its value has been proven

by very accurate experiments, extending over several years at a number of experiment stations. Many farmers have found seed selection to be one of the most profitable parts of their work. I was one of the first in the United States to use it, beginning in the fall of 1904 by digging about 300 bushels with hooks and saving the best hills. The following year this selected seed gave an increased yield and greater market value. I have found the profit from seed selection to be even more from the increased sale value than from the better yield. The cost is very small, consequently the net profit above cost is large in proportion.

We are always on the lookout for some new variety which should displace those we now have as these in their time drove out the Burbank and Early Rose, themselves successors to now forgotten varieties. Many thousands of new seedlings have been and are constantly being tried out. From these a list of less than a dozen varieties can be made which are superior to all the rest. The chance against getting a new seedling variety better than those we have is in the same proportion of thousands to one.

We have always thought of a potato variety as something unchangeable, though with also the belief that sooner or later it must "run out." Seed selection has proved that these varieties are made up of many separate strains differing more more or less, with further variation going on most of the time. From these variations within a variety we can select and keep up a strain having the particular qualities most suited to the needs of any grower in the same way that we now select the variety most suited to our conditions. It is now believed that unless a variety is grown under unfavorable climatic or other conditions that it will keep its vigor indefinitely. One has been grown in Sweden over one hundred and fifty years. Conditions in the United States are often poor. In their original home in South America the growing season is long, wet and cool.

The tubers were small and but little drain on the strength of the plant. Out of the many thousands of varieties produced we have kept for our use only those that produce very heavy crops of tubers in one half or one third of the time required by the original potato plant. In connection with our hot and dry cliamte this throws a very severe strain on the vitality of the potato. It is not strange that some plants break down and produce tubers nearly worthless for seed. In northern Europe the great ocean current called the Gulf Stream makes the climate much more favorable to the potato. Yet differences in vigor are seen even there as tests between seed from the north and south of Great Britain show. In our south the summer heat is so great that potatoes maturing at that time are nearly worthless for seed. When planted in the same section so as to mature in the cold weather of fall good seed results, the so-called "second-crop" seed. Even as far north

as Ottawa, hot and dry weather in 1906-7-8 ruined the varieties grown there. I believe that growers should study every possible means of maintaining vitality of potatoes in the hot and dry seasons. Not only is the crop reduced at a time when prices are highest but the seed is injured for following years.

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Many experiments show that when the tubers of any hill are used as seed each has a strong tendency to resemble the parent hill in all its qualities. Every potato grower is conciously or unconciously changing his varieties, either for better or worse. A number of methods of choosing seed potatoes are in use. Having never seen any comparison of the merits and defects of more than two or three together I will try to present a fair discussion of the whole subject.

The Use of Small Seed.

By carefully digging a field of potatoes it will be seen that a few of the poorest hills produce a larger proportion of the small tubers. The best hills produce mainly large ones. Diseased hills are almost certain to have a light yield and the tubers mainly small. I have selected hills for seed for 11 years, always choosing the best yielding. Now I get less than 2% of small ones in good seasons, even though the hills are planted only a foot apart to produce the medium sized stock demanded by city markets. I do not feel that the reduction of the small tubers until there are not enough to plant the next year's crop is a serious objection. Farmers use small seed because it is cheap. While it is possible that the increased yield from the use of large seed might not pay the extra cost, the use of small seed year after year increases the proportion of weak and diseased hills, the yield diminishes, and the variety is said to be "run out." Many scientific experiments have almost always shown better yields from large than from small seed when sorted in the usual way. The Geneva Station has made a test in which care was taken to have the large and small tubers taken from the same hills in order that in the inherited vigor might be equal. Under these conditions the small seed was at least as good as large pieces of equal weight. While an exceptionally bad season might produce many weakened hills with small tubers small seed may be considered safe if taken from a stock from which the weak hills are kept eliminated by some method of seed selection.

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This plan would be of immense value if we were certain just what points in the appearance of a tuber were reliable indications of its value as seed. The Uncle Sam variety varies all the way from smooth flat-oval shape to a longer and rougher type, the vine, flower, etc., being the same. I once selected the hills which were smooth, discarding those longer and rougher. The yields compared to other varieties declined so rapidly that it was apparent that the poor looking hills were the ones that had given the yield. With the Rural this same smooth type is found in the best hills and is the best seed. Tubers longer and narrower than the usual type of any variety are to be regarded with suspicion in most years, especially if the eyes are longer than usual and clustered closely around the seed end. Prof. C. L. Fitch in Iowa Extension Bulletin No. 20 states that "Flatness and relative shortness are the result of healthy growth and signs of strength. One exception I have noticed is that in seasons like 1909 and 1912 when a lone drough was followed by plenty of rain after the tubers had reached their usual shape, I have seen all the best hills in a field have tubers longer than the usual variety type. Where seed selection was not practiced by neighbors the enlargement took the shape of knots or prongs. The poorer hills died earlier and their tubers were of the usual variety type. When these best hills were used as seed the following seasons the shape went back to normal. Prof. Wm. Stuart of the National Department of Agriculture states that shape is often affected by the nature of the soil and by cultural methods as well as by the season. So for the present we are not warranted in depending too much on any rigid type as a means of selecting the best seed potatoes. Any one making a tuber-unit test will be greatly surprised at the variation between different units although the seed tubers may have been as nearly exactly alike as it was possible to select from the bin. The large tops are often believed to indicate a large yield.

