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1912

PROCEEDINGS

OF THE

Fifty-third Annual Meeting

OF THE

State Horticultural Association

of Pennsylvania

HELD IN

Pittsburgh, Pa., January 16, 17, 18, 19, 1912

GABRIEL HIESTER.

Gabriel Hiester was born at "Estherton," near Harrisburg, April 28, 1850, son of Augustus I. and Catharine Cox Hiester. He died at "Estherton," his lifelong home, January 18, 1912.

He attended the Harrisburg Academy and later Pennsylvania State College whence he was graduated in Science and Agriculture. He returned to his father's grain farm with an interest and a belief in horticulture which remained with him as long as he lived. This faith in his chosen life work supported him through the planting of orchards and the ups and downs of growing garden crops. In these things he was more than commonly successful and I have heard him say "One hundred odd acres returns enough to allow us to live like other folks" which meant all of the necessities and many of the "comforts" of life.

Mr. Hiester spent much time in the interest of education. He succeeded his father as a trustee of State College in 1891 and served until his death. He was a member of the Executive Committee of the Board and one of the Advisory Committee of the School of Agriculture. In all of these duties he served most unselfishly.

He was a member of the State Board of Agriculture since 1881. He believed in Farmers' Institutes and all other forms of enlightenment for the farmer and especially in young men who were striving to make a start in horticulture. For them he had stores of good advice and encouragement.

Mr. Hiester first joined the State Horticultural Association in 1872 and his name has been constantly on the roll since 1882. Since 1885 he has represented Dauphin County on the General Fruit Committee. From 1902 to 1904 he was elected one of the vice-presidents. In 1905 and each year until his death he was elected President being elected for the eighth term on the evening before his death.

Gabriel Hiester was a man of sterling integrity, broad minded, straight-forward and fair. This is the verdict of many men with whom I have talked during his life and since his death, men associated with him in large enterprises and in small ones, buyers of his fruits and produce, employes on his farm, their tribute is the same. His calm, cool, far-seeing judgment has been of immense service to the College and to the fruit interests of Pennsylvania. Service with him in the Association has been a blessed privilege never to be forgotten.

CHESTER J. TYSON.

AN APOLOGY.

We dislike apologies most heartily but we do feel that some explanation is due for the delay in getting out this report.

A highly recommended stenographer from the Department at Washington was engaged to report the meeting. At the very last moment he failed to appear and a substitute was hurriedly secured in Pittsburgh. This substitute, a court stenographer unfamiliar with horticultural terms and expressions, occupied three whole months in transcribing the report. Repeated writing and telegraphing had no effect.

We trust you will be lenient with the shortcomings of this report.

State Horticultural Association of Pennsylvania

Officers Elected for 1912

PRESIDENT.

Gabriel Hiester, Harrisburg.

Mr. Hiester died January 18, 1912. Mr. Creasy elected to fill term.

VICE-PRESIDENTS.

Hon. Wm. T. Creasy, Catawissa; Robert M. Eldon, Aspers; F. H. Fassett, Meshoppen.

SECRETARY.

Chester J. Tyson, Flora Dale.

TREASURER.

Edwin W. Thomas, King of Prussia.

VICE-PRESIDENTS FROM COUNTY ASSOCIATIONS.

(Presidents of County Associations for current year.)

Adams, Robert M. Eldon; *Beaver*, Paulus E. Koehler; *Bucks*, John H. Washburn; *Cambria*, Abram Hostetler; *Cumberland*, H. A. Surface; *Erie*, Geo. W. Blaine; *Lackawanna*, A. B. Kilmer; *Luzerne*, W. J. Lewis; *Perry*, William Stewart; *Somerset*, D. B. Zimmerman; *Snyder*, W. W. Bruner; *Wyoming*, S. R. Brunges.

EXECUTIVE BOARD.

All the above named officers.

STANDING COMMITTEES FOR 1911.

Legislative Commitee.

William T. Creasy, Catawissa; Howard G. McGowan, Geigers Mills; Levi M. Myers, Siddonsburg.

Exhibition Committee.

Prof. W. J. Wright, *Chairman*, State College.

Ward C. Pelton, North Girard; Chas. A. Wolfe, Aspers; John B. McClelland, Canonsburg; R. H. Garrahan, Kingston.

General Fruit Committee.

John D. Herr, *Chairman*, Harrisburg.

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.
Anderson, H. W.,	Stewartstown,	York.
Atwater, Richard M.,	Chadds Ford,	Chester.
Banzhaf, W. H.,	Muncy,	Lycoming.
Barlow, Thos. W.,	Fort Washington,	Montgomery.
Blaine, Geo. W.,	North East,	Erie.
Blessing, David S.,	4 N. Court St., Harrisburg,	Dauphin.
Boltz, Peter R.,	Lebanon,	Lebanon.
Boyer, John F.,	Middleburg,	Snyder.
Brinton, Wm. P.,	Christiana,	Lancaster.
Chase, Charles T.,	Devon,	Chester.
Chase, Howard A.,	Union League, Philadelphia,	Philadelphia.
Crouse, E. A.,	Gettysburg,	Adams.
Creasy, Wm. T.,	Catawissa,	Columbia.
Cummings, Jos. F.,	Sunbury,	Northumberland.
Dill, Robert,	North East,	Erie.
Dunlap, Jas. M.,	Walnut Bottom,	Cumberland.
Eldon, Robert M.,	Aspers,	Adams.
Engle, Enos B.,	Harrisburg,	Dauphin.
Engle, Jno. G.,	Marietta,	Lancaster.
Espe, August G.,	Perrysville,	Allegheny.
Filbert, R. J.,	Fox Chase,	Philadelphia.
Fox, Cyrus, T.,	Reading,	Berks.
Freed, A. J.,	Racine,	Beaver.
Freed, W. A.,	Racine,	Beaver.
Garrettson, Eli P.,	Biglerville,	Adams.
Good, C. W.,	Waynesboro,	Franklin.
Grove, W. E.,	York Springs,	Adams.
Haddock, John C.,	Wilkes-Barre,	Luzerne.
Haverstick, Paul E.,	Lancaster,	Lancaster.
Hartman, D. L.,	Littleriver, Florida,	
Hartman, Geo. R.,	Biglerville,	Adams.
Hartman, L. E.,	Etters,	York.
Heard, R. E.,	Buffalo, N. Y.,	
Hill, Wm. D,	North East,	Erie.
Hoopes, Abner,	West Chester,	Chester.
Hostetler, Abram,	Johnstown,	Cambria.
Huff, Burrell R.,	Greensburg,	Westmoreland.
Huff, L. B.,	Greensburg,	Westmoreland.
Hull, D. W.,	Waymart,	Wayne.
Jones, J. F.,	Willow Street,	Lancaster.
Jones, S. Morris,	West Grove,	Chester.
Keller, H. M.,	Gettysburg, R. 5,	Adams.
Landis, Israel,	Lancaster,	Lancaster.
Lightner, Wm. A.,	Landisburg,	Perry.
Loop, A. I.,	North East,	Erie.
Maffet, Miss M. A.,	264 S. Franklin St., Wilkes-Barre,	Luzerne.
Martin, J. O.,	Mercersburg,	Franklin.
McClelland, John B.,	Canonsburg, R. 4,	Washington.
McCormick, James,	Harrisburg,	Dauphin.
McFarland, J. Horace,	Harrisburg,	Dauphin.
McLanahan, J. King,	Hollidaysburg,	Blair.
Meehan, S. Mendelson,	Germantown,	Philadelphia.
Mitchell, Ehrman B.,	Harrisburg,	Dauphin.
Muller, Adolph,	Norristown,	Montgomery.
Myers, Levi M.,	Siddonsburg,	York.
Negley, Henry Hillis,	600 N. Negley Ave., Pittsburgh,	Allegheny.
O'Connor, Haldeman,	13 N. Front St., Harrisburg,	Dauphin.
Pannebaker, Wm. M.,	Virgilina, Va.,	
Rankin, Chas. C.,	West Chester,	Chester.
Reist, John G.,	Mt. Joy,	Lancaster.

NAME.	POST OFFICE.	COUNTY.
Rick, John,	Reading,	Berks.
Rinehart, E. S.,	Mercersburg,	Franklin.
Roberts, Horace,	Moorestown, N. J.	
Rush, Perry M.,	Sycamore, R. 1,	Greene.
Satterthwaite, Fred'k G.,	Fallingston,	Bucks.
Shaffner, Jacob,	Harrisburg,	Dauphin.
Sharpe, Miss E. M.,	Accotink, Va.,	
Snavely, H. H.,	Willow Street,	Lancaster.
Stem, Dr. J. C.,	Lemoyne,	Cumberland.
Strausbaugh, E. F.,	Orrtanna,	Adams.
Thomas, Chas. L.,	King of Prussia,	Montgomery.
Thomas, Edwin W.,	King of Prussia,	Montgomery.
Tyson, Chester J.,	Flora Dale,	Adams.
Tyson, Edwin C.,	Flora Dale,	Adams.
Tyson, Wm. C.,	Guernsey,	Adams.
Van Deman, H. E.,	3630 13 St., N.W., Washington, D.C.	
Weaver, Abram,	Windber,	Somerset.
Wertz, D. Maurice,	Waynesboro,	Franklin.
Wertz, Geo. M.,	Johnstown,	Cambria.
Westrick, F. A.,	Patton, R. 2,	Cambria.
White, Arthur H.,	Pulaski,	Lawrence.
Williams, Irvin C.,	Royersford,	Montgomery.
Woods, Edward A.,	Frick Building, Pittsburgh,	Allegheny.
Youngs, L. G.,	North East,	Erie.

Annual Members for 1912

Adams, R. M.,	Lancaster,	Lancaster.
Adams, W. S.,	Aspers,	Adams.
Anwyll, Harry L.,	Harrisburg,	Dauphin.
Anderson, A. J.,	214 S. 12th St., Philadelphia,	Philadelphia.
Anderson, Jos. W.,	Stewartstown,	York.
Ansbacher, A. B.,	253 Broadway, N. Y.,	
Arkcoll, W. W. B.,	Paoli,	Chester.
Armstrong, John,	Wayne,	Delaware.
Atny, L. Wayne,	New Britain	Bucks.
Arthur, W. A.,	Greenlane, R. 2,	Montgomery.
Atkinson, D. Watson,	State College,	Centre.
Atkinson, Robert E.,	State College,	Centre.
Atwater, C. G.,	17 Battery Place, New York, N. Y.,	
Aurand, Chas. M.,	Lewistown, R. 1,	Mifflin.
Baird, A. T.,	Lock Haven,	Clinton.
Baker, Howard,	Harrisburg,	Dauphin.
Banks, M. C.,	Beaver Falls,	Beaver.
Banks, Wm.,	Mifflintown,	Juniata.
Barnard, C. P.,	Northbrook,	Chester.
Barnhart, Albert,	Annville,	Lebanon.
Baugher, H. G.,	Aspers,	Adams.
Baughman, F. E.,	Manor,	Westmoreland.
Beaver, James,	Mifflinburg,	Union.
Behrhorst, C. E.,	417 7th Ave., Pittsburgh,	Allegheny.
Bell, James A.,	Canonsburg, R. 4,	Washington.
Bell, J. Alvan,	Lawrence,	Washington.
Bemish, Frank,	Charlotte, N. Y.,	
Bender, E. P.,	Carrolltown,	Cambria.
Benn, M. L.,	Coudersport,	Potter.
Bergey, James,	Mifflintown.	Juniata.
Berner, Ralph A.,	Tamaqua,	Schuylkill.
Blair, Chas. P.,	Monaca,	Beaver.
Bliss, Howard,	Beaver,	Beaver.
Boles, McClelland T.,	Hanlin Sta.,	Washington.
Bonear, Homer W.,	Honesdale, R. 2,	Wayne.
Bostwick, D. C.,	North East,	Erie.
Bowen, E. T.,	Springbrook,	Lackawanna.
Bowers, E. C.,	East Petersburg,	Lancaster.
Bowles, John Elliott,	35 Wall St., New York,	
Bowser, D. E.,	Schellsburg,	Bedford.
Boyd, J. C.,	Guys Mills,	Crawford.
Brashear, Walter,	West Fairview,	Cumberland.
Brenneman, J. W.,	Willow Street,	Lancaster.
Briggs, J. S.,	Norristown,	Montgomery.
Brinton, S. L.,	West Chester,	Chester.

NAME.	POST OFFICE.	COUNTY.
Brinton, Wm.,	Timicula,	Chester.
Brooke, R. G.,	Schwenksville,	Montgomery.
Brown, E. L.,	Charlotte, N. Y.,	
Brown, M. B.,	North East,	Erie.
Brown, R. C.,	Mann's Choice,	Bedford.
Brown, Wm.,	2108 Myrtle St., Erie,	Erie.
Bruner, W. W.,	Paxtonville,	Snyder.
Brunges, Howard F.,	Tunkhannock,	Wyoming.
Brunges, S. R.,	Tunkhannock,	Wyoming.
Buchanan, John,	Canonsburg, R. 3,	Washington.
Bucher, Dr. I. Riley,	Lebanon,	Lebanon.
Bullers, A. J.,	Brookville, R. 6,	Jefferson.
Bullock, W. H.,	Honesdale,	Wayne.
Burgess, Nelson W.,	Wyoming,	Luzerne.
Burke, Paul H.,	3428 N. 21st St., Philadelphia,	Philadelphia.
Butler, C. S.,	Ardmore,	Montgomery.
Butt, G. Will,	North East,	Erie.
Card, Fred. W.,	Sylvania,	Bradford.
Cecil, R. E.,	Sewickley,	Allegheny.
Chambers, Alfred H.,	938 Pear St., Reading,	Berks.
Chandler, W. H.,	Scranton,	Lackawanna.
Chapin, Irvin,	Shickshinny,	Luzerne.
Claar, W. M.,	Queen,	Bedford.
Clark, M. N.,	Claridge,	Westmoreland.
Clark, R. S.,	Dillsburg,	York.
Clegg, Wm. S.,	New Bloomfield,	Perry.
Clemson, J. W.,	Halifax,	Dauphin.
Close, G. G.,	Lawrenceville,	Tioga.
Close, Mrs. G. G.,	Lawrenceville,	Tioga.
Clouse, W. H.,	414 Shaw Ave., McKeesport,	Allegheny.
Clovis, A. E.,	Jollytown,	Greene.
Cochran, J. W.,	Canonsburg, R. 5,	Washington.
Cocklin, B. F.,	Mechanicsburg,	Cumberland.
Cocklin, J. A.,	Siddonsburg,	York.
Coen, W. H.,	Pine Bank,	Greene.
Cohee, J. A.,	Richland Centre,	Bucks.
Cole, W. A.,	Pittsburgh,	Allegheny.
Collins, S. C.,	Bainbridge,	Lancaster.
Conley, M. D.,	Etters, R. 2,	York.
Cook, Henry E.,	Beaver,	Beaver.
Cooper, C. A.,	1000 Highland Ave., Coraopolis,	Allegheny.
Cope, Francis R., Jr.,	Dimock	Susquehanna.
Coray, W. H.,	Pittston, R. 1,	Luzerne.
Coursen, I. H.,	Wyoming,	Luzerne.
Couse, Norman W.,	North East,	Erie.
Cox, J. W.,	New Wilmington,	Lawrence.
Crago, Wm. H.,	Carmichael,	Greene.
Crawford, Chas. G.,	5710 Rippey St., Pittsburgh,	Allegheny.
Crawford Bros.,	North East,	Erie.
Criswell, Robert T.,	Chambersburg,	Franklin.
Critchfield, Hon. N. B.,	Harrisburg,	Dauphin.
Crowell, Ralph T.,	3342 N. 13th St., Philadelphia,	Philadelphia.
Crowell, Thomas,	Avondale,	Chester.
Cumbler, H. B.,	Logania,	Perry.
Cummings, J. W.,	New Wilmington,	Lawrence.
Curstead, N. B.,	Oliphant Furnace,	Fayette.
Cushman, G. R.,	Baltimore, Md.,	
Darby, R. U.,	804 Continental Bldg., Baltimore, Md.	
Davis, Cameron,	Indiana, R. 3,	Indiana.
Davison, C. M.,	Chambersburg,	Franklin.
Dawson, C. C.,	Tarentum,	Allegheny.
Decker, Aaron,	Tunkhannock,	Wyoming.
Decker, H. B.,	Stroudsburg,	Monroe.
Demming, H. C.,	Harrisburg,	Dauphin.
Denlinger, Amos B.,	Strasburg, R. 1,	Lancaster.
Dechamps, F. Z.,	Forest Grove,	Allegheny.
Dewitt, I. A.,	Falls,	Wyoming.
Dice, Chas. L.,	Enon Valley,	Lawrence.
Dickey, Samuel,	4 Chalmers Place, Chicago, Ill.,	
Dickinson, B. M.,	Pittsburgh,	Allegheny.
Dickson, Mrs. Jas. P.,	Dalton,	Lackawanna.
Dively, B. F.,	Claysburg,	Blair.
Dobbs, Geo.,	Beaver,	Beaver.

NAME.	POST OFFICE.	COUNTY.
Dugan, S. J.,	1510 4th Ave., Coraopolis,	Allegheny.
Dulles, Jno. W.,	West Chester,	Chester.
Duncan, B. S.,	Hollidaysburg,	Blair.
Dunlap, Walter C.,	West Bridgewater,	Beaver.
Edge, Samuel,	Jackson Centre, R. 17,	Mercer.
Elder, Irvin C.,	Chambersburg,	Franklin.
Eldon, Mrs. Robert M.,	Aspers,	Adams.
Ellis, David M.,	Bridgeport,	Montgomery.
Emerson, J. B.,	40 E. 41st St., New York City,	
Engle, D. I.,	Beaver, R. 2,	Beaver.
Engle, Ezra B.,	Marietta,	Lancaster.
Erb, E. S.,	1849 N. 18th St., Philadelphia,	Philadelphia.
Erk, Geo.,	Seeleyville,	Wayne.
Eslinger, Samuel L.,	Lemoyne,	Cumberland.
Espenshade, F. L.,	Refton,	Lancaster.
Estabrook, F. L.,	Athens,	Bradford.
Estabrook, V. S.,	State College,	Centre.
Faust, S. L.,	Jersey Shore,	Lycoming.
Fassett, F. H.,	Meshoppen,	Wyoming.
Fassett, Wallace,	Mehoopany,	Wyoming.
Felty, G. B. O.,	Millersville,	Lancaster.
Fenstermacher, P. S.,	Allentown,	Lehigh.
Ferguson, B. B.,	New Bethlehem,	Clarion.
Fernald, Geo. H.,	North East,	Erie.
Fertig, F. R.,	Lebanon,	Lebanon.
Finn, A. O.,	Clifford,	Susquehanna.
Flinchbaugh, F. T.	York,	York.
Forry, Laroy S.,	Spring Forge,	York.
Forsyth, Samuel,	Jarrettown,	Montgomery.
Foster, T. C.,	Winfield,	Union.
Frederick, T. J.,	Spring Church,	Armstrong.
Freed, H. A.,	Racine,	Beaver.
Fulton, H. R.,	State College,	Centre.
Galey, F. S.,	316 N. Negley Ave., Pittsburgh,	Allegheny.
Gardner, L. M., Jr.,	York Springs,	Adams.
Garrahan, R. H.,	Kingston,	Luzerne.
Garrett, Howard M.,	West Chester,	Chester.
Garrettson, Eli,	Gettysburg, R. 6,	Adams.
Garretson, Robert,	Flora Dale,	Adams.
Garvey, Thomas I.,	443 W. Chestnut St., Lancaster,	Lancaster.
General Chemical Co.,	712 Lafayette Bldg., Philadelphia,	Philadelphia.
Gibson, Ralph,	Williamsport,	Lycoming.
Gidem, Geo. D.,	1722 Arch St., Philadelphia,	Philadelphia.
Gillespie, J. B.,	Canonsburg,	Washington.
Glenn, A. G.,	Garman Mills,	Cambria.
Good, Geo. S.,	Lock Haven,	Clinton.
Good, Martin R.,	Blue Ball,	Lancaster.
Goulds Mfg. Co.,	Seneca Falls, N. Y.,	
Glass, S. J.,	Bulger,	Washington.
Graper, A. W.,	96 Diamond Market, Pittsburg,	Allegheny.
Graybill, I. B.,	Refton,	Lancaster.
Green, James Jr.,	Creighton,	Allegheny.
Gregg, J. W.,	State College,	Centre.
Griest, A. W.,	Flora Dale,	Adams.
Griest, C. A.,	Guernsey,	Adams.
Griest, F. E.,	Flora Dale,	Adams.
Griest, Geo. G.,	30 Church St., New York, N. Y.,	
Griest, Maurice E.,	105 W. 163rd St., New York, N. Y.,	
Gross, W. E.,	Danville, Va.,	
Guillaume, L. R.,	State College,	Centre.
Hailman, G. L.,	5815 Wilkins Ave., Pittsburgh,	Allegheny.
Hain, G. W.,	Evans City,	Butler.
Haines, Miss Mary M.	Cheltenham,	Montgomery.
Hall, L. C.,	Avonia,	Erie.
Hall, Robert W.,	152 S. Linden St., Bethlehem,	Northampton.
Hardman, Dr.,	Harrisburg,	Dauphin.
Hardt, C. W.,	Camp Hill,	Cumberland.
Harris, Joseph,	Shamokin,	Northumberland.
Harris, Philip,	Light Street,	Columbia.
Harrison & Sons, J. G.,	Berlin, Md.,	
Harrison, W. O.,	531 Wood St., Pittsburgh,	Allegheny.
Harshman, U. W.,	Waynesboro,	Franklin.
Harvey, Frank L.,	Foxburg,	Clarion.

NAME.	POST OFFICE.	COUNTY.
Harvey, H. R.,	Foxburg,	Clarion.
Hawkins, E. B.,	Delta,	York.
Hazard, Willis Hatfield,	West Chester,	Chester.
Heilman, J. R.,	Palmyra, R. 2,	Lebanon.
Heilman, R. P.,	Emporium,	Cameron.
Heilman, Mrs. R. P.,	Emporium,	Cameron.
Helt, Edward,	Bellevue,	Allegheny.
Heisey, S. A.,	Greencastle,	Franklin.
Henderson, J. C.,	Petersburg,	Huntingdon
Herr, Frank H,	Millersville,	Lancaster.
Herr, Jay M.,	Lancaster, R. 4,	Lancaster.
Herr, Jno. D.,	Lancaster,	Lancaster.
Hershey, H. F.,	Harrisburg, R. 2,	Dauphin.
Hershey, H. S.,	East Petersburg,	Lancaster.
Hile, Anthony,	Curwensville,	Clearfield.
Hilliary, E. D.	Camp Hill,	Cumberland.
Hinkle, Horace,	York,	York.
Hoffman, Harry,	Butler,	Butler.
Holmes, M. L.,	Harrisburg,	Dauphin.
Horton, Harry H.,	Sheffield,	Warren.
Howard C. J.,	Emporium,	Cameron.
Howe, Homer B.,	Wellsboro,	Tioga.
Huey, S. R.,	New Castle,	Lawrence.
Huff, B. P.,	Roanoke, Va.,	
Hyde, A. A.,	Mann's Choice, R. 1,	Bedford.
Hynicka, R. G.,	Lebanon,	Lebanon.
Ide, S. C.,	Alderson,	Luzerne.
Ide, Mrs. S. C.,	Alderson,	Luzerne.
Jacob, P. A.,	Wellsburg, W. Va.,	
Jacobs, Daniel Clarence,	Gettysburg, R. 5,	Adams.
Jamison, C. B.,	Saltsburg,	Indiana.
Jaques, Mrs. Elizabeth H.,	Germantown, Philadelphia,	Philadelphia.
Johnson, Howard M.,	Catawissa,	Columbia.
Johnson, Mrs. F. C.,	Dallas,	Luzerne.
Johnson, M. E.,	Conoquenessing,	Butler.
Johnson, W. E.,	206 6th St., Pittsburgh,	Allegheny.
Johnston, C. B.,	North Warren, Box 82,	Warren.
Johnston, J. C. M.,	New Wilmington,	Lawrence.
Johnston, J. H.,	New Wilmington,	Lawrence.
Jones, R. E.,	Sugargrove,	Warren.
Jordan, J. H.,	1104 Diamond Bank Blgd. Pittsburgh,	Allegheny.
Kauffman, Chas.,	Stoney Brook,	York.
Kauffman, E. F.,	York, R. 3,	York.
Keency, A. C,	Laceyville,	Wyoming.
Keeney, Fred. B.,	Laceyville,	Wyoming.
Kell, Reuben H.,	Blain,	Perry.
Keller, Mrs. H. M.,	Gettysburg, R. 5,	Adams.
Keller, S. Clarence,	Gettysburg, R. 5,	Adams.
Keller, Mrs. S. Clarence,	Gettysburg, R. 5,	Adams.
Kernan, William,	Dushore,	Sullivan.
Kester, R. P.,	Grampian,	Clearfield.
Ketchum, E. M.,	North East,	Erie.
Kidder, O. S.,	North East,	Erie.
Killam, B. F.,	Paupack,	Pike.
Kilmer, A. B.,	Springbrook,	Lackawanna.
King, Cleason G.,	861 E. Philadelphia St., York,	York.
Kitner, Joshua,	New Bloomfield,	Perry.
Klinefelter, U. S.,	Biglerville,	Adams.
Kloss, Mrs. W. S.,	Tyrone,	Blair.
Klussman, F. C.,	Millvale,	Allegheny.
Knuppenburg, D. A.,	Lake Carey,	Wyoming.
Koch, Chas. H.,	McKeansburg,	Schuylkill.
Koehler, Paulus E.,	Monaca,	Beaver.
Kolb, Reuben,	52 N. 4th St., Easton,	Northampton.
Koons, Dr. P. R.,	Mechanicsburg,	Cumberland.
Krady, W. S.,	Mt. Joy,	Lancaster.
Krewson, James,	Cheltenham,	Montgomery.
Kunkel, B. F.,	Tamaqua,	Schuylkill.
Kunkel, E. H.,	New Ringgold,	Schuylkill.
Kunkel, N. J.,	New Ringgold,	Schuylkill.
Kunkel, Jonas,	New Ringgold,	Schuylkill.
Large, Miss Katharine,	Orrtanna,	Adams.
Larner, John B.,	1709 19th St., Washington, D. C.,	

NAME.	POST OFFICE.	COUNTY.
Laub, H. H., Jr.,	Lewistown,	Mifflin.
Lauffer, E. C.,	Irwin,	Westmoreland.
Lauver, Rufus,	Biglerville,	Adams.
Lee, R. F.,	Little Orleans, Md.,	
Leeds, Miss Sarah B.,	West Chester, R. 6,	Chester.
Leet, C. E.,	North East,	Erie.
Leighton, Jas, G.,	Tunkhannock,	Wyoming.
Leonard, Frank E.,	New Kingston,	Cumberland.
Lerch, Fred.,	Biwabik, Minn.,	
Leslie, Wm. H.,	Arnold, R. 1,	Westmoreland.
Levi, Newton R.,	1821 N. 17th St., Philadelphia,	Philadelphia.
Lewis, Bradley W.,	Tunkhannock,	Wyoming.
Lewis, H. G.,	Pittston, R. 1,	Luzerne.
Lewis, W. J.,	Pittston, R. 1,	Luzerne.
Lick, Simon,	Marysville,	Perry.
Lincoln, Geo. H.,	410 Wheeler Ave., Scranton,	Lackawanna.
Linville, Arthur S.,	Chadds Ford,	Chester.
Lisle, R. Mason,	Paoli,	Chester.
Lord, John,	Wyoming, R. 1,	Luzerne.
Locke, David C.,	Monaca,	Beaver.
Long, W. H.,	Cisna Run,	Perry.
Loomis, Edw.,	North East,	Erie.
Love, B. D.,	Erie, R. 2,	Erie.
Lowe, M. J.,	Bradford,	McKean.
Luke, W. J.,	Morganza,	Washington.
Lupp, R. H.,	Biglerville, R. 2,	Adams.
Lushen, A. F.,	Venetia, R. 2,	Washington.
Lyon, Claude E.,	Emporium,	Cameron.
Macneal, Wm. P.,	Parkesburg,	Chester.
MacVeagh, Walter F.,	Williamsport	Lycoming.
Martin, A. L.,	Harrisburg,	Dauphin.
Mayer, Dr. I. H.,	Willow Street,	Lancaster.
McAllen, R. W.,	Fannettsburg,	Franklin.
McBride, S. Bruce,	Canonsburg,	Washington.
McCaleb, Wm. B.,	27 N. Front St., Harrisburg,	Dauphin.
McClelland, Wm. B.,	Canonsburg,	Washington.
McClure, F. L.,	Conoquenessing,	Butler.
McDonald, Jas. A.,	North East,	Erie.
McDonald, T. M.,	North East,	Erie.
McDowell, M. S.,	State College,	Centre.
McEwen, R. K.,	Beadling,	Allegheny.
McGowan, Howard G.,	Geiger's Mills,	Berks.
McHenry, G. S.,	Benton,	Columbia.
McKay, Geo. H.,	1118 Arch St., Philadelphia,	Philadelphia.
McLain, J. A.,	Allenport,	Washington.
McLaughlin, Joseph M.,	North East.	Erie.
McLean, J. T.,	Greenville,	Mercer.
McMurray, Leslie,	Canonsburg,	Washington.
McMurray, Levi A.,	Canonsburg, R. 4,	Washington.
McMurray, J. G.,	Canonsburg,	Washington.
McPherson, W. W.,	Boyce, R. 1,	Allegheny.
Mechling, Edward A.,	Moorestown, N. J.,	
Menges, Franklin,	233 E. Philadelphia St., York,	York.
Michael, J. E.,	Norristown, R. 3,	Montgomery.
Michell, Henry F.,	518 Market St., Philadelphia,	Philadelphia.
Mickley, J. W.,	Fairfield,	Adams.
Miller, Edw. J.,	Leetsdale,	Allegheny.
Miller, Maris T.,	Kennett Square,	Chester.
Miller, Phillip,	Beaver Falls, R. 2,	Beaver.
Minter, Mrs. D. G.,	Arendtsville,	Adams.
Modoc, The Co.,	Fernwood,	Delaware.
Morey Nurseries,	Dansville, N. Y.,	
Morgan, Miss F. Kate,	Orrtanna,	Adams.
Moon, Jas. M.,	21 S. 12th St., Philadelphia,	Philadelphia.
Moorehead, E. T.,	North East,	Erie.
Moorehead, R. E.,	North East,	Erie.
Moorehead, R. J.,	North East,	Erie.
Mottier, C. H.,	North East,	Erie.
Myers, C. E.,	State College,	Centre.
Myers, Harry C.,	Siddonsburg,	York.
Myers, John R.,	Siddonsburg,	York.
Murphy, S. I.,	Wawa,	Delaware.
Musselman, C. H.,	Biglerville,	Adams.