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injured by the heat. I have found them in blue-sprout, white-sprout and Irish Cobbler varieties. Usually each hill has a small number of very large potatoes which are coarse, deep-eyed and often hollow. As these are almost unsalable in large cities this is another objection to saving hills with large tops.

Blight Resistance.

A few years ago there was a demand for blight resistant potatoes. Sometimes these late growing hills were saved on that account. One of the best potato bulletins we have, Ohio No. 218 by Prof. F. H. Ballou states that "Experiments coupled with many observations suggest that little is gained by selecting parent hills because of superior individual yields. It is the actual work done within the hill that should most interest the potato breeder. The later growing hills simply demonstrate that there develops, through natural plant variations, these tardy, deliberate, slow-maturing strains which we should not mistake for strains of special disease resistance."

At the Vermont Station hundreds of varieties have been tested for blight resistance. Few showed much, and these were commercially useless from other defects in yield, shape, etc.

Selection on the Basis of a Particluar Number of Salable Tubers.

Practical growers know how the number set in each hill varies with each. In 1914 the set in my field was small, and the tubers large. In 1905 there were too many in the hill and the crop ran small. In 1910 one field had a small set and another planted with the same seed the same day but with a light sandy soil set nearly twice as many to the hill.

Early Removal of Weak and Diseased Hills.

Most potato diseases reduce the yield of the affected hills. Removing hills with fusarium wilt, black-leg, leaf-roll, curly-dwarf, etc. leaves a healthy seed stock which will give a better yield the next year than if the diseased hills are left. Particularly is this true where small seed is planted, as diseased hills produce many small potatoes. Some of these diseases also infect the soil and attack potatoes for years after. This digging must be done before the healthy tops die. Work is usually not pressing at his time. The extra expense is small as these hills would have to be dug and picked up later anyway.

The Tuber-Unit Method.

Good sized tubers of as near the same size as possible, are selected from the bin. These are quartered lengthwise and planted in adjoining hills. When dug all are piled together. This method has an advantage over any other in that one can

begin in the spring and have clear proof of seed transmission of plant characters the same season. This method of quartering all seed is objectionable after the first year because of different strains varying greatly in size. The quarters from the strains which have only a few large tubers to the hill will give a better start to their plants than those from the strains with a larger number of medium sized tubers to the hill. As these large potatoes are worth less per bushel this method increases the proportion of poorer yielding and less valuable potatoes. There is also considerable labor and trouble in keeping units separate. Other objections are that some growers are liable to pay more atttention to getting a particular tuber type and to large vines than to yield and sale value.

Digging by Hand and Saving the Best Hills.

This is especially adapted to the immense proportions of our crop dug by hand. Where machine diggers are used the seed should be dug before the crop is ripe enough to dig without bruising by the machine, unless late blight is known to be in the field. In that case the seed may be dug later on days when the ground is too sticky from rain to use the machine. It is certain in Europe and probable in this country that immature seed yields better than that allowed to become fully ripe. The only extra expense over ordinary hand digging is a little care in keeping hills separate and that of going over the rows and picking up the best hills first. While some may be better because of a better chance on fertile spots it is very unlikely that any seed will have the same luck two years in succession. So the second year will throw out all except those that yield well because of their inherited vigor. Farmers can be persuaded to use this method because it involves less change from their present methods than any other. As the number of hills worked with is limited only by the size of the field the chance of finding the very best strains is increaed.

Hill-Unit or Hill-Row System.

Planting a short piece of row from the produce of each hill or larger unit is the most accurate method for scientific work and for farmers who have the time for caring for several hundred strains. Field methods of cutting seed must be used as the results are more reliable for farmers' use than where the tuber-unit method of quartering is used. With any strain the pieces must be of equal average weight or the tests are worthless. From each strain a similar amount, say one bushel to the short row should be saved for comparison. The whole of the produce of the best strains should be saved to produce seed for the main field crop.

Practical Points.