NAME.	POST OFFICE.	COUNTY.
Neal, H. C.,	Dravosburg,	Allegheny.
Nevin, John D.,	Easton,	Northampton.
Newcomer, Aaron,	Smithsburg, Md.,	
Newcomer, W. S.,	Glenrock,	York.
Nissley, A. H.,	Bamford,	Lancaster.
Norris, H. E.,	North East,	Erie.
Norris, Mrs. Wm. F.,	1530 Locust St., Philadelphia,	Philadelphia.
Northrup, A. M.,	Danville,	Montour.
Norton, W. C.,	Waymart,	Wayne.
Oliver, C. R.,	Portersville,	Butler.
Oppenlander, Emanuel,	Passer,	Bucks.
Orton Bros.,	North East,	Erie.
Oyler, George,	Gettysburg, R. 5,	Adams.
Ozias, Geo. E.,	Quakertown,	Bucks.
Pauley, J. J.,	Jefferson,	Greene.
Peachy, J. H.,	Belleville,	Mifflin.
Peck, Wm. H.,	Third Nat. Bank Bldg., Scranton,	Lackawanna.
Pennock, Edw. A.,	Chatham,	Chester.
Perham, W. E.,	Pleasant Mount,	Wayne.
Perry, E. F.,	Garman Mills,	Cambria.
Pickle, J. H.,	Millersville,	Lancaster.
Pierce, B. R.,	North East,	Erie.
Pierce, Geo. E.,	North East,	Erie.
Pitzer, H. C.,	Aspers,	Adams.
Plessinger, F. P.,	Locust Grove,	Fulton.
Pollock, Geo. B.,	Wyoming,	Luzerne.
Pomeroy, John H.,	Chambersburg,	Franklin.
Pratt, B. G.,	50 Church St., New York, N. Y.,	
Raffensperger, C. E.,	Arendtsville,	Adams.
Rakestraw, Thos.,	Kennett Square,	Chester.
Ramsey, D. C.,	Huntingdon,	Huntingdon.
Rawle, Francis,	West End Bank Bldg., Philadelphia,	Philadelphia.
Rawsthorne, Edw.,	Pittsburgh,	Allegheny.
Reber, J. C.,	Reading,	Berks.
Reith, Geo., Jr.,	Wyoming, R. 1,	Luzerne.
Repp, Albert T.,	Glassboro, N. J.,	
Rettstatt, G. F.,	Smithton,	Westmoreland
Rettew, C. Vernon,	1000 N. 3rd St., Harrisburg,	Dauphin.
Riddlemoser, H. E.,	McKnightstown,	Adams.
Rife, J. L.,	Camp Hill,	Cumberland.
Rittenhouse, Dr. J. S.,	Lorane,	Berks.
Rice, Dan'l,	New Bloomfield,	Perry.
Richards, A. C.,	Schellburg,	Bedford.
Richards, C. S.,	Ransom,	Lackawanna.
Richards, N. F.,	Schellburg,	Bedford.
Robinson, A. Blaine,	North East,	Erie.
Rohland, Otto,	Narrowsburg, N. Y.,	
Root, J. W.,	Manheim,	Lancaster.
Ross, W. J.,	413 Market St., Harrisburg,	Dauphin.
Rouf, Fred'k,	Hummelstown,	Dauphin.
Rozelle, H. E.,	Pittston,	Luzerne.
Ruhl, Harry F.,	Manheim,	Lancaster.
Runk, John A.,	Greenridge, Md.,	
Rush, John G.,	West Willow,	Lancaster.
Ryburn, Joseph T.,	Washington, R. 10,	Washington.
Sampson, H. O.,	Scranton,	Lackawanna.
Saylor, J. C.,	Pottstown,	Montgomery.
Schell, Walter S.,	Harrisburg,	Dauphin.
Schock, Oliver D.,	Hamburg,	Berks.
Scholl, H. A.,	Fleming,	Centre.
Schweitzer, E. A.,	Egypt Mills,	Pike.
Sedelmeyer, L. H.,	North East,	Erie.
Seeds, Walter W.,	Birmingham,	Huntingdon.
Shoemaker, Seth W.,	Scranton,	Lackawanna.
Shalcross, Frank R,	Frankford,	Philadelphia.
Shank, H. L.,	Lancaster,	Lancaster.
Shattuck, Wm. S.,	Erie,	Erie.
Shryock, Harry L.,	State College,	Centre.
Siegfried, A. H.,	Selinsgrove,	Snyder.
Siegler, Franklin,	320 S. 44th St., Philadelphia,	Philadelphia.
Silvis, Bert W.,	Export, R. 1,	Westmoreland.
Sloat, W. H.,	Camp Hill,	Cumberland.
Smedley, Samuel L.,	2442 Bryn Mawr Ave., Philadelphia,	Philadelphia.

NAME.	POST OFFICE.	COUNTY.
Smedley, Walter,	904 Stephen Girard Bldg., Phila.,	Philadelphia.
Smith, C. M.,	Lewistown,	Mifflin.
Smith, Henry,	Finleyville,	Washington.
Smith, J. Russell,	Swarthmore,	Delaware.
Smith, R. C.,	Venetia,	Washington.
Smith, Dr. W. O.,	15 S. Market Square, Harrisburg,	Dauphin.
Snavely, G. J.,	Cleona,	Lebanon.
Snavely, H. C.,	Cleona,	Lebanon.
Snavely, J. R.,	Harrisburg,	Dauphin.
Snodgrass, David P.,	Canonsburg, R. 3,	Washington.
Snyder, C. B.,	Ephrata, R. 1,	Lancaster.
Snyder, E. B.,	Jacks Mountain,	Adams.
Somerville, Dr. H.,	Chest Springs,	Cambria.
Spangle, Wm. G.,	Altoona,	Blair.
Stanton, Jas. F.,	New Stanton,	Westmoreland.
Steele, Emery.	Larksville,	Luzerne.
Stein, Geo. E.,	East Prospect,	York.
Stephens, A. W.,	Mooresburg,	Montour.
Stevens, C. E.,	Hummelstown,	Dauphin.
Stewart, J. P.,	State College,	Centre.
Stewart, Wm.,	Landisburg,	Perry.
Stichter, Geo. B.,	Pottsville,	Schuylkill.
Stitzer & Reed,	Mifflinburg,	Union.
Stough, W. W.,	Shippensburg,	Franklin.
Stover, F. S.,	Bowmansville,	Lancaster.
Stow, W. L.,	North East,	Erie.
Strain, Thomas,	16th and Columbia, Philadelphia,	Philadelphia.
Strode, A. D.,	West Chester,	Chester.
Strode, M. D	West Chester,	Chester.
Stull, James B.,	North East,,	Erie.
Sunnyside Orchard Co.,	Tyrone,	Blair.
Surface, H. A.,	Harrisburg,	Dauphin.
Swank, Luke H.,	Johnstown,	Cambria.
Taylor, B. C.,	Chester,	Delaware.
Taylor, H. W.,	Canonsburg, R. 5,	Washington.
Taylor, F. C.,	45 W. 43rd St., Bayonne, N. J.,	
Tennant, J. G.,	Westfield, N. Y.,	
Thomas, A. J.,	Eighty-four,	Washington.
Thomas, Carl B.,	West Chester,	Chester.
Thomas, Jackson M.,	Emporium,	Cameron.
Thomas, Jos. O.,	Wilmore,	Cambria.
Thompson, Jno. I., Jr.,	Lemont,	Centre.
Thorpe, Francis Newton,	North East,	Erie.
Townsend, J. G., Jr.,	Selbeyville, Del.,	
Treible, C. E.,	Vosburg,	Wyoming.
Trostle, F. C.,	York Springs,	Adams.
Tyson, A. R.,	Norristown,	Montgomery.
Ulman, L. W.,	Carrollton, O.,	
Vallerchamp, W. F.,	New Berlin,	Union.
Vensel, J. D.,	Saltsburg,	Indiana.
Wadhams, Miss Lydia F.,	Wilkes-Barre,	Luzerne.
Walter, K. C.,	Selinsgrove,	Snyder.
Walter, Wm.,	Blairsville,	Indiana.
Walton, Richard C.,	Bristol,	Bucks.
Walton, Robert J.,	Hummelstown,	Dauphin.
Washburn, J. H.,	Farm School,	Bucks.
Watterson, W. F.,	Cleveland, O.,	
Watts, D. H.,	Kerrmoor,	Clearfield.
Watts, R. L.,	State College,	Centre.
Watson, Mrs. H. F.,	356 W. 6th St., Erie,	Erie.
Weigle, H. M.,	314 Crescent St., Harrisburg,	Dauphin.
Weimer, E. A.,	Lebanon,	Lebanon.
Webster Basket Co.,	Webster, N. Y.,	
Werder, O. E.,	5500 Columbus St., Pittsburgh,	Allegheny.
Werner, Harvey O.,	State College,	Centre.
Wertz, S. H.,	129 S. 3rd St., Reading,	Berks.
Wheeler, W. S.,	Northeast,	Erie.
Wickersham, R. A.,	Mechanicsburg,	Cumberland.
Wiese, H. Benson,	Parkesburg,	Chester.
Wilder, H. J.,	Bureau of Soils, Washington, D. C.,	
Wiley, J. C.,	Bridgetown,	York.
Williams, John L.,	Dickinson,	Cumberland.
Willson, H. M.,	Sharon,	Mercer.

NAME.	POST OFFICE.	COUNTY.
Willson, J. C.,	Wallace Run,	Lycoming.
Wilson, B. F.,	Aspers,	Adams.
Wilson, I. J.,	Library, R. 1,	Allegheny.
Wilson, J. L.,	Overbrook,	Philadelphia.
Wilson, W. W.,	Saxonburg,	Butler.
Winship, Lionel,	Moscow,	Lackawanna.
Wirt, Charles,	129 Cliveden Ave., Germantown,	Philadelphia.
Withrow, J. C.,	Vanport,	Beaver.
Wolf, Dr. W. E.,	Arendtsville,	Adams.
Wolfe, Chas. A.,	Aspers,	Adams.
Wolff, C. W.,	Greentown,	Pike.
Woods, W. Edgar,	Elizabeth,	Allegheny.
Woodward, Albert L.,	410 Arch St., Philadelphia,	Philadelphia.
Woolman, Anna,	21 N. Highland Ave. Lansdowne.	Delaware.
Worrell, Hibberd B.,	217 Manheim St., Germantown,	Philadelphia.
Wright, A. Cooper,	Hummelstown,	Dauphin.
Wright, W. J.,	State College,	Centre.
Wynkoop, J. W.,	Erie, R. 5,	Erie.
Young, Willard S.,	218 Bridge St., Harrisburg,	Dauphin.
Zercher, Andrew J.,	Conestoga,	Lancaster.
Zigler, Amos,	Elizabethtown,	Lancaster.
Zimmerly, H. H.,	Erie,	Erie.
Zimmerman, D. B.,	Somerset,	Somerset.

Membership by Counties

Does your county have as many members in the State Association as she should have? Is the number less or more than last year? What have you done to help? Here is the list corrected to June 1, 1912:

39 Adams.
38 Erie.
34 Lancaster.
30 Allegheny.
29 Dauphin.
25 Philadelphia.
23 Chester.
22 Washington.
20 York.
18 Luzerne.
17 Centre.
15 Montgomery.
13 Cumberland.
12 Wyoming and Beaver.
11 Franklin.
10 Lackawanna.
9 Cambria, Lebanon, Perry and Westmoreland.
8 Butler.
7 Berks, Blair, Bucks, Lawrence and Schuylkill.
6 Bedford, Delaware and Wayne.
5 Cameron.
4 Columbia, Greene, Indiana, Lycoming, Mifflin, Snyder and Union.
3 Clarion, Clearfield, Huntingdon, Mercer, Northampton, Pike, Somerset, Tioga and Warren.
2 Bradford, Clinton, Juniata, Montour, Northumberland and Susquehanna.
1 Armstrong, Crawford, Fayette, Fulton, Jefferson, Lehigh, McKean, Monroe, Potter and Sullivan.

Roll of Honor

The following have qualified for the 1912 Roll of Honor, by securing five or more members, one life member counting as ten annuals. The Treasurer and Secretary are not eligible:

John B. McClelland.
Jonas Kunkel.
R. P. Kester.
H. F. Hershey.
W. J. Wright.
C. A. Wolfe.
J. C. Withrow.
H. H. Zimmerly.

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 one dollar ($1.00) to the Secretary, such membership to expire on the first day of the following annual meeting, unless renewed. Any one paying ten dollars ($10.00) 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. 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 regularly 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 Committees 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 Exhibitions to consist of five (5) member; a Committee on Membership to consist of one (1) member from each county in the State showing evidence of horticultural activity, and a General Fruit Committee, consisting of one from each

county represented, with a general chairman of the whole, each member of the 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.

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 Vice-Presidents.* 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 custodian 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 announcement 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 necessary 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 upon 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 sum 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 disposition 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 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 condition, general interests and prospects of the Association as it shall judge necessary or expedient. All important measures shall be submitted to this Board, but may, by the Board, be re-submitted 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 Committee 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 legislation which in their judgment is desirable; when so directed by the Association, it shall cause to be introduced into the State Legislature 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 grower.

(2). The Committee on Exhibitions 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 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 Association 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 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.

PROPOSED AMENDMENTS.

The following proposed amendments to the Constitution were presented, in writing, at a special meeting of the Executive Board held March 14, 1912. They were considered and it was ordered that notice be hereby given to all members and that the amendments come before the next Annual Business Meeting of the Association for action.

First.—Addition to Article 3, "No person may serve as President for more than two consecutive terms."

Second.—That Article 6 be amended by omitting the phrase. "during the month of January."

PROCEEDINGS

OF THE

FIFTY-THIRD ANNUAL MEETING

OF THE

State Horticultural Association

of Pennsylvania

HELD AT

Pittsburgh, Pa., January 16, 17, 18, 19, 1912.

The Fifty-third Annual Meeting of the State Horticultural Association of Pennsylvania convened in the Lecture Hall of the Carnegie Institute, Pittsburgh, at 1:30 P. M., Tuesday, January 16, 1912, with Vice-President Geo. W. Blaine in the chair.

PRESIDENT'S ADDRESS.

Serious illness prevented the presence of President Gabriel Hiester. After his death the following article was found among his papers. It is the last written expression of a clear-thinking man on some phases of the fruit business that are seriously puzzling many of us today.

COMMERCIAL ORCHARDING IN PENNSYLVANIA AS A BUSINESS PROPOSITION.

By Gabriel Hiester, *Harrisburg, Pa.*

I have always taken an interest in fruit culture. Since boyhood I have seldom missed an opportunity to attend a meeting on this subject. Up to within a year or two the discussions at these meetings have been carried on principally by amateurs—from the viewpoint of the home garden and home orchard, and were confined entirely to a comparison of varieties—the merits of the latest novelties, methods of culture and pruning.

We have now reached the commercial stage. Fruit growing has become a business of vast importance in this country, and in addition to the important subjects just mentioned, there are others of a business nature equally important to occupy our attention It is my purpose to consider some of these newer questions.

To read the flashy articles that appear from time to time in some of our leading magazines, one might easily be lead to believe that this is one of the finest "get rich quick" schemes imaginable. That any man—even though he had been a failure at everything else, could go out into the country any where and plant an orchard and the trees would do the rest.

Those of us who have been in the business longest know that it is not a get rich quick scheme by any means. But we do know that an orchard of the right kind of trees, planted in the right place, by the right man, is a thoroughly good, safe business proposition, but it is a business that requires untiring energy, intelligence, pluck and dogged perseverance.

The wonderful development during the past 25 years of railroad, steamship, telegraph and telephone lines has brought the ends of the earth very close together. The man in Pennsylvania who grows fruit for the general market today is the active competitor of every man in the world who grows the same kind of fruit, and must measure wits with some of the shrewdest, sharpest business men to be found anywhere. The orchard that is planted in Pennsylvania today will have as its competitor the best located, best cared for orchards in the world.

Bearing these two facts in mind it behooves us to exercise the greatest care in starting every new plantation. We want to be as sure as we can be that we are planting the right tree in the right place.

We are told by very good judges of fruit, men who have traveled over every State in the Union, that we can grow fruit of as high quality in Pennsylvania as can be grown anywhere. We believe this to be true. We know, however, by experience, that while all kinds of peaches, all kinds of pears, all kinds of apples will grow on any well-drained farm in this valley, only a very few varieties will reach their highest degree of perfection on any one farm, often different fields on the same farm produce widely different results. This fact was brought very forcibly to my mind when an orchard that I planted about 40 years ago came into bearing and I found one-third of the trees unprofitable, although I had seen the same varieties bearing profitable crops in Franklin County.