Before beginning seed selection a grower should first make sure that he has the type and variety most suited to his cli-

mate, soil and markets. Eastern city markets pay the highest prices for flat round, oblong white potatoes of medium size and of good cooking quality, smooth, without disease and free from second growth shown by knots and cracks. Red varieties may be sold in summer. While others may do well in some seasons the Rural type of blue-sprout varieties do best from New England to Minnesota, including most of New York and Pennsylvania. The Green Mountain or white-sprout type is best in the cooler climate of Maine and northern New York, and does well further south in cool and wet seasons. Burbank is raised on the Pacific coast and the Pearl under irrigation in Colorado. Irish Cobbler, Bliss Triumph, Green Mountain and other varieties are raised in the north to be sold in the south for seed.

It is neccessary to test new varieties at least two years because of variation between seasons and because they have been kept under different storage conditions. The seed selection can be begun with all the first year and all but the best variety discarded.

Any score-card of points may be used in the selection of a type, variety of strain according to the wishes of the grower. With most of us net profit is the thing to be most considered. This may be produced in different ways. For early markets extreme earliness pays better than high yield on account of high prices. Quality and white color are also less important than with the late main crop varieties. Freedom from disease must always be considered unless like scab it can be prevented by disinfection. High yield, good appearance and table quality are almost always the largest factor in securing the greatest net profit.

Beginners should use spring scales until their eyes are trained to judge the weight of hills with fair accuracy. At first a hill with a few large tubers will appear to the eye to be heavier than one with a larger number of the medium sized tubers that sell better. Large size is a bad defect for city trade. There is some danger in trying to work against the usual type of a variety as I found in trying to select a smooth type of the Uncle Sam at the cost of reducing yield. Shape may be affected by the season, character of soil and culture methods. Small tubers may be expected in any hill. Some varieties like the Irish Cobbler normally have a numerous second setting, at last with me. Weight of salable tubers should be the determining factor, disregarding small ones unless there should be many more than usual. Any mixture of varieties should be thrown out. One Variety is the best for any one set of conditions and only that on should be kept.

I never saved any poor hills to test until 1912. That year the low yielding row averaged only 70 Bu. per A. against 350 for the adjoining rows treated exactly the same. In 1913 the low yielders averaged 150 against 290 for the normal. This was not a fair test as the low yielders were mature when a

frost September 14 killed the others while in full growth. In 1915 the yields were 74 and 334 bu. per A. In some seasons low yielding strains may be told by a longer and more pointed shape than normal.

I dig about one acre out of 17 each fall with hooks, either before the rest are ripe enough to dig with a digger or days too wet to use a machine. Each hill is kept separate. Next I go over the row myself and select 5 to 20% of the best hills. This is the hardest part and requries the best judgment. These selected hills are planted the next year in a seed plot on the best part of the field. If necessary extra care should be given. The soil should be one holding water well for times of drouth, the time when seed vitality may be injured. Early in the fall and before the tops on the healthy vines die a hook should be used to remove all weak, early dying or diseased hills. This year I found only 4 bushels of such on 5 acres yielding 1810 bushels. Small tubers from such a plot are as good as large ones but there are not very many.

Owing to the different parts of a field varying greatly in yield is better to take a percentage of the best hills rather than to use a rigid standard of weight over the whole field. This percentage should be higher in the good parts than where potatoes are poorer because of possible injury to the vigor of seed from poor parts of the field. In case conditions are so poor that degeneration takes place it would be best to save only from the best part. Seed selection cannot prevent loss of vigor, but it can quickly eliminate the damaged strains unless the injury is so severe that all are affected.

Scientists are not agreed as to whether the yield of a particular strain can be increased by annually selecting the best hills. It is regarded as certain that the average yield of a variety can be increased by finding and multiplying the best strains within the variety. As a farmer I am well satisfied that this can be done with profit by using some of the methods here given. The cost is so small that every hour spent is well repaid. I believe that I have received greater returns from the time used in seed selection than in any other thing done on the farm.

STATE ORGANIZATION FOR VEGETABLE GROWERS.

PROF. PAUL WORK, *Ithaca, N. Y.*

The usefulness of organization as a means by which individuals may more successfully and more efficiently accomplish desired ends is now generally recognized. We have business partnerships and corporations, societies of physicians, lawyers, and clergymen, unions of masons, locomotive engineers,

and deck hands, building and loan associations, co-operative stores, and inumerable others. For more or less clear-cut reasons the farmer is among the last to recognize this usefulness, nor has the vegetable man been a leader in such movements as have arisen. Now that men are banding themselves together more closely in associations of many sorts and for many purposes, it would seem evident that the producers of vegetables should be taking full advantage of this means for their own advancement, perhaps it may not be out of place to pause and view the subject as a whole, considering the functions, problems, and possibilities of organizations for vegetable men.

The societies of vegetable men in the United States should be thoroughly co-ordinated with each other. At the top of the pyramid is the Vegetable Growers' Association of America. As at present constituted it holds a meeting each year and is attended by individual growers from most sections of the country although the South and West are not fully represented. As this body develps it will probably become so large as to become unwieldly and will perhaps become a delegate body as the state and local associations increase in numbers and strength.