I proposed to our State Horticultural Association that we try to secure an investigation either by the National Government, or the State Government of the effect of soil and sub-soil upon the various varieties of fruit. After agitating the question for about 15 years, Dr. Hunt, Director of our State Experiment Station, secured for us the services of Mr. H. J. Wilder, of the Bureau of Soils, at Washington, for one year, to make this investigation. One year was entirely too short a time, but fortunately for us, Mr. Wilder had been studying this question for 7 or 8 years before he came to us. He had been observing the growth and production of the leading varieties on different soils on what is known as the Appalachian Chain of which these mountains are a part, extending from Massachusetts to North Carolina. He found that over this entire district a certain kind of soil and sub-soil always exercised the same influence over a given variety. I understand the result of his work in Pennsyl-

vania is ready for the printer, so we ought to be able to get it before very long. While this bulletin will not enable us to make our selection of varieties with absolute certainty, it will aid us very materially and I am sure any young man can avoid making as costly mistakes as I made in my first plantings.

It was a great disappointment to me to have Mr. Wilder taken from Pennsylvania just at a time when he could do us so much good. We had hoped that he might spend another year giving field demonstrations to our people of soil testing and soil comparison so that we could use his bulletins understandingly. When he talked to me about the kind of soil, for instance, that the Baldwin apple delighted in I was convinced that he knew what he was talking about, but it was not at all clear to me that I could identify that soil, but when he took me to one of my orchards where really good Baldwins grew, bored down into the soil three feet and took a sample which he carried to another block where the apples were not nearly so good, showed me the two samples and by sight and touch explained the difference I felt that he was giving me something that I could understand. It is the field work of the expert that counts. It is the field work, the demonstration work that we need in this state to put us properly on our feet. It is the personal touch of the demonstrators right out in the orchard that brings results.

So many boxed apples have been shipped into our markets during the past few years from Oregon and Washington that our people have been educated up to the point where they demand and expect absolute perfection and if we expect to meet this demand we must plant only varieties that are at home in our soil and climate. It is worse than folly for any one to plant anything else.

Someone has said that the training of a child should begin with its grandparents, likewise the man who expects to market fancy fruit must grow fancy fruit, begin by planting the right tree in the right place—then he must spray the trees to keep the foliage healthy and the fruit clean; must prune to allow the sun to reach every part of the tree; must thin when too heavily loaded and when harvest time comes handle like eggs to prevent bruising.

Grading, Packing and Selling the Crop.

We have much to learn in Pennsylvania about grading and packing. We have become so accustomed to sell the run of the tree in our local markets, having each basket topped out with a few fine specimens that we find it very hard to follow the lead of our progressive western brethren—but we must do it—and it seems to me the easiet way for us to fall in line will be to start as they did, have the growers in each small fruit district co-operate, that is get together and decide upon the different grades of fruit that shall go out from that district and carry their brand into the general market, and determine to stand or fall on the reputation of the fruit carrying that brand. The grading and packing of fruit is an art, it requires time and patience and a certain amount of intelligence to learn it, hence in the fruit districts of the west and south we find expert packers often command very high wages. We sometimes find it difficult to get

the right kind of help at picking time to pick and pack our fruit, but I think the establishment of fruit centres along our eastern coast, and the co-operation of the growers at these centres is going to solve the labor problem very nicely. It is always hard to get one extra hand just when we need him, but it is easy to get 50 or 100. These large gangs of men and women who make a business of this work—they start in Florida in mid-winter and work gradually up the coast as the season advances until late fall finds them in northern New York, Michigan or Canada. Now it would be impossible for one man with a ten or twenty-acre orchard to secure the services of such a gang, but if there are fifteen or twenty orchards in a neighborhood they can easily be divided up among them and the work be properly and systematically done, then again one small grower could not induce an expert packer to come to his place for a week to pack his crop but, a community can give him work for the packing season, even at the high wages they demand because each one will only need him for a few days.

It is very important, when introducing our fruit to the general market, that we place the first lot of fine fruit in the right hands. Just how this shall be done is a matter that each fruit district will have to work out for itself, but no fruit should ever be shipped to a dealer by any one either for himself or for his association until he has by careful inquiry assured himself that the dealer is responsible and has established a reputation for fair dealing.

REPORT OF THE GENERAL FRUIT COMMITTEE.

By John D. Herr, *Chairman, Lancaster Pa.*

The present report is the first to be compiled from the reports of the county members of this committee who were appointed by the President of the Association in conformity with the terms of the new Constitution adopted at the Annual Meeting at Harrisburg last year. While none but persons intimately connected with the horticultural interests of their respective counties are serving on the committee, and their reports are accurate and complete, it would add to the value of this paper if a few additional members were added in each county, especially in the more important fruit growing sections.

Reports were received by the chairman from sixty-four counties, and these serve as the basis of the present paper. Much credit is due the local members for their unselfish interest, and the painstaking care and fullness with which local fruit conditions are reported. Without this interest on their part no State Report could as a matter of course be made, and whatever merits this paper may possess is largely due to this disinterested co-operation.

The general yield of fruit in Pennsylvania in 1911 was above the average, both in quantity and quality. Of some fruits it was specially large, winter apples averaging for the entire State 120% of an average crop and 150% of last year's crop, while fall apples average 130% of the average and of last year's crop. This is con-

siderably above the average for the United States. Pears were a normal crop, but averaged 135% of last year's yield, which was a short one.

The most conspicuous falling off in the yield of any class of fruit was that of the peach, of which the average of all counties is 70% of a normal crop and 50% cent of last year's crop. Please note that I give this as the average of all counties. This estimate is higher than is justifiable because of the fact that some relatively unimportant peach growing counties report good yields, while other and greater peach sections have had but one-third of a crop or less. It is my personal opinion that the peach crop of 1911 was not much above one-half that of the previous year. The quality of peaches was, however, unusually fine.

Plums drop, also, slightly below the normal yield, being 75% of an average crop and 85% of last years, while cherries bore 95% of an average and 120% of last year's crop. Strawberries, raspberries and blackberries yielded 75% of last year's crop, which was slightly above an average for these fruits. The yield of tomatoes, cabbage and beans was below the normal, while potatoes were a short crop in most sections of the State, and with many indeed almost a complete failure.

The prices received by the grower for fall apples averaged 57 cents per bushel. This price does not do full justice to the possibilities of the market for this fruit. This is shown by the statement of some fall apples sold in some markets as high as $2.00; others sold at 20 cents per bushel. The prices received for fall apples is largely a matter of growing sound fruit, packing in attractive form, and facilities for marketing.

There is, without doubt, a good market for fall apples in the cities and towns of all parts of the State which has just been begun to be supplied.

The prices paid for winter apples as reported averages $2.10 per barrel for all varieties, and the prices in the commercial sections ranged about this point. Such fruit as has been packed in bushel boxes from $1.50 to $2.50 per box, while bulk apples sold as low as 40 cents per bushel. Evaporators and canners paid 25 cents per hundredweight for drops and culls. The price of pears averaged 95 cents per bushel, but should be $1.00 as this includes that paid for Kieffers, which is given as 20 cents per bushel in bulk.

This season was the successful peach growers great opportunity, and he who was lucky or foresighted enough to have a crop reaped a golden harvest. The price for all grades of peaches averaged $1.50 per basket. True, the quality was high as a rule, and the fruit was worth the money. This was due to the lighter yield resulting in larger sized and more perfect fruits.

Plums were little cheaper, selling at a premium price of $1.35 per basket, while cherries brought 8 cents per quart box and $2.50 per crate. These figures include the sour varieties. The sweet cherries brought more money.

There are not a great many bearing quince trees in this State, and this may account for the fact that prices of these fruits is quoted at the per dozen rates, which is 25 to 40 cents. This is now the

price of eggs, and more than is usually received for boxed apples, and inasmuch as there is a steady demand for this fruit, and trees of the quince come into bearing early, the quince growing industry is heartily commended to the consideration of fruit growers who are willing to combat the conditions producing twig blight, which is the greatest enemy of the quince tree just now.

Grapes sold at 5 cents per pound, 80 cents per crate, and $24.00 per ton, in the northwestern Pennsylvania grape region. The price per ton for grapes is less than that paid for cabbage in some sections, although the consumer paid at the 5-cent per pound rate or $100.00 per ton. Who gets the $76.00 per ton profit?

The general price for strawberries was 10 cents per quart box, and $2.75 per crate. The same price ruled in the case of raspberries and currants, while blackberries sold one cent lower. Potatoes averaged for all sections 98 cents, and tomatoes 73 cents per bushel.

If the fact be conceded that the measure of the development of the apple growing industry in any section is determined by the amount of fancy boxed apples put upon the market then Pennsylvania has much room for improvement in completing the marketing end of the business. I do not, however, regard this as a fair criterion of judgment in all cases. The great bulk of apples will probably during all time be packed in barrels for the use of the millions. There is, however, an ever increasing demand for fancy boxed apples, and this local demand should be supplied by the growers of our own State instead of importing from outside. This is not yet done, judging from the statement that but 1¾% of the salable crop of apples is packed in boxes. There is, however, an awakening of our people to the possibilities of this package, and from present indications Pennsylvania boxed apples will surely be heard from in the future.

Only 25% of our apples are packed in barrels. This appears low, but is accounted for by the fact that our numerous local markets offer exceptional advantages to selling apples in bulk during a large part of the season. Bulk apples, therefore, total 50% of the entire crop.

One statement I am obliged to record, and I do so with shame for my native State, and that is the fact that 40% of the entire crop of apples grown in this State are culls. Thus 2-5 of the entire crop is made unprofitable by neglect, and since the growing of culls in any large proportion is entirely avoidable there is no excuse for such conditions. Culls can be avoided by spraying and thinning of the fruits. Such culls as are grown should not be offered on the market filthy with the ejects of worms, and covered with unsightly fungous diseases to disgust the consumer and pauperize the producer.

The planting of apple trees is increasing in 40 counties of this State. This increased planting has been going on for several years, and with a corresponding interest in the care of trees and marketing the crop will result in making Pennsylvania the leading apple growing State in the Union. There are now estimated to be over 33,000,000 apple trees growing in this State.

Planting of peach trees is increasing in 45 counties. In consideration of the fact that the high and northern tier of counties are

not peach growing territory the counties reporting increased planting comprises all the area of the State where peaches can be grown successfully. Over production is feared by some, and possibly with a fair degree of reason, but if quality rather than quantity is kept in mind by the grower, and high grade fruit only is offered on our markets overproduction is not so near at hand as perhaps is overplanting. No one is now planting dwarf apples, even as fillers, except probably the city planter and the experimentalist. Dwarf pears are freely planted as fillers.

Other horticultural operations mentioned by correspondents are the growing and evaporation of sweet or sugar corn and strawberry culture. One of the most notable and successful of these newer industries is that of celery culture in Tioga County. Here hundreds of acres of richest valley soils are planted to this crop, amounting to many thousands of dollars in value annually. Chestnut culture is reported from three counties, but while this industry formerly offered means by which otherwise barren mountain land could be turned to the production of valuable crops the presence of the Chestnut Bark Blight among us is calculated to put at least a temporary check upon chestnut planting.

The price of horticultural land in the State has increased during the last few years in 30 counties and averages 25%. There has, also, been a general increase in the value of all farm lands.

All commercial orchards worthy the name are now sprayed. Twenty-three per cent. of all orchards are sprayed at least once during the year. The remainder will be sprayed or else soon go out of existence as producing orchards. The above percentage refers to orchards and not to trees. There is no doubt that over 50% of the total number of fruit trees within the State are now treated by spraying.

Some system of culture is practiced in 15% of all orchards, while 16% are properly pruned. Cultivation of peach orchards is a necessity to full success, and is practiced by nearly all commercial growers. More instruction is needed in pruning, cultivation and fertilization.

The most damaging pests in 31 counties is the San Jose Scale, and in 25 counties the Codling Moth. There is no doubt that these two insects, the one attacking the tree and the other the fruits, will continue our most important pests for some time to come. They are responsible for the destruction of hundreds of thousands of dollars of property in this State annually. The comparative ease with which they can be controlled by well-known methods seems to be recognized by nearly all, as they are seldom mentioned as difficult of control. Lime-sulfur for the Scale and arsenate of lead for the Codling Moth are the reliable remedies.

Other pests mentioned are Oyster-shell Scale in 12 counties, while but 5 give any importance to the Curculio. I believe the latter responsible for much damage even to apple, and the arsenical spray before the blossoms open to supplement the regular Codling Moth treament should not be overlooked in spraying for the Curculio where its presence is indicated in the apple orchard.

Borers are mentioned in 6 reports as the most damaging pests and difficult to control. When they once have entered the trunks of the trees the only course is the knife or carbon bisulphide. Preventive applications are useful, and deserve more general use everywhere.

Pear or Twig Blight has been exceptionally prevalent and destructive on pear and quince. It is questionable whether much damage will be done to apple on the limbs, as it has a tendency to self limitation on apple twigs. Collar Blight, however, which is said to be caused by the bacillus of Pear Blight is one of the most serious diseases of the apple orchards in some sections of the State.

Leaf Blister Mite is spreading through the orchards of the northern half of the State. It is easily controlled by the lime-sulphur treatment given for San Jose Scale and Oyster-shell Scale. Canker Worms do much damage in the western half of the State. For these spray with arsenicals early as the caterpillars are seen feedng, and before the trees are defoliated.

Seed Chalcis and Railroad Worm are more numerous than formerly, and these pests because of their habits of feeding inside the fruits are a real menace to the apple industry. No other means of controlling these insects is known to science than the destruction of the infested fruits while the pests are inside them. Unless this be done by the grower recourse must be had to legislation on the subject, and a strict enforcement of the same over the entire infested areas.

One correspondent mentions ignorance as the most menacing pest of fruit growing in Pennsylvania, and with probably some sign of reason. This is an enemy we are constantly fighting, and there is no let-up in our battle against ignorance, especially at the sessions of the Horticultural Meetings such as the present. Like the poor, however, we shall always have the ignorant with us, but not as fruit growers. Competition with the well-informed will automatically drive the ignorant fruit grower out of business. Another mentions the "humbug" as the worst enemy the fruit grower has to deal with. The crop of humbugs is, unfortunately, perennial. The humbug goes about often in the garb of an angel of light, like another well-known personage seeking whom he may devour. We can not spray for the humbug it is true, but since it is known that he thrives on ignorance and cupidity by withholding his natural food he starves to death and disappears.

Taking conditions as a whole the Pennsylvania horiculturist has much to encourage him. We have within our borders the finest fruit soil in the world. We can grow all of the fruits indigenous to our climate right here at home. Killing spring frosts are very unusual, and on proper sites entirely unknown. The markets at our very doors are unsurpassed by any anywhere. Our people in the cities are employed as skilled labor earning high wages, which makes them good customers. We have no serious pests not now under control. The markets afford fair prices. Care of trees, co-operative selling of fruit, and buying of supplies is being undertaken. All signs point to the time when Pennsylvania, great in so many industries will be the greatest fruit growing State in the Union.

Prof. Surface called special attention to the part of this report referring to the treatment of apple and peach borers. He recommended a coating of white lead and linseed oil to prevent apple borer and a coating of lime-sulphur with sediment for peach borers. In his own work he adds to the lime-sulphur some arsenate of lead, Pyrox or other sticking poison for peach borers. He described the use of carbon bisulphide for destroying apple borers by injecting it into the borer hole with a spring-bottom oil can.

SOME MISTAKES IN FRUIT GROWING

By C. E. Bassett, *Fennville, Michigan.*

I wish to speak of some of our common mistakes. It is our ordinary practice to boast of our successes and not to say anthing about our defeats.

But some defeats are better than some successes, especially if we courageously meet defeat and are not discouraged. It is then we learn a valuable lesson. Real failure consists in failing to rise up after we have been knocked down.

We must start with the idea that we are bound to have defeats, but those who overcome them gain the reward.

We are falling into a bad practice in the way we secure our nursery stock. The old practice was to purchase trees in the fall and have them heeled in, but the large nurserymen found it a difficult matter to make a fall delivery and so they followed a new process, erected large frost-proof cellars and stacked the nursery stock up in them like so much hay, none of the trees being heeled in.

In consequence of this abuse we have had a great deal of failure in getting a stand, especially of peach trees.

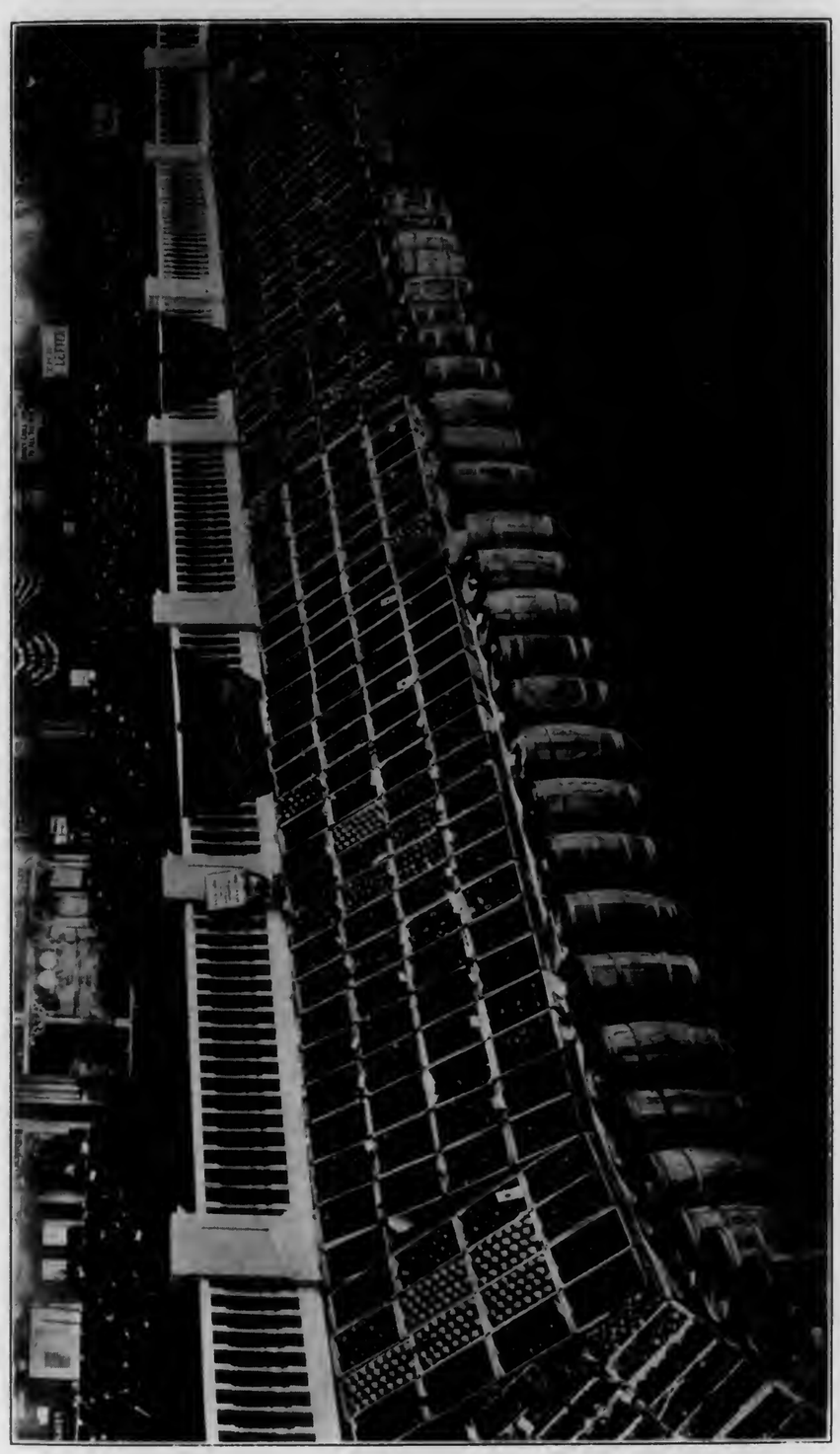
It is unnatural and wrong to have trees stored like that, and we do not care for cellar-stored trees, but insist on fall delivery for two reasons. First, we get the pick of the stock; second, we can take good care of the trees, trimming the broken roots off when we heel them in and then they are ready to be set out the first thing in the spring.

Cellar-stored trees are lacking in vitality and in some cases are absolutely dead.

Our greatest fault in Michigan horticulture is that everywhere we have "skinned" the land. We must build up our land and make it richer. We have drawn our cheques upon the soil fertility, and have now little or nothing in the bank, and thus trees already weakened by cellar wintering are also placed in an unfavorable soil.

Many of us are not adapted to fruit growing at all. Many retired business and professional men are coming from the city. These men often make mistakes in their way of handling their orchards, but they can often teach us that we need better business methods on our farms.

It is a great tribute to the occupation that it can yield some return without any business method in selling. As a rule we have no say in the price at which we sell, or at which we buy.



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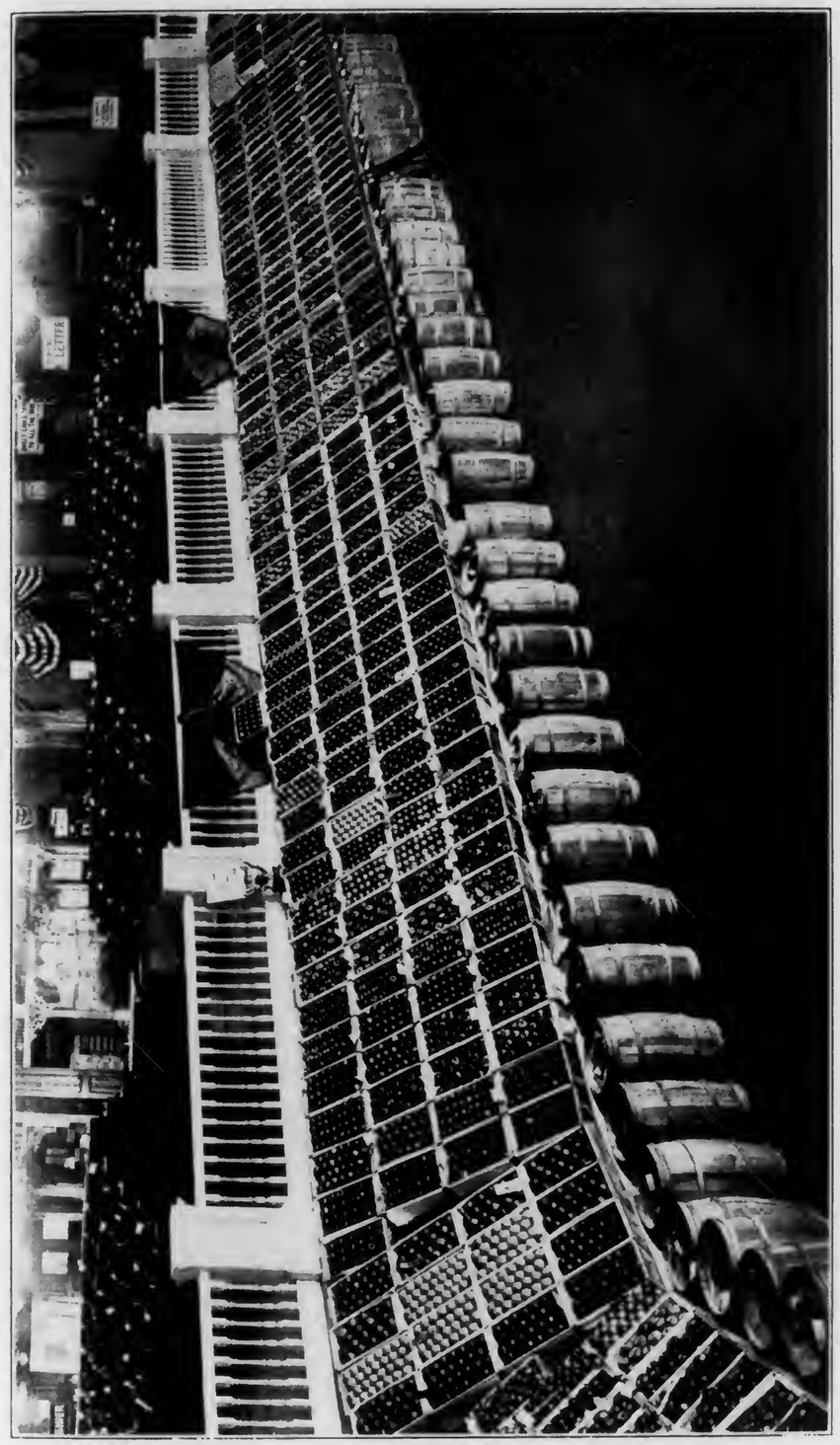

PART OF THE PITTSBURGH SHOW.

We need in our horticultural and agricultural processes better business methods. We need the system of co-operation which is correcting some of our mistakes.

We are attempting to pass an act in Congress to meet the faults in marketing our fruits. We are doing this partly in consequence of the Canadian "Fruit Marks Act," which has increased their output and decreased ours.

In pruning, I believe we are still not restricting the plants sufficiently. Feeding, restriction and protection are the three things necessary to successful horticulture; and we will meet with greater success when we adopt the same principles as the dairy men do, of feeding heavily at the right time.

But "restriction" is also necessary. The reason why the Baldwin does not bear every year is that it sets a large amount of fruit and men allow their orchards to overload, and then ask the trees to do more than they can.

Often such orchards bloom freely but set no fruit, from exhaustion at blossoming time and want of sufficient plant food. Overloading and under-feeding produces short-lived trees.

The principle I want to found my pruning on is to keep close to nature. When you go contrary to that you are going wrong and will be punished for it.

Many want to bring their trees into bearing as quickly as they can, but you take a small boy and build his constitution well and develop his brain well; and the time will come when he will have a strong body and brain and will be equipped so that he can earn large wages.

Apply this principle to trees, for they are like babies, and it is probably better to build up a strong healthy top before asking them to do their best work.

Good pruning of trees—especially apple trees—from the start, is not a mistake. Nip the buds off that you don't want and throw the energy into those you do.

Feeding is our prime need, then restriction by pruning, continued by thinning.

There are two periods of exhaustion. The blossoming time and the time of seed production, and the less you can have of both the better.

The more blossoms the greater the strain and the more fruit the greater the strain. The excess of fruit must be picked off before the seed is formed.

Many of our growers are becoming wedded to thinning apples because they find that it pays excellently. Apples in clusters can hardly be kept free of Codling Moth.

Trees are sometimes picked where there are no imperfect apples. I know of a grower in Michigan who picked 23 barrels from two Hubbarston trees; 21 of these were No. 1, two were high grade No. 2 and there were only three poor apples.

These trees gave a return of 12 times what the thinning cost and the man has gained a state-wide reputation.

Our mistakes are based largely on want of feeding, of restriction (pruning and thinning) and of protection (spraying, etc.) These

cover the whole process of fruit growing up to the time of picking and packing.

Tree roots should be pruned before heeling in, and the bruised roots cut off smooth with a good sharp knife. This forms a callous and starts the feeding roots of the new system.

I do not care for fall planting, we lose too many trees. It is better to heel them in at an angle and protect them. Trees heeled in an upright position do not come through the winter well. Ridging or banking high will help.

The best time to get a tree is straight from the nursery in the spring, but the nurserymen cannot handle trees on this plan in very large quantities. Fumigation has made a great difference in the way trees are exposed.

Some good growers think that fall is the best time to plant trees. You only require to ridge them up a little and they will do better than in spring, they think.

Among other common mistakes is the failure to select a well-drained, elevated site for the trees. Instead of increasing our acres of fruit, we might better increase our attention to what we now have. Quality pays better than quantity.

Most of our growers seem to spend more time and strength in settling the exact time to prune than they do in performing the work, with the result that trees get away from them and they end up in the "forestry" business.

In our spraying operations we lack knowledge of what we are trying to do and so make most terrible mistakes. In fact, a little more time spent in study and the development of our reasoning powers will pay larger dividends than devoting all our time to manual labor.

Just now we are being told that the trouble with our marketing methods of the apple crop is that we do not make use of the box in place of the barrel. But will you tell me why the barrel is unpopular and the box is sought for in our markets? Is it not because the contents of the barrel is, as a rule, bum poor "crap," while the boxes are honestly packed with good dependable fruit? That is the situation and when we put good fruit in any package and the purchasing public find it out, there will be more call for our products.

The fruit grower who imagines that he can fool "all of the people all of the time" is making the biggest mistake of all. Fair dealing not only gives a clear conscience and establishes self-respect, but it builds up the biggest bank account.

PROCEEDINGS OF WEDNESDAY MORNING, JAN. 17th.

The meeting was called to order by Vice-President Robert M. Eldon, who introduced Dr. Francis N. Thorpe, a fruit grower of North East, Erie Co., Pa. Dr. Thorpe's address was, in part, as follows:

THE FRUIT FARM AS AN INVESTMENT.

FRANCIS N. THORPE, *North East, Pa.*

An investment is valued by its returns. Large returns depend upon favorable conditions—large demand, limited supply, skilled labor, economical adminstration, in brief, the relation of cost of production to gross income.

A fruit farm considered strictly as an investment must be measured by the tests commonly applied to any legitimate investment plus conditions essential to the particular business of horticulture. It is largely the horticultural conditions which must be considered Limiting ourselves strictly to particular fruits, we must first consider local situation, that is, we must select the locality adapted to the particular fruit: apples, cherries, grapes, peaches, prunes, plums, berries, &c. The first condition for profitable fruit farming is location, and this is determined by climate. Soil is a less important factor than climate. Given the right climate, for grapes, cherries, peaches, &c., soil can, practically, be made. Soil consists of plant environment, which means available food, moisture, heat, humus. Chemical processes in the soil contributory to plant life depend upon climate, that is, temperature, moisture, disturbance of the soil (cultivation) and the actual presence of the plant root. The process of plant life is the fundamental problems in horticulture. Hence the incalculable importance and practical value of our Agricultural Colleges, Experiment Stations, Departments of Agriculture, the results of whose attempts to solve the great food problem are in part made available by innumerable reports; in part, by the presence of experts from these institutions, from time to time in various fruit localities. The time has passed for horticulture by "rule of thumb."

The location of the fruit farm within the climatic belt adapted to the particular fruit under consideration is determined, as an investment, by practical tests. As a rule that fruit farm is best worth having which is salable at a good price at any time. It is well to own land which any body interested in profitable horticulture would like to own. This rule includes both new and old farms. New lands are ever "coming into the market" and an investor must be guided by the market value. The tests here are obvious: location as to market; as to ordinary accessibility by good roads; as to local conveniences, school, church, post-office, shops, stores, physicians, &c., in considering which matters, telephone equipment is a factor. A farm near town, village or city, freight station, freight-siding, a farm on a good road, or roads, over which produce may be hauled at minimum cost is always salable. It is the farm, not the farm buildings which gives value. The old saying, "he that has two roofs has one

that leaks" hints at economy in building. A farm sells as productive land, not as an aggregate of buildings. A stock farm in the fruit belt is changed to a fruit farm, but the barns, sheds, &c., essential to stock-raising are quite useless on a fruit farm. So Cato, in his classic treatise on farming advises building in middle life, meaning that by this time the farmer knows best what he needs.

Market location is not a local question in a narrow sense. "Much fruit, many buyers" is the ruling principle. The Lake Erie and Chautauqua fruit belt is thronged by buyers through the season. In the city business of a kind by busines necessity (laws of profit and loss) locates in a section and there prospers best. So the banks, the wholesale houses, the insurance offices, the commission houses are in little settlements and there remain, the aggregate settlement perhaps moving at long intervals as the city grows. An isolated fruit farm is not easily made profitable unless its size is sufficient to dominate the market. Indeed the usual aggregate of fruit farms is practically, as a world-market, one vast fruit farm. In selecting a fruit farm the investor must like other investors seek to do business where business is done. And now arises the problem of attempting to raise fruit productively in new regions. Climate, soil are highly favorable but the locality is isolated. This means that one or two generations of farmers must wait for market facilities. It is a question whether a man cares to be either of these waiting generations. That he must decide.