Every state should follow in the lead of Ontario, New York, Connecticut. and Pennsylvania, in forming a central body, and each local producting center should be well organized.

Let us devote our consideration primarily to the development of the state bodies, their activities and methods of work. The suggestions are based on experience in the organization of the New York Association and on observations of others. They are not advanced as representing a well worked out scheme of development which is approaching its final form, but merely as notes which by chance may be of service to others.

The variation in local conditions is so wide, the interests of the different states are so diverse, and our experience in this type of work has been so brief, that very marked changes in activities and methods are bound to develop.

The first requirement for any organization is a clear-cut aim or objcet. Without such no real service may be performed and no substantial support may be enlisted. The object may be stated in very concise and general terms as is the case in the New York Association:

"The object of this Association shall be to organize and federate the interets of those engaged in vegetable growing to the end that larger crops of constantly improving quality may be grown and marketed with increased profit."

But this is not enough. It must be definitely indicated in just what ways the association expects to contribute toward the realization of its aim. This raises the whole subject of activities of state associations. In general a newly formed body should not attempt too much. It is better to start in a

small way and and gradually extend than to take a flying start and record a failure. Such disasters injure very seriously the chances of a state's enjoying the advantages of co-operative effort and they postpone sometimes for years the development of the movement in the state and in the local neighborhoods as well.

The activities of state organizations may be divided into three classes, educational, supervisory, and business. The first class is distinctly the most important because ideas and knowledge lie beneath all progress. The first work of an association whether national, state, or local, should be the holding of meetings. A central national association should offer a program which will represent the best thought and the best practice of the time in matters of production, as well as the best of consevative enthusiasm and dynamic inspiration, marketing method, and business relations. The round table idea is becoming more and more popular from year to year and will so continue as men become more experienced in asking and answering questions. For such sessions a skilled leader is necessary to draw out the ideas of those present and to so direct the discussion that it shall comprehend the various phases of the subject and yet avoid aimless rambling.

A single national meeting, even though it last for several days, could hardly be expected to meet the requirements of our larger states with their thousands of vegetable men. It is much cheaper and easier to take speakers to the growers than to bring growers to the speakers In other words, there should be local sessions of the state organization or at least the state society should aid the local groups in securing the best men for their own meetings. The New York State Vegetable Growers' Association has just this winter begun holding sectional sessions, three having taken place before the date of going to press. All have been well attended and the interest shown has been such as to assure the success of the plan.

The development of local meetings does not mean that the annual State meetings should be neglected, for the state-wide interchange of ideas and the visiting of producing districts are both very necessary, to say nothing of the deliberative duties which could not be handled otherwise.

One of the best features of all meetings is the opportunity for the advancement of mutual acquaintanceship and the inspiration and enthusiasm which go with them. These are fostered by the round table discussions and by mingling in conversation in the meeting hall, hotels and eating places.

Luncheon should always be arranged in connection with one day meetings, in cities, at a near-by restaurant, and in small towns the ladies of a church are usually glad of an opportunity to serve a dinner. Head-quarters for meetings of more than one day should always be established in some hotel. The lobby is as important as the meeting hall.

Not everyone can attend the meetings of an organization

and even so those who are not practiced in note taking find themseles on arrival at home without many of the concrete points which they wished to remember. Thus a report recording the papers and the discussions, which should be taken by a stenographer, should always appear. It should be edited and boiled down, disregarding irrelevent and useless material but preserving the points that are important on both sides of all questions. The report has been one of the most popular features of the New York association.

The educational work of the state organization may be carried forward in other ways. Lists of books and bulletins may be prepared and members may be assisted in procuring bulletins of other states. Subscription to periodicals of known merit may be encouraged.

The local societies of the state should be offered every possible encouragement and assistance toward strong activity of their own. Such a body is invaluable in permitting a closer acquaintanceship, a freeer interchange of ideas, a fuller confidence in one another. and a hearty co-operation in both business and educational affairs. A sectional group can undertake many enterpises that would be inadviseable for a state society. In fact, most actual business transactions of buying and selling are better handled on a local basis and in the light of local needs and conditions.

This brings us to a consideration of the relations of the state association to business matters. As just suggested, the wide difference in local conditions and requirements render it desirable that the state body leave such matters chiefly to the local groups. Co-operative enterprises should begin at the bottom as to territory covered as well as in complexity of activity. Even when the usefulness and feasibility of any central selling organization formed to serve many locals becomes evident, it may well be established independently of any body of the type which we are considering. The former is similar to a great publicly owned wholesale house, while the latter is more of an educative and deliberative institution.

This does not mean, however, that the state association should leave all business activities out of consideration. It should be a powerful factor in the advancement of the co-operative idea. Its committees should gather information as to methods and should assist the local people in carrying forward their plans. In a word, the state society should be a powerful ally for the business enterprises.

Experience shows that an activity which can afford direct financial advantage is of great usefulness in building up the membership of an association. The Ontario and New York societies have found the seed service very helpful, not only for its own value but for the reason just suggested.

The gathering, compiling and distributing of crop and market reports is properly a national function. It should probably be handled by the government to be of the highest service. Nevertheless, the absence of satisfactory information would seem to make the establishement of a report service desirable. If such work is undertaken the reports should be regularly secured from members and by exchange from growers in other states. The development of this work brings forward the question of the establishment of a periodical sheet for the distribution of the reports and for other communications to members. The Wisconsin Horticultural Society maintains such a paper and finds it of great value.

Nation-wide advertising of Jersey cattle, of Sunkist Oranges. Florida grape-fruits, and Skookum apples have proved exceedingly profitable. A state society might well engage space in the important periodicals and by constantly changing copy give wide publicity to the merits of the various products as they come into season.

Under the head of supervisory activities might be included the influencing of legislation, assistance in the guidance of college and experiment station activities into the most useful channel a (co-operation which is by the way most acceptable to the institutions), the taking of concerted action for the improvement of transportation conditions, the improvement of state and local exhibition conditions. In all of these directions wide-awake committees will find no end of opportunity for most useful activity, accomplishing things which would be utterly impossible for individuals. Results are frequently attained much more easily than anticipated. For instance, the New York Society found the State Fair Commission more than willing to meet them in every proposal for the betterment of the exhibits at Syracuse. The premium list was doubled and the superintendency of the exhibit was turned over to one of the members of the Association.

Perhaps a word might be said regarding the methods of organizing of state societies and conducting their affairs. The first necessity is for strong, energetic, unselfish and broad-minded leaders, of the type to inspire confidence, coupled with this requirement is the need for men of ability and willingness to carry on the various activities of the organization. Most of the work should be done by committees and it should be subdivided (logically not piecemeal,) in such a way as to burden none. A member who is assigned a task and works at it is worth vastly more to the society than an inactive one, not only for for what he does but for his enthusiasm and spirit. Possible committees are as follows: Transporation, Co-operation, Finance, Marketing, Legislation, Investigation, Crop Reports, Seed Service, Exhibition, Local Societies and others to meet special needs.

The business of an association should center in the Executive Committee consisting of the officers and a few other members. Each member of this committee should be the chairman of one of these important sub-committees, thus cen-

tralizing the organization in the interests of unity and efficiency.

The constitution of an association ought to be simple and brief. It should provide proper safe-guards for the interests of the members. At the same time it should not place useless and hampering limitations upon the officers.

Finance always offers very serious difficulties, and more frequently than otherwise is the factor which limits a society in the development of its work. The membership fee should not be made too low. A man who is really interested will be about as willing to pay $2 as $1 and this gives the association just twice the resources. The solution of the financial problem lies in the building up of a large membership. After the enrollment has attained to several hundred, the problem becomes much less difficult because the work more nearly carries itself. Programs are often printed by means of advertisements. In some cases state aid is available although some societies have found that they get along better without such aid because it usually involves limitations as to the way in which the funds shall be used and may involve more or less undesirable political activity.

In conclusion it may not be out of place to outline the general method by which the New York Association has been able to establish itself and bring about a slow but steady increase in its numerical strength and in its activity. The first suggestion of a state association came from a group of growers who were attending the Toledo meeting of the Vegetable Growers' Association of America. Some of them wondered why such an association might not just as well be held in New York State each year. Taking up this suggestion the Department of Horticulture of Cornell University wrote to a considerable number of leading growers in different districts of New York. The replies were favorable and these same men were asked to sign a call for a meeting which was held in February of 1911. The agricultural and daily papers of the state were freely used in making known the progress of the movement and their co-operation has been exceedingly helpful. The membership has been increased largely through direct correspondence with men who should be interested and through the efforts of present members. At the time of the 1915 meeting the demand for activities had gotten far beyond the ability of the funds derived from membership fees to carry them forward, and it became apparent that the organization must either stand still in its work or greatly increase its membership. A committee entirely distinct from the Executive Committee volunteered to enlist strength in a very practical form. Memebers of the Association were asked to agree either to secure two new members or to stand for the $4 of their fees. Thirty or forty per cent. of the members signed this agreement and a vigorous campaign is being conducted through other channels with the same object in view. The results are

thus far most gratifying, though hardly to be classed as spectacular. The Association is now very widely known through New York by means of its members, through the programs which are mailed to a list of some eleven or twelve thousand growers, and through small cards and folders which have been printed in fairly large numbers. The Association is looking for a continuance of this substantial growth and expects shortly to find its work on a much sounder basis than it has been at any time in its history.