But there are fruit farms and fruit farms, just as there are factories and factories. The land itself must lie right for fruit. A northern exposure, to insure protection against early, premature start of leaf and bud; drainage, or at least the opportunity for it, to secure against drowning and freezing of roots (as climate may determine); and such a lay of the land as permits economical cultivation, level surfaces, moderate grade, tillable soil under modern methods and tools, these are essentials to be considered. It is the rough, poor rebellious soil that cuts down the profits. A farmer is prone to value his land by his best acres, when in truth it is his poorest acres that fix his income. That is the best fruit farm whose poorest land is the most productive. He is the best farmer who takes best care of his poorest land. And it is a question of land, this matter of "The Fruit Farm as an Investment." Soils may be brought back to fertility by proper feeding, and the first question the investor in a fruit farm must ask is "What is the soil feed-bill?" This question is largely a question of the lay of the land. Land that washes is most expensive; hollows and pockets become too rich for fruit though productive of plant growth. A fruit grower is not raising shade trees.

And by no means least to be considered, in selecting a fruit farm, is outlook, neighborhood, scenery, weather conditions, adaptability of the land to practical "fruitscape" results. A well planned, well laid out, well kept fruit farm, well located is always marketable. The widow can always sell to advantage; the heirs (small children) inheriting a valuable farm are precisely in the position of heirs inheriting a valuable factory. Selecting a fruit farm is like selecting a father and mother to be born from: one may as well select a good one.

But every investment if profitable means ceaseless care, economical management, sound administration. This is a question of brains. No fruit farm will run itself, except into the sheriff's hands. No fruit farm is every quite up to the standard its masterful owner has set. Each year has accidents, failures, storms, sleet, hail frosts, blight, pests, this row of grapes, that section of the cherry orchard killed by lightning; a horse dies; some of the help fail, fertilizers fail to fertilize; tools break down; markets are fickle; fashion for fruits can change, and there are days of sickness and bad weather. But seed time and harvest have their round and the large conditions of horticultural success are matters of experience. The whole problem is one of administration. And here are the "Don'ts" and the "Do's" which experience is ever ringing in our ears:

Feed your land, says Franklin (he said "Keep your shop") and your land will feed you.

Crop your land and you lose your crop.

A hard soil means a lean purse.

Humus in the land is money in the bank.

Labor is capital. Use labor well and your capital grows.

A weak plant is a perpetual loss.

Standard varieties fill the basket.

Let Governments and State Colleges experiment,—unless you are a millionaire.

Rule of thumb is the rule for losing.

The best farmer makes the best book on farming.

It is the pennies that count, not the dollars in discarded tools.

There are times not to do things.

Trim the plant when it is at rest; its work is to bear fruit.

Much trimming means quality of fruit.

Better trim with a pen-knife than an ax.

Don't wound the tree or the vine, no man can at the same time lie in hospital and do active service.

The most profitable labor is profiting by its labor.

The eye makes the package and the package makes the market.

Look out for the lean spots on the farm; one lean spot eats up seven fertile spots.

The land likes a mixed diet, but it must be fed.

The best market comes to the best farm.

The man who knows all about fruit raising has not yet been born.

Handsome fruit brings handsome profits.

Stones and culls in your package sell the other man's fruit.

The quality of your fruit reflects your own. The quantity shows the willingness of the land.

Don't expect more from your fruit farm than you put into it.

Results.—Responding to care, a fruit farm located on the South Shore of Lake Erie, Erie County, Pa., shows:

Gross Returns.—$125 per acre, grapes; $400 per acre raspberries; $550 acre cherries (sour); $700 per acre goose berries; $600 per acre prunes; $350 per acre peaches. This means land at $1,500 to $12,000 per acre.

The fruit belt in Erie County, Pa. centres at North East. There may be found practically ideal conditions for horticulture. Gradually intensive is supplanting extensive cultivation; scientific farming is supplanting farming by "rule of thumb." The whole problem consists in getting on the side of Nature.

[Mr. Thorpe's property at North East, known as "Indian Arrow Vineyards," is the result of more than twenty years' care and development. It consists of some sixty acres and no waste land. There are some fifty acres in grapes, five in cherries (Montmorenci, Richmond), and plums, prunes, and a few peaches. A conspicuous feature of the property is a grove (original forest) of chestnuts, hemlock, white wood, three acres amidst which stand the farm buildings—commodious, modern—overlooking Lake Erie. The owner's residence stands on an elevation also overlooking the lake. Gas wells on the property and ample water supply (from North East water works). The region is one of great beauty and notably healthful. It is part of the famed Lake Shore and Chautauqua Fruit Belt.]

APPOINTMENT OF COMMITTEES.

As a Committee on Resolutions, the Chairman named the following: Robert J. Walton, Geo. W. Blaine, Chas. L. Thomas and Richard M. Atwater.

As a Committee to Nominate Officers for the ensuing year the following were named by the Meeting and appointed by the Chair: Abram Hostetler, R. L. Watts, R. H. Garrahan, Thomas Rakestraw, and Robert J. Walton.

CONVERTING A RUN-DOWN FARM INTO A PAYING ORCHARD AND MARKET GARDEN.

By Horace Roberts, *Orchardist and Gardener, Moorestown, N. J.*

Members of the Pennsylvania Horticultural Society: Two weeks ago it was my privilege to attend the session of the New York Fruit Growers' Association, and after attending that meeting and hearing the New Yorkers speak of their own apples and their own barrels, I would be very doubtful about buying a New York barrel of apples without seeing the middle of the barrel. What do I find in a Pennsylvania program? I find on top, a law professor, Dr. Thorpe. In the bottom one of the best known investigators in the United States, Prof. Stewart, and in the middle of the barrel, a plain New Jersey farmer, not even a specialist. I realize I am the middle of the barrel, and Mr. President, as soon as it gets tiresome, cut me off and make room for Professor Stewart.

I will begin by telling you how I started taking up old farms then tell you what the farms have done for me and after that tell you of our system of management.

At 21 I rented the old homestead. I wanted to plant it in fruit at once but my father was older and wiser than I and quickly told me that to plant our cultivated land in orchard would for the time

being cut my revenue off and that if I wanted land for fruit I must clear off more woodland. It was good advice to the boy but a death-blow to the timber. Where we cleared in the winter we would plant apples and peaches in the spring and then raise watermelons the first year between the trees. The next year we would plant sweet potatoes on that same ground and have a fresh tract cleared for young trees and watermelons. On virgin soil like that one crop of watermelons or sweet potatoes either is worth more than 50 years' growth of timber. Peach trees bear early and soon began to increase the income from the farm very much so that I had a little ready money. I then tried to buy the old farm but father said no. It was too big a thing, more than I would ever be able to pay for. No one member of his family need ever hope to own it all. As I could not buy the one I lived on, I bought an old neglected fruit farm, 7 miles from home, and farmed it in addition to my home farm. The year before I got it the fruit from that farm had averaged 10 cents a basket and the total revenue for the year had been $1,200. The first year as a result of trimming, spraying and fertilizing our apples on the new farm averaged 20 cents a basket and the farm sales were $1,900. The next year in spite of a severe hail storm our apples averaged 28 cents a basket —and the farm sales were about $3,000. The fourth year our apples averaged 40 cents a basket and the farm sales were over $6,000. All this time, the farm I lived on was also doing a little better each year so that I once more had some free money. By this time father had forgotten that no one of his sons could ever pay for the whole of the home farm and he sold it all to me. After making a settlement for the home farm (largely paper) I still had a little money left and I bought another right away. I engaged an old Irishman as foreman. I felt I could trust that Irishman to raise potatoes for me better than anything else. So we planted a great part of it in potatoes while we were getting it ready for fruit. We had a great crop of potatoes. The sales of the farm the first year were $4,100, the third year were $5,100 and last year the twelfth they were about $10,000 clear of commission. The other farms I have tackled have given me similar results.

How do we do it, simply by practicing intensive culture in an extensive way, by fertilizing, liming, draining and getting humus or life in the soil. We have taken all kinds of land, gravel, sand, clay and their combinations and we have found none that we have not been able to double the productive value of in 5 years or less. It has been our custom to take farms that were out of condition, whose reputation was poor and that other people did not want and after getting them develop them quickly in whatever direction we think them best adapted for. If it is wet we drain it. If it is too heavy and stiff, with lime, draining and cover crops we can soon make it more mellow. If it is too high and loose and inclines to blow away in the spring, by using lime and deeper plowing and keeping the land covered with something it soon gets the habit of lying still.

We believe in keeping the land busy. If you talk to a corn expert you will find he lays great stress upon early plowing and thoroughly working up the land several times before the corn is planted. We do this by putting a crop like peas, beans or onions that need

lots of tillage ahead of the corn. In this way we get more corn than if we had not done the early farming, the first crop is extra. The same system is true of all such crops as tomatoes, melons and cabbages. Then after all these crops we use cover crops, to protect the soil during the winter and have it in the best of condition in the spring. We try to be land builders not land robbers. Nor are we speculators nor boomers. We buy the farms low, they build themselves up and are revenue producers and we do not have to sell them, nor do we want to.

We find in most cases our New Jersey soil especially lacks lime. Nothing is so cheap as lime. We have long known the good results of lime on heavy land but the good effects of carbonate of lime on light land still astonishes us.

Now as to our method of farm management. It has been my custom when I get a farm to engage an ordinary farm hand as foreman by choice a man raised in my own neighborhood. I sort of take him as a partner and we run that farm together.

I pay him by the month, and he has charge of the men on that farm. In twenty years I have never had the first reason to suspect one of my foremen of dishonesty. When you see one of those men, you see a man who really feels he is doing it all. Why, they are so good and true to me, I don't know. I have very seldom had to change foremen; once or twice, but most of my farms have the original foremen on them; the man who started them is there yet. We get along nicely together. They always seem glad to see me come, and I am sure I am always glad to see them. Instead of being a worriment and a care, it is a pleasure to run these farms. A good many in this audience have come out there on the farm and tried to cheer me up a little, and I always enjoy having them.

One of the main things for a farmer is the sympathy of his own household. Now, let me tell you. The very first time I called on my wife—she had been a farmer's daughter and her father had moved into town—I asked her which she liked best. Your life or farm life? She told me farm life. Now, wasn't that encouraging? (Laughter.) That little woman would still tell you she likes farm life best. She generally goes around with me to these farms and is just as much interested as I am. My older boys are as enthusiastic as any farmers you ever saw. The oldest one is at Cornell studying agriculture. The next two will be somewhere studying agriculture next year. They are more enthusiastic than their father, and when they come back we will do still better. I have got a little red-headed boy at home so high. He wishes he could hurry up and grow big and learn how to farm.

My business has been developing these old farms. Instead of buying the high-priced land, I have bought them because they are cheap. I can see the possibilities in them. It is not what they are. It is what you can make them. You can do it out of the farm and do it at a profit, but times are changing. We have been doing this for twenty years. My neighbors are doing it and a lot of other things have come. First, stone roads, then rural delivery, then the telephone, so each farmer could get in touch with his commission man and know what stuff he gathered the day before sold for.

They do business on a better business basis. Times have changed. You have to find a man out of his head almost to have a farm change hands in our neighborhood. Farmers are prosperous. They have automobiles; they have steam-heated houses, and live as well as anybody. Sentiment is all right, but sentiment won't hold boys on the farm. But let me tell you, if you make your boys think that a farmer can make more money, have more fun, lay by a better competence for old age than any other line, you will put those boys in a state of mind that you cannot drive them off the farm with a club. You may think that is not true, but it is, and if you want to talk to real enthusiastic farmers, talk to my boys.

I don't care what kind of soil you have, you have to learn what it is good for, and then apply scientific business principles; we have great faith in the producing value of land and we are only beginning to appreciate our calling.

A Member.—Do you practice crop rotation?

Mr. Roberts.—Yes, but it varies for different things.

Question.—What crop does corn follow?

Mr. Roberts.—Why, ordinarily we put that on our grass sod, but a great deal of my land is in fruit, and we cannot practice rotation in fruit as we can some other things.

Question.—What I want to get especially is the crop before corn?

Mr. Roberts.—Peas, beans or onions.

Question.—Do you raise hay?

Mr. Roberts.—We raise hay. I don's stand here to say fruit is the only thing we can make money at. There is money in hay. There is no crop I have found yet but if you put a little scientific knowledge to it, it will pay well. Fruit is my specialty. There is more fun in that than anything else.

Question.—Do you sell your hay off the farm?

Mr. Roberts.—Yes.

Question.—What do you use for cover crops; do you use turnips for cover crops?

Mr. Roberts.—Yes, but Vetch and Crimson Clover are better.

Question.—How about alfalfa?

Mr. Roberts.—Where alfalfa will grow, fruit will grow, and I would rather raise fruit.

Question.—Do you raise alfalfa?

Mr. Roberts.—No, I do not.

Question.—You said you put a crop in ahead of corn that you cultivated. What crop do you put ahead of corn that you cultivate?

Mr Roberts.—Peas and beans. Plant them five feet apart and put the corn in between.

Question.—What time do you plant your corn?

Mr. Roberts.—From the middle of May until the forepart of June. It will do with us for the second week in June.

Question.—You spoke of your plan of labor organization. What arrangement do you have with the farm managers? Are they paid simply a salary, or do you work on a co-operative basis?

Mr. Roberts.—The plan is just this: He is entitled to good wages. I am entitled to interest on my investment. Beyond that, we can divide between ourselves on a fair basis, but he is entitled to get his wages first. It has worked well. I have got the good will of those men, and that counts for a whole lot. They are loyal and true. We put all our fruit under one brand. It gives us a good name in the market. I have no reason to practice deception, because the same customers get my goods the year around, and they depend on my goods being straight. Each foreman tries to keep his goods up to the standard. I have often had people tell me if they could put their goods in my baskets, it would bring 10 or 15 cents a basket more.

FERTILIZATION AND CULTURAL METHODS FOR APPLES IN PENNSYLVANIA.

Dr. J. P. Stewart, *Experimental Pomologist, State College, Pa.*

The Pennsylvania Experiment Station has been conducting experiments bearing upon the above subject, during the past five years. Altogether, it has now in operation 18 such experiments, involving 11 soil types and 3,660 trees. In many respects, this series of experiments is by far the most comprehensive of any similar series thus far reported in America. In number of soil types; in the number of treatments and checks; in number, variety and range of age of the trees; in duplications of the experiments of a given type; in the amounts of fruit involved; and in the fact that the experiments are distributed over the state and located as a rule in regions generally recognized as being well adapted to apple production;—in all these respects we believe that the Pennsylvania orchard experiments enjoy distinct advantages over most previous efforts to answer the questions involved.

The results considered in the present paper are chiefly from 10 experiments, containing 2,219 bearing trees and involving 10 different soil types. Some of the general features of these experiments are given in Table 1.

TABLE I.—LOCATION, SOIL TYPES, VARIETIES AND TREES IN EXPERIMENTS AWAY FROM THE COLLEGE.

Expt. No.	County.	Soil.	Varieties.	Age. 1911.	No. of trees.
215[1]	Adams	Porters loam	York and Stayman, ...	12	160
216	Franklin	Mont Alto fine sandy loam	York and Jonathan, ...	12	160
220	Bedford	DeKalb stony loam,	York and Baldwin, ...	13 & 23	160
217	Franklin	Mont Alto loam	York and Gano,	18	358
218	Franklin	Hagerstown clay loam,	York and Albemarle, ...	12 & 16	400
219	Bedford	Frankstown stony loam	York, Jonathan, Ben Davis and Gano, ...	9	320
221	Wyoming	Chenango fine sandy loam	Spy and Baldwin, ...	39	115
336	Chester	Chester loam	Grimes, Smokehouse and Stayman, ...	9 to 11	120 & 105[2]
337[3]	Mercer	Volusia silt loam	Spy, Baldwin and Rome, ..	4	180 & 180
338	Lawrence	Volusia silt loam	Baldwin, ...	23	80 & 105
339	Bradford	Lackawanna silt loam,	Baldwin and Fallawater, ..	17	120 & 16

It will be noted that the soil types range from heavy clay loams, experiment 218, through silt and plain loams to light sandy and stony loams, in experiments 216 and 219.