ABSTRACTS FROM ROUND TABLE ON VEGETABLE FORCING.

Conducted by R. L. WATTS.

Question: Does vegetable forcing offer good business possibilities in Pennsylvania?

Answer: There are many towns and small cities in Pennsylvania where vegetable forcing should prove profitable. It is important to locate near a good local market. Shipping facilities to larger towns are also an important factor.

Question: Is Southern competition a real barrier to the development of vegetable forcing in Pennsylvania?

Answer: I do not think so. The field grown Southern crops are inferior in quality to Northern greenhouse vegetables. The fact is that many growers in some of the most important vegetable forcing sections, such as the Ashtabula district, Cleveland, Irondequoit, and other sections, are producing and selling immense quantities of vegetables in competition with southern-grown crops. We are able to obtain larger prices for the greenhouse vegetables and we know how to produce them more economically than we did a few years ago.

Question: What is meant by the term "malnutrition" as applied to vegetable gardening?

Answer: Malnutrition diseases are likely to appear in soils which have received large applications of commercial fertilizers over a long term of years. For example, in the Norfolk district it is not unusual for land to receive an annual application of 3000 pounds of commercial fertilizer. When this amount of fertilizer is used year after year the soil soon becomes extremely acid and a condition develops which makes it impossible for the plants to be properly nourished. In other words, many of the garden crops fail to grow satisfactorily in these extremely acid soils. The remedy is to apply a liberal amount of lime. Three or four tons of lime to the acre will probably correct the acidity in the most acid soils.

Question: Is it necessary to rotate onions?

Answer: While onions are frequently grown in the same soil every year for a long term of years, it is always safer to rotate the crop with other vegetables that are well adapted to the soil under cultivation. In the muck districts, a common rotation is lettuce, celery and onions. On sandy loam a variety of crops may be rotated with the onion. There is very much less danger of loss from thrips, maggots, smut and other pests if the crops are systematically rotated.

Question: What are the essentials in the forcing of head lettuce? The most important factors in the forcing of head lettuce are a well aerated soil, a constant and abundant supply of soil moisture, and all the available food that the plants can utilize to advantage. The first of these factors is often overlooked. In other words, growers sometimes attempt to grow head lettuce in soils which are close and compact, with the result that the crop is an entire failure. Good soil aeration may be obtained by mixing a liberal amount of sand and thoroughly decayed manure in the soil before the crop is started.

Question: What variety of tomato do you recommend for forcing in Pennsylvania?

Answer: Bonny Best is one of the leading red tomatoes. It is very prolific and produces solid fruits that run very uniform in shape. Probably no red tomato is more widely popular than Bonny Best. The Globe is a successful purple tomato which is popular in some sections. It is exceedingly prolific. The fruits, however, are larger than some markets desire.

Question: What do you think of the mulching system in greenhouses?

Answer: Mulching with fresh horse manure is a most desirable practice in the growing of tomatoes and cucumbers. A manurial mulch of 4 inches conserves moisture more perfectly than any tillage which may be given the soil. The mulch not only conserves moisture but supplies food to the plants after every application of water. It also renders tillage unnecessary and prevents weed growth in the beds.

Question: Does it pay to grow English cucumbers in our American greenhouses?

Answer: It is doubtful whether English cucumbers will pay in Pennsylvania. Most of our consumers prefer the American type, and we are also better acquainted with the methods which are employed in the growing of the White Spine and other American cucumbers.

Question: Is mint a profitable greenhouse crop?

Answer: I see no reason why mint should not prove profitable in greenhouses, provided there is a market for the crop. It is important to start with a small bed and then increase the area of mint as the demand increases.

Question: How about radishes as a greenhouse crop?

Answer: Radishes are profitable whenever they can be sold to advantage. The round, red forcing varieties are the

most popular. The rows should be about 4 inches apart and the plants thinned to 1½ to 2 inches apart in the row.

Question: Suggest a rotation suitable for vegetable forcing in Pennsylvania.

Answer: This will depend largely on the local demand for greenhouse products. A very common rotation, and one which should prove satisfactory in Pennsylvania, is to start with lettuce in the fall, beginning to cut in September. Lettuce may be grown until about the first of March, or perhaps later, when tomatoes are planted for the spring crop. Some growers prefer to grow a fall crop of tomatoes; a midwinter crop of lettuce, and cucumbers for the spring crop.

Question: Does it pay to use commercial fertilizers in the forcing of vegetables?

Answer: Fertilizers may be employed to a limited extent in greenhouse culture. As a rule, however, if the soil contains a sufficient quantity of stable manure, there will be little or no necessity for using commercial fertilizers. It is interesting to note in this connection that the most successful growers of greenhouse crops in the United States apply practically no commercial fertilizers.

Question: What do you consider an ideal soil for greenhouses?

Answer: Greenhouse soils should contain a liberal amount of vegetable fiber. This means that stable manure should be applied with freedom in the preparation of the soil. It is also desirable to use some sand, if the expense is not prohibitive. A most excellent practice is to spread 4 or 5 inches of fresh horse manure on any good land early in the fall, plow and harrow until midsummer and then make another application of manure if the soil does not seem to be sufficiently fertile. Manure can thus be worked into the soil during the entire summer and it should be in ideal condition to take to the greenhouse in the fall. Some growers prefer to spade rotten manure into beds in the greenhouse, and in some respects this is the most desirable practice. Whatever plan is used, the all important consideration is that there be no shortage of vegetable fiber in the soil.

Question: What means would you suggest to control the white fly?

Answer: The white fly may best be controlled by fumigating with hydrocyanic acid gas. This is a very deadly poison, not only to insects but to all forms of animal life. No one should attempt to use this means of control unless they are thoroughly familiar with the character of the gas and the axact strength to use.

Question: How can the green fly be controlled?

Answer: The green fly may be very readily controlled on lettuce or other greenhouse crops by fumigating with tobacco fumes. By burning tobacco stems the fumes will be very readily produced. Special fumigating cans are best to use in

this connection. If the fumigating is done regularly at intervals of a week or ten days, the green fly very rarely cause any trouble. In case it gets a foot hold, repeated fumigations on three or four successive nights will generally kill them entirely.

Question: Can tomatoes be profitably grown in the greenhouse for the Wilkes Barre market?

Answer: Tomatoes may be grown successfully in the greenhouse, but not profitably for this market.

Answer: Tomatoes have not paid me as a greenhouse crop, altho I have secured as high as 12 pounds per plant in the late spring crop. It is difficult to get merchants to handle them as they can make more money handling the Texas and Mississippi crops that are picked green and wrapped and shipped in refrigerator cars. The people here need to be educated to ask for the greenhouse crop, but this kind of work is very slow and expensive.

REPORT OF RESOLUTION COMMITTEE.

To the Officers and Members of the State Horticultural Association of Pennsylvania:—

Resolved, That the Association in the deaths of D. E. Murray, Fred Fertig, J. H. Peachy and J. G. Harrison has lost the services of four of its valued members.

Resolved, That the Association wishes to extend their most sincere thanks to the Wilkes-Barre Chamber of Commerce for their most generous accommodations for the meeting and hearty assistance in making the convention a success.

Resolved, That the legislative committee be instructed to make a careful investigation of the different legislative acts pertaining to the commission business and report with suggestions to the next annual meeting. Also that the executive committee use their influence to agitate this matter with the county organizations and allied interests.

Resolved, That while the Association is most heartily in favor of the movement to secure better roads, both main and local, they are not in sympathy with the system and management of the present Highway Department.

Resolved, That the Association most seriously recommends that in the arrangement of the State Department of Agriculture that the horticultural interests of the State be given full recognition as is justly due one of the greatest industries of the State.

Resolved, That the thanks of the Association be extended to all the officers for their faithful work and untiring efforts for the Association during the past year.

Resolved, That recognizing the value to the farmers and fruit-growers of the State Constabulary, we recommend that the Legislative Committee be requested to give their support to secure the necessary appropriation for the maintainance of the Constabulary.

Resolved, That we heartily recommend to the State Legislature liberal appropriations for the work of the State Department of Agriculture and for the Pennsylvania State College and Experiment Station.

Resolved, That the Association is heartily in favor of standard packages for the use of fruits and vegetables but that the standard be fixed by measure rather than by weight on account of the great variation in weights of different varieties of the same kind of fruit.

Signed by

C. A. GRIEST,
A. D. STRODE,
D. E. HULL,
H. B. KILMER,
W. E. GROVE,
Committee.

January 21, 1915.

FRUIT SHOW AWARDS.

Class One.

First prize, H. M. Keller, Gettysburg, Pa.
1 bbl. York Imperial.
Second Prize, H. M. Keller,
1 bbl. Stayman.

Class Three.

First Prize, H. M. Keller, 5 bbl. Stayman.
Second Prize, H. M. Keller, 5 bbl. York.

Class Four.

First Prize, C. J. Tyson, Flora Dale, Pa.
Black Twig Section.
Second Prize, Eli P. Garretson, Biglerville, Pa.
Grimes Golden Section, First Prize C. J. Tyson.
Winter Rambo Section, " " " "
Stayman Section, " " " "
Wagner Section, " " " "
Summer Rambo Section, " " " "

Class Five.

C. J. Tyson, 1 Box Fallawater, First Prize.
C. J. Tyson, 1 Box King David, Second Prize.

Class Six.