The first three experiments deal with the influence of fertilizers, and involve 10 treatments and 6 checks in each case. The next four experiments deal with cultural methods and involve 12 treaments in each case, except the last, which has six. The last four experiments are a combination of portions of the first two types and deal with both fertilizers and cultural methods.[4] As shown

[1]The names and addresses of the owners of the orchards in which these experiments are located are as follows: 215, Tyson Brothers, Flora Dale, Pa.; 216, D. M. Wertz, Quincy; 220, Mrs. S. B. Brown, Manns Choice; 217, J. H. Ledy, Marion; 218, Ed Nicodemus Waynesboro; 219, J. R. Sleek, New Paris; 221, F. H. Fassett, Meshoppen; 336, A. Darlington Strode, West Chester; 337, A. M. Keifer, Greenville; 338, J. B. Johnston, New Wilmington; 339, F. T. Mynard, New Albany.

[2]In the two sets of figures in this and the following experiments, the first gives the number of trees under fertilizer experiment, the second those under differing cultural methods. In Experiment 339, the latter includes only a mulch plot.

[3]Trees set out in connection with these experiments and not yet in bearing, hence excluded from consideration at this time.

[4]For further details, see our Bulletin 100 and our Annual Report for 1910-11.

in the table, the trees are of 10 varieties, though with one exception there are two or more varieties in each experiment. In age at the present time, the bearing trees range from 9 to 39 years; and since the work started they have produced over 1,315,000 pounds of fruit.

In this one item of fruit, we may call attention to the facts that, so far as American experiments are concerned, this amount is more than treble that reported in any other single experiment, and very distinctly more than the total fruit reported from all other similar experiments combined. This does not mean that the importance of the experiments elsewhere is to be minimized in the least, but it should help to emphasize the fact that, in those cases where conclusions or attitudes are in conflict, very careful attention should be given to the actual and relative amounts of evidence upon which the differing attitudes are based. In fact, within our own experiments we can find the counterparts of practically all those reported elsewhere. If we had fewer experiments,—for example, only one on fertlization and another on cultural methods,—our conclusions could be much more easily formulated, and we might readily become ardent partisans on either side of the questions, the side depending merely upon which of the present locations our experiments chanced to have. In other words, if we attempted to base our conclusions upon any one or two of our present experiments, those conclusions would be very different from any we would now formulate, on the basis of all the results. There can be no doubt that when the whole truth is known, we shall be able to account for *all* of the facts, and this is what we are undertaking to do.

The Influence of Fertilization.

The first factor to which we shall give attention is that of fertilization. Can the yield, color, size and wood-growth[5] of apples be influenced by fertilization, and, if so, how and under what conditions? This has always been an important question, and five years ago, when we were starting our experiments, we could find no data upon which to base a definite, well-founded answer. We do not say that we can fully answer it yet, but such progress as we have made may be partially seen in Tables II and III.

[5]Quality is omitted from consideration at the present time, not because we do not consider it important, but because as yet we have no measure of quality sufficiently accurate and impersonal to enable us to make satisfactory comparisons of the fruit under different treatments.

TABLE II.—INFLUENCE OF FERTILIZERS ON YIELD. (JOHNSTON ORCHARD, EXPERIMENT 338).

(Total yields of fruit on each plot and annual yield per acre).

	PLOT.									
	1	2	3	4	5	6	7	8	9	10
	Check.	N. P.	N. K.	Check.	P. K.	N. P. K.	Check.	Manure.	Lime.	Check.
YEAR.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1908, ...	90	528	237	446	57	759	211	278	558	106
1909, ...	675	6,018	5,257	1,932	3,089	6,621	2,008	3,531	1,216	1,266
1910, ...	2,575	3,265	1,822	3,168	3,552	2,108	1,629	6,149	3,185	3,505
1911, ...	283	7,563	7,816	617	1,227	8,209	1,262	4,874	388	106
3 yr. totals, ...	3,533	16,846	14,895	5,717	7,868	16,938	4,999	14,554	4,789	4,877
Bushels per acre, ...	141.3	673.8	595.8	228.6	314.7	677.5	200.	582.1	191.5	195.

TABLE III.—EFFECT OF FERTILIZERS ON YIELD. (JOHNSTON ORCHARD).

(Average returns from certain treatments during past 3 years).

Treatment	Checks (Av. 1, 4, 7, 10)	Manure (Plot 8)	N-Fertilizer (Av. 2, 3,6)	P.K.-Fertilizer (Plot 5)
Totals 3 yr., ...	4,781 lb.	14,554 lb.	16,226 lb.	7,868 lb.
Ratios, ...	100	304.4	339.4	164.5
	....	100	111.5	....
Average An. Yield per A.,	191.2 bu.	582 bu.	649 bu.	314.7 bu.
Av. Gain per A., ..	....	390 bu.	457 bu.	123 bu.

These tables are from one of our "combination" experiments, involving both fertlization and cultural methods, and started in 1908. The fertilizers have therefore had a chance to affect the crop only during the past 3 years, and it is for that period that the totals and annual yields per acre are computed.

Even a glance at these tables can leave no doubt as to the positive and profound effect of *proper* fertilization on the yield of apples. It will be noted that the checks run fairly uniform, averaging a little over 190 bushels per acre annually. Lime applications (at the annual rate of 1,000 pounds per acre) have given almost exactly the same returns as the average check. The phosphate and potash combination has affected yield in this case rather decidedly, having raised it by 123 bushels per acre. This may be partly due to a slight superiority in location, as indicated by the fact that its adjacent

check is the highest in yield and is within 86 bushels of the phosphate-potash treatment. While this increase in yield is fairly satisfactory, there is nothing in the growth or appearance of the trees of plot 5 that would lead one to believe that their treatment is appreciably superior to that of the checks. In other words, the trees of plot 5 still look starved and indicate that there is something else lacking, although it will be noted that this is the fertilization ordinarily recommended for orchards.

This lack is very decidedly met by the manure treatment of plot 8. In this plot, the trees are making a luxuriant growth, both in wood and foliage, and the yields have been increased by 390 bushels per acre annually,—a very satisfactory exchange for 12 tons of stable manure. Even this increase in yield, however, is considerably less than those obtained on the plots receiving a nitrogen-carrying fertilizer. Under the latter treatment on three plots, the *average annual yield* has been increased from 191 bushels on the checks to 649 bushels on the fertilized plots, or an annual *increase* of 457 bushels of apples per acre. This resulted from fertilizer applications that actually cost less than $17, and the essentials of which can be bought at retail for about $10 per acre. During the past year,—the fourth year of the experiment,—as shown in Table II, the yield on plots 2 and 3, compared with that of their adjacent checks, was at the rate of 17 to 1, the yield on the checks being at the rate of 54 bushels per acre, while that on the intervening nitrogen plots was 922 bushels.

There is no reasonable possibility of these results being due to any other agent than the fertilizers. The trees are all of the same variety and same age. They receive the same spraying, pruning, soil handling and other care. The soil is practically level and very uniform. The treatments are abundantly checked. In fruit, foliage, growth and general health of trees, the benefits stop abruptly where the fertilizers stop, and similar results are being obtained by the owner in other parts of the orchard, on the same and other varieties, with the combinations of fertilizers found effective in the experiment.

In regard to the relative values of the different fertlizer elements, it will be seen in Table II, that nitrogen is evidently the first limiter. Thus, the phosphate and potash combination in plot 5 has given an increase of 123 bushels per acre, while by the addition of nitrogen to this combination, in the adjacent plot 6, we get an increase of 486 bushels. In other words, the addition of nitrogen to the treatment ordinarily advised for orchards, resulted here in nearly quadrupling the benefit. In plot 3, where the phosphates are omitted, it will also be noted that there is an annual deficit which amounts to nearly 80 bushels per acre. This doubtless indicates that phosphorous is the second limiter and that the yield in plot 3 is being reduced by lack of this element. Potash applications, on the other hand, have been of practically no avail in this experiment. This may be seen by comparing plots 2 and 6. The annual addition of 150 pounds of actual K_2O in the latter treatment has resulted in a gain of only 3.7 bushels of apples.

The above results were obtained without any aid from tillage or cover-crops, the fertilizers being merely sowed over the surface

of untilled soil, on which there was a light sod composed chiefly of mixed grasses. Here the question may be raised as to whether equal or superior benefits may not have been obtainable with some form of cultural methods. This question is answered in Table IV.

TABLE IV.—CULTURAL METHODS AND FERTILIZERS ON YIELDS. (JOHNSTON ORCHARD).

Plot	XIII	XII	XI	(Av. 2 & 6)
Treatment.	Sod	Sod-Mulch	Tillage and Cover Crop	N-P-Fertilizer
	lb.	lb.	lb.	lb.
1908, ...	1,170	2,265	2,843	2,813
1909, ...	17,982	7,455	10,702	27,649
1910, ...	2,940	16,789	17,254	11,752
1911, ...	3,550	2,629	7,500	34,502
Totals last 3 yrs., ...	24,472	26,873	34,456	73,903
Ratios, ...	100	109.8	144.8	302
Ratios, ...	.....	100	131.9	275
Ratios, ...	.....	.....	100	208.4
Average Annual Yield per Acre, 3 yr., ...	223.7 bu.	245.7 bu.	324.1 bu.	675.7 bu.
Average gain per A.,	.....	22 bu.	100 bu.	452 bu.

In this portion of the experiment, which is devoted to cultural methods, the plots are larger and contain 35 trees each. The yields of plots 2 and 6, from the fertilizer portion, therefore, are raised to their corresponding values for plots of equivalent size. No fertilizers were used on the cultural methods plots, until the season just past. They were used then uniformly on all treatments, primarily because the sod plot had gone two years with very little fruit, though all the trees of these plots were plainly in need of something additional.

In Table IV the sod plot shows a little higher annual yield than the average of the checks in the fertilizer portion, this being due to an exceptional crop that occurred on this plot in 1909, and from which the plot has not yet recovered. In the next plot, we see the effect of adding a mulch to the sod treatment. In this case, although all the herbage that grows is left in the orchard, and a further application of 3 tons of straw per acre is added to the plot, the average annual gain is only 22 bushels per acre. In the next plot, we find that tillage and leguminous cover crops have given a fair increase, amounting to 100 bushels per acre on the average. This however, is hardly to be compared with the 452-bushel increase shown in the next case, which is obtained without tillage of any kind, merely by the addition of a fertilizer that carries the elements that are evidently lacking.

In some quarters one would gather the impression that apples can scarcely be grown without tillage. While we have nothing against proper tillage as an orchard treatment, yet this and other results from our experiments show that it is by no means indispensable in the production of first grade apples and that it can be readily over-emphasized like anything else. There are many situations that are otherwise very well suited for apples, where tillage is decidely inadvisable, and where, with proper management, the trees would get along very much better without it. In such situations it is undoubtedly preferable to sow the orchard down to some leguminous crop as a permanent cover and follow the mulch system, properly supplementing it with fertilization. For this purpose, hairy vetch is doubtless preferable, on account of its relatively low moisture draft, and its usually excellent staying powers when once well seeded down. Whenever it is crowded out by the grasses, the orchard may be re-plowed and again sowed to vetch, if the trees seem to require it.

Data on Fertilizers from Other Experiments.

Thus far we have confined our attention to a single experiment, primarily because the contrasts in it are so great that both the existence and nature of the effects could scarcely fail to be recognized. To go through each experiment in this way would be impossible in our present space, hence we have condensed into the next two tables a statement derived from the results of six experiments, including the one just discussed. These tables show the average effects of the different fertilizer elements, obtained in six experiments, during periods covering from three to five years as indicated. The effects are calculated as closely as possible and are expressed in terms of per cents of benefit based on the normal performance of the treated plots. The methods followed in making the calculations are described briefly in our Bulletin 100 from the Pennsylvania Station, and described in full in our Annual Report for 1910-11.

TABLE V.—EFFECT OF FERTILIZER ELEMENTS ON YIELD, COLOR, SIZE AND GROWTH.

(Calculated Percents of Benefit).

Expts. 336, 338 & 339.	Yield 1908-11	Yield 1911	Color 1909-11	Size 1909-11	Growth 1908-11
	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.
Nitrates in combination, ...	94.05	163.1	—13.3	—4.81	24.11
Phosphates in combination, ..	36.65	35.8	—.95	4.04	—3.97
Potash in combination	—4.65	—6.42	—.1	13.2	4.17
Complete fertilizer, ...	122.5	166.4	—16.0	5.93	27.50
Manure, ...	144.1	169.8	—14.3	30.8	37.49
Lime alone, ...	19.5	—3.07	—2.9	19.4	8.04

TABLE VI.—EFFECT OF FERTILIZER ELEMENTS ON YIELD, COLOR, SIZE AND GROWTH.

(Calculated Percents of Benefit).

Expts. 215, 216 & 220	Yield 1908-11	Yield 1911	Color 1908-11	Size 1908-11	Growth 1907-11
	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.
Nitrates in combination, ...	41.7	18.05	—12.35	—1.67	14.83
Nitrates alone, ...	30.0	39.10	—16.00	—6.23	18.33
Phosphates in combination, ...	15.4	9.35	—1.55	.925	.62
Phosphates alone, ...	—7.4	—7.37	2.80	—1.21	.52
"Floats" alone, ...	—18.8	6.4	7.70	—1.92	—6.00
Potash in combination, ...	15.2	12.80	6.55	5.67	2.71
Complete fertilizer, ...	68.8	65.7	—16.00	4.30	19.10
Manure, ...	101.—	221.90	—9.90	4.73	24.70
Lime alone, ...	—12.0	15.1—	.8	—1.05	3.1

In general, these tables corroborate and extend the deductions obtained from those already considered. The addition of the results from the other experiments have reduced the apparent benefits somewhat and the relative values of certain materials are also slightly changed. We have included the results of the first year in the yields of Table V, which also reduces the apparent benefits, since the fertilizers had not yet had time to operate. Even at that, however, we see that the yields during the 4-year period have been nearly doubled by the addition of nitrates, in experiments 336, 338 and 339 and with the same material they have been increased by 41% in the younger experiments of Table VI.

Phosphates, when used in combination with nitrogen or in a complete fertilizer, maintain their position as the next limiter after nitrogen, though they are closely pressed by potash in Table VI. On the other hand, neither acid phosphate nor "floats" nor lime, when used alone, have shown any consistent benefits on yield thus far. Their apparently *negative* influences on yield may be smoothed out in time, as indicated by some of the results of the past year. There is some evidence, however, that certain of these negatives really indicate a toxic action that is manifested only under certain conditions, but we have not yet carried this far enough for definite statements.

The important advantage shown by manure, especially in Table VI, is doubtless largely due to the very full crops on the manure plots of those experiments during the past year, which was rather an off year for the similar plots receiving complete fertilizer. The better moisture-conservation under the manure and the larger amounts of plant food carried in it also probably account for a part of the superiority. In general, however, we do not find any important superiority in manure over a proper commercial fertilizer, neither in actual nor net increases. Manure is undoubtedly a safe and valuable material to apply in orchards, when it can be satis-

factorily obtained in sufficient amounts. But with very few exceptions, thus far in our experiments as a whole, wherever manure has given important increases, these increases have been approached or surpassed by a proper commercial fertilizer.

Correlation Between Yield and Growth.

In regard to growth, it will be observed that, in general, the improvements in it have accompanied those in yield. The same materials that have improved the one have generally improved the other. In other words, as a rule, our best growing plots have been our best fruiting plots. Contrary to a prevalent notion, therefore, we may say that growth and fruiting are not necessarily antagonistic, but rather are associated, unless either should occur in abnormal amount.