C. J. Tyson, 1 Box Stayman, 1 Summer Rambo, 1 Black Twig. First Prize.
G. E. Gay & Son, Pittston, Pa. 5 Boxes Baldwin, Second Prize.

Class Eight.

Baldwin Section,
First Prize, E. P. Garretson.
Second Prize, W. E. Schoonover, Dallas, Pa.

Ben Davis Section,
First Prize, B. F. Willson, Biglerville, Pa.
Second Prize, Boyer Bros., Biglerville, Pa.

Hubbardston Section.
First Prize, W. E. Schoonover.
Second Prize, I. H. Coursem, Wyoming, Pa.

Jonathon Section,
First Prize, B. F. Wilson, Biglerville, Pa.
Second Prize, C. J. Tyson.

King Section,
First Prize, J. B. Rice, Trucksville, Pa.
Second Prize, Fred Ellsworth, Dallas, Pa.

Grimes Golden Section,
First Prize, Eli P. Garretson.

Black Twig Section,
First Prize, E. P. Garretson.
Second Prize, E. C. Keiffer, Aspers, Pa.

Northern Spy Section,
First Prize, G. W. Agnew, Dallas, Pa.

R. I. Greening Section,
First Prize, W. E. Schoonover.
Second Prize, E. P. Garretson.

Rome Beauty Section,
First Prize, H. M. Keller.
Second Prize, I. H. Coursem.

Smokehouse Section,
First Prize, E. P. Garretson.
Second Prize, C. J. Tyson.

Summer Rambo Section,
First Prize, C. J. Tyson.
Second Prize, E. P. Garretson.

Stayman Section,
First Prize, C. J. Tyson.
Second Prize, E. P. Garretson.

York Stripe,
First Prize, George P. Myers, Aspers, Pa.
Second Prize, W. S. Adams, " "

Wagner Section,
First Prize, E. P. Garretson.
Second Prize, J. B. Rice.

Winter Banana Section,
First Prize, W. C. Schoonover.
Second Prize, " "

Class Nine.

First Prize { Baltzley, Benoni, Paradise Sweet } E. P. Garretson.

Second Prize, Fred Ellsworth, Dallas, Pa., with 1, N. Spy; 2, Walbridge; 3, Fallawater.

Class Ten.

First Prize, C. J. Tyson, with 5 plates of Stayman.
Second Prize, W. H. Agnew, with 5 plates of McIntosh.
Third Prize, H. M. Ira F. Frantz, Dallas, Pa., 5 plates Baldwin.

Class Fourteen.

First Prize, W. J. Lewis, Pittston, Pa., 24 boxes, 12 varieties.
Second Prize, E. F. Hay, Carverton, 51 plates, 10 varieties.

Class Sixteen.

Award of Merit, Adams Co., Fruit Growers' Association. Chas. A. Wolfe, Sec., Aspers, Pa.

The Show was made up of the following in exhibit form:

20 Barrels.
81 Bushels Boxes.
80¼ Bushel Trays.
336 Plates (5 Apples Each).
39 Varieties.

TREASURER'S REPORT.

DISBURSEMENTS.

1-29-14	To Publishing House of the United Evangelical Church,	$ 252 73
1-29-14	" Edwin W. Thomas,	18 12
1-29-14	" C. J. Tyson,	249 09
1-29-14	" C. J. Tyson,	187 00
1-29-14	" Pub. House Evan. Church,	18 95
1-29-14	" " " " "	270 00
1-29-14	" Times and News Pub. Co.,	11 80
1-29-14	" C. J. Tyson,	201 13
2-1-14	" A. M. Seabrook,	12 00
2-7-14	" The Gettysburg Compiler,	16 00
2-7-14	" Pub. House Evan. Church,	5 20
2-7-14	" St. Louis Button Co.,	13 50
2-7-14	" Times and News Pub. Co.,	6 00
4-17-14	" Pub. House Evan. Church,	2 17
4-17-14	" D. E. Murray,	25 00
6-17-14	" J. A. Runk,	33 46
6-17-14	" J. L. Rupert,	32 25
1-19-15	" balance, cash on hand,	65 33
		$1419 93

RECEIPTS.

	Cash balance, Jan. 19, 1914	$ 164 75
1-28-14	From C. J. Tyson, Annual Dues,	194 00
1-28-14	" Life Membership Fund,	1000 00
2-9-14	" Annual Dues,	4 00
3-1-14	" C. J. Tyson, Annual Dues,	31 00
3-1-14	" C. J. Tyson, York Show,	26 18
		$1419 93

AUDITORS' REPORT.

WILKES-BARRE, PA., January 20, 1915.

We, the undersigned have examined the above account and find the same to be correct.

C. J. TYSON,
W. J. LEWIS,
Auditors.

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END OF YEAR