Data and Deductions on Color.

In regard to color, it will be observed in Tables V and VI that none of the applications have given any important increases, and most of them have given decreases. Similar results have also been uniformly obtained elsewhere, so far as we have received the reports. The same is essentially true of applications of iron salts. From these and other considerations, therefore, we believe that color in apples cannot be materially *improved* by soil applications, and that it is *primarily dependent on maturity and sunlight.*

This refers only to the red colors in apples. The yellow colors can probably not be affected by any external agency. Physiologically, the yellow color is connected with certain bodies located in the superficial layers of cells in the apple skin. It develops independent of light, and its intensity depends merely upon the degree of maturity or ripeness. The red color, on the other hand, is a constituent of the cell sap; it is capable of being influenced by a number of agencies; and its intensity is dependent primarily upon the amount of light received during the latter stages of maturity. In other words, we get back to its dependence upon maturity and sunlight. Conditions increasing one or both of these factors, such as late picking, light soils, open pruning, and sod culture will increase color. Opposite conditions decrease it.

From this viewpoint, the reduction in color caused by the nitrates and the manure is easily explained. It is evidently due to delayed maturity. That such is the case was shown the past season, especially in the Johnston orchard, where the fruit of the nitrogen plots was left on the trees until it reached approximately the same stage of maturity as that on the checks when they had been picked. The difference in the dates of picking, which corresponded closely with the delay in maturity, was exactly 3 weeks,—from September 28 to October 19. And when the final picking was done, the amount and brightness of the color on the nitrate plots was actually greater than it had been on the checks. The average increase in color on the treated plots, 2, 3 and 6, over the checks, 1, 4 and 7, was actually as great at 10.3%. The great importance of maturity on the tree in increasing color is thus clearly shown.

The importance of sunlight, we had already determined in an earlier experiment. In it, we found that after the apples were picked, exposure to sunlight increased their redness by 35%, while the checks in the dark and those exposed to electric light showed no definite increase.

We may also mention the facts that color may be materially affected by certain kinds of spraying and by internal variations such as appear in the solid-colored variants from the Gravenstein and 20-Ounce. These points also are discussed in our Annual Report for 1910-11, but space is too limited for further consideration here.

Relation of Fertilization to Size.

Again referring to Tables V and VI, we see that nitrates have apparently reduced the average size of the fruit. Phosphates have given only a slight benefit, if any; while potash and manure have given quite important increases. This apparent benefit from potash is interesting, and it may indicate an actual fact, since size depends so much upon moisture and potash has been credited physiologically with the ability of increasing the osmotic power of plant cells.

All these apparent influences on fruit-size, however, must be considered in their relation to the size of the crop on the trees. A year ago, we plotted a number of curves from data given in connection with a fertilizer experiment at the New Jersey Station, in order to determine definitely, if possible, whether any relation existed between these two factors,—fruit-size and size of the crop on the tree. We found that no correlation exists below what we may call a certain critical point, and that, under the New Jersey conditions, the number of fruits on even moderate-sized trees had to exceed about 1,400 per tree before any perceptible correlation appeared. *And above this critical point,* however, it is probable that *crop-size is the dormant influence on the size of the fruit,* though the exact position of the critical point may doubtless be raised or lowered somewhat by local conditions of moisture, plant food, etc.

In our judgment, this has a bearing upon the fact that nitrogen has apparently failed to increase the size of the fruit in our experiments. The crop-size was raised so much that full size of the fruit was not obtainable.

It also has an important bearing upon thinning. It means, in general, that if one thins an apple tree of even moderate size before the number of fruits has reached a critical point, which may be 1,400 or more, he can hardly expect to modify the size of the remaining fruit, and the most effect of the thinning will be an actual reduction in total weight of apples at least for that year. Exceptions to this may appear in varieties of extra large size, or in seasons or locations that are exceptionally dry.

It also means that, below the critical or the thinning point, there is opportunity for the other factors to exert their influence. It is here that such factors as fertilizers, cultural methods, moisture-supply, and heredity show their effects, and they may co-operate in such a way as to materially raise the critical point. This assumes that the variety is properly located in respect to temperature and

length of growing season, both of which are factors that may have an influence on fruit-size. We also may mention here the factors of pollination and number of seeds per fruit, which have been found to affect fruit-size by Ewert and Muller-Thurgau in Germany.

Suggestions on the Use of Fertilizers in Orchards.

The foregoing discussion does not mean that all fertlizers or all orchards will give a profitable response to fertilization. There are too many other limiters for that. Some of our experiments and some treatments have given no important results as yet. This may be due to improper moisture supply, relative youth of some of the trees, or to the action of some other one or more of the many possible limiters.

All the facts, therefore, emphasize the necessity for local or community trials. It is unsafe for the grower to assume either that all orchards need fertilizers or that no orchards need them. Either of these attitudes, if consistently acted upon, is almost sure to prove costly to its possessor. The only safe attitude is the one that views the orchard like other crops, knowing that lack of available food is undoubtedly the limiter at times, and using proper fertilization extensively only where and when it is needed.

As to what constitutes a proper fertilizer, on the basis of present results, we are suggesting a combination that will carry about 30 pounds actual nitrogen, 50 pounds of actual phosphoric acid (P_2O_5) and about 25 pounds of actual potash (K_2O) per acre. Where there is evidence that potash is needed, the above amount may be increased to 50 pounds of K_2O. The former amounts are carried in 500 pounds of a 6-10-5 fertilizer, and the latter are given by the same weight of a 6-10-10 material. We apply the nitrogen by using 100 pounds of nitrate of soda and 150 pounds of dried blood, thus getting quick action and also one that is prolonged well through the season. The phosphates may be carried in 200 pounds of steamed bone meal or raw rock phosphates, or in about 350 pounds of acid phosphates or basic slag. The potash may be carried in 50 or 100 pounds of muriate or high-grade sulphate, depending upon which of the formulas is desired, or in 100 or 200 pounds of low-grade sulphate. Upon the relative values of these latter carriers, we have very little evidence as yet.

The above amounts are intended as annual applications for bearing trees of medium age where most of the ground is to be covered. For younger trees, they may profitably be reduced, approximately in proportion to the amount of soil to be covered. On older trees or in special conditions, the combination is expected to be varied as later results direct. For example, in some instances, especially in connection with sod, we have found that the amount of nitrogen is apparently a little too low, while with tillage and leguminous cover crops it is likely to be somewhat higher than necessary.

As to where fertilization is needed, this is more difficult to define, and probably the only certain method of determining it is by actual trial. These trials are very simple. Merely leave a typical portion of the orchard untreated for three or more seasons as a check

on the value of the treatment, and carefully mark and record the trees in at least one of the groups. There are a number of points, however, that will aid one in determning the relative size to make these groups, or in other words, aid in deciding whether to leave most of the orchard in the check or in the treated portion.

In general, for two years at least the check should be much the larger in most young orchards or in any orchard that is doing well in growth and fruiting and retains a green and thrifty foliage well through late August and September. The fact that the trees are well loaded in a given year, however, is no sufficient reason for omitting the fertilizer that year. In fact, that is one of the best reasons and times for applying a proper fertilizer rather liberally, in order to prevent the total absence of a crop the following year and in the long run to steady the annual production.

In case of the reverse conditions:—old orchards or those not retaining a thrifty look throughout the season or not growing and bearing regularly and satisfactorily,—it is best to reverse the procedure and fertilize most of the orchard, leaving only a small block as a check. In all cases, however, we strongly advise the use of a check until the real value of the treatment is thoroughly established. Even then it is not desirable to omit either the check or the treatment entirely. The less valuable one may be reduced to a small space, but it should not be omitted entirely if the grower cares much for his orchard. One of our experiments, for example, showed practically no response until the fifth year, and then when the cropping strain began to appear, quite marked differences arose in favor of the properly fertilized plots.

The time of application we also consider important, especially in the case of nitrates. While our evidence is by no means complete on this point, yet we have some indications that nitrates applied too early in the season may be wholly lost to the trees. Other evidence leads us to believe that distinct harm may be done by making nitrate applications too near the fruit setting time, especially in the case of peaches. We feel, therefore, that nitrates should be applied not earlier than petal-fall in apples and probably not later than the first of July, though we have had some very good results from applications made as late as July 8. Making the applications within this period also permits one to vary the amount applied somewhat in accordance with the amount of fruit set on the trees.

With the less soluble and slower acting minerals, the application time is less important. We know some careful observers who regularly apply their phosphates and potash in the fall on peaches and claim that this gives the best results. Thus far we have felt that the time of application for the minerals is of relatively little importance, since they are rather quickly fixed in the soil, in any case, and they do not leach readily. We, therefore, apply them along with the nitrogen at the time that we consider best for it.

The method of application that we have followed is merely to scatter the fertilizers broadcast over the surface of the ground, taking care not to get it too close to the tree trunk, where there are few absorbent roots, and extending the applications well out beyond the spread of the branches. This may either be left on the surface

to be washed in by the rains or it may be lightly harrowed or plowed into the soil. With this all done, it is well to remember that the fertilizer applied in any given season can hardly affect materially the yield of that year, since the fruit buds are formed in the latter part of the preceding season. Important results, therefore, should not be expected before the following season, at the earliest, and, as stated above, they may not appear until considerably later and still prove of value.

PROCEEDINGS OF WEDNESDAY AFTERNOON, JANUARY 17, 1912.

The meeting was called to order at 2 o'clock, and the Chairman introduced Mr. C. E. Bassett, of Fennville, Michigan, who addressed the convention on

ESSENTIALS OF SPRAYING.

Mr. Chairman and Friends:—Spraying is of really modern origin, and its use has only been general practically during the time I have been interested in fruit growing. The matter of spraying is practically a fixed proposition. It is something I don't believe we are ever going to get along without. I believe it is something we are going to improve upon, and I believe, in a general way, that while spraying is a most expensive operation, it has paid us, outside of the known foes it has combated, in the improved condition of trees and vines and plants. I was rather startled this morning by the statement of Prof. Stewart. I think it was that he feared that spraying was of detrimental influence, had a bad effect. It is possible the chemist may analyze the work and state it has some injurious effect, but at any rate, we know in the cleaning up of our trees, as a result of spraying for San Jose scale, with lime and sulphur, we have certainly rid the trees of a condition or conditions that were quite disastrous. It is not possible, I believe, for scientists to tell us absolutely what we have destroyed. I try to get to the Department of Agriculture at Washington at least once a year and look over things there, to keep in touch with the improved methods of spraying, and so on, and I have often had it emphasized and brought close to my mind, that although scientists understand a great deal, the knowledge we have yet to gain is many, many times that we have already secured; that really science is an experimental state, and there are many lower forms of plant life which we classify as fungi, that we don't know and in cleaning up our trees with lime and sulphur as we have done for the scale, we have also destroyed certain conditions and have improved the general health of our trees by the application of these chemical sprays.

The success of spraying depends upon three things,—the use of the proper mixtures or the proper chemicals, at the proper time and in the proper way, and just what those proper things are is a difficult matter, perhaps, to absolutely say, but there is one thing that you and I must know first of all. I wish I could talk to some of the people in the back forties, who are not here. I am talking

THE "BEST TWENTY-FIVE BOXES," STAYMAN WINESAPS.

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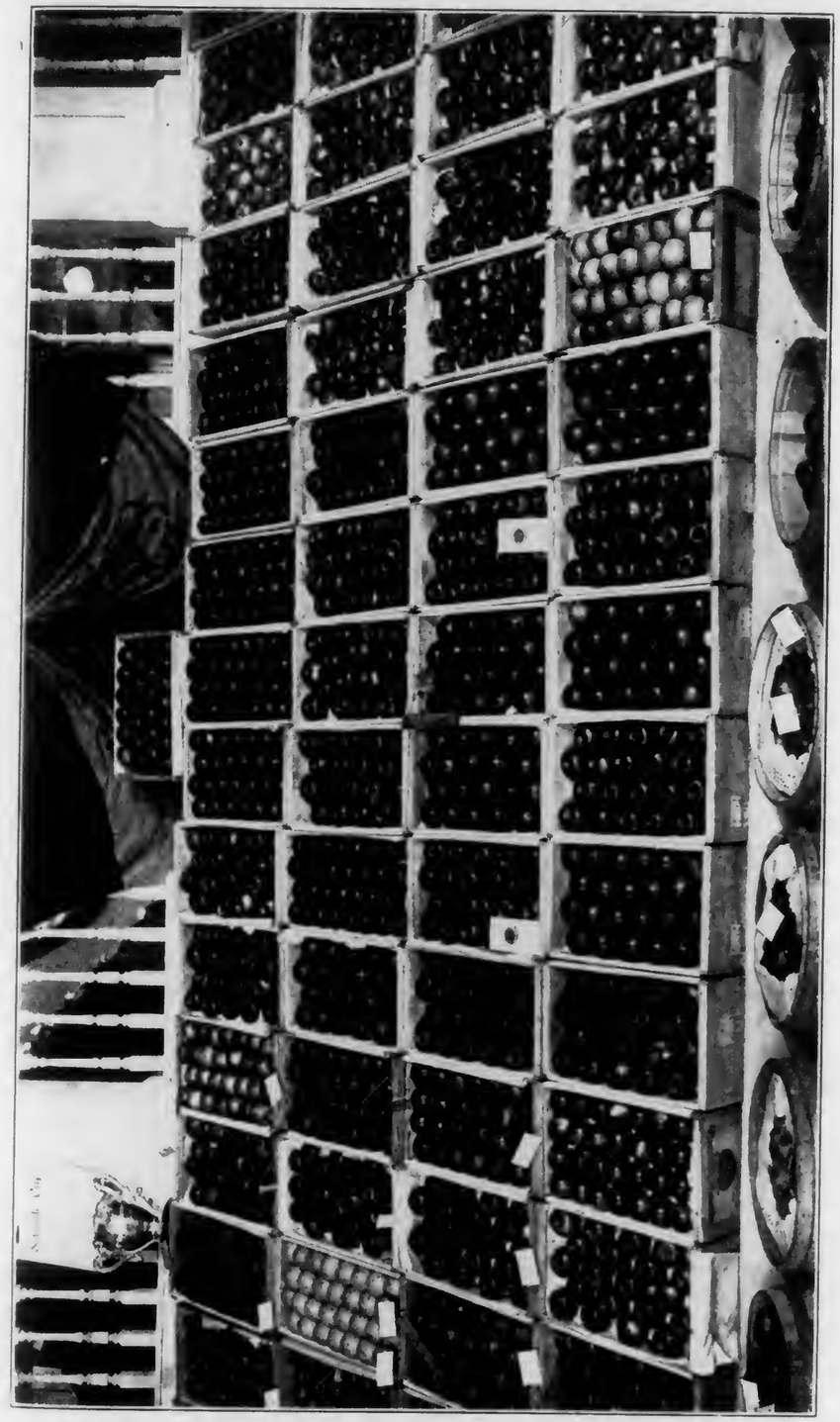

THE "BEST" TWENTY-FIVE BOXES," STAYMAN WINESAPS.

to men who don't need this talk. I am going to start by saying that nine-tenths of the failures we find in spraying operations are due, first of all, to a lack of knowledge of what we are trying to do; what are the foes we are combating? A prominent man in my county, who had been a fruit grower more years than I am old, took up this matter of spraying, and talked it over with me, and with his friends and neighbors, and we in a general way tried to advise him. He bought a good outfit, and went after those particular pests that he had trouble with. He was trying to raise sweet cherries. He came to me with blood in his eye, for he was a quick-tempered man, and condemned the whole proposition, saying it was all tommy-rot, all foolishness. I asked him what the matter was. Shoving a branch under my nose, he said, "Well, look at that." I looked at it and recognized it as a case of cherry aphis—a little aphis, which you know attacks the foliage and causes it to curl up, and in that cluster of leaves the aphis does its work. He was condemning spraying because he applied the remedy which he said in this case was Bordeaux mixture and poison. As a matter of fact, Bordeaux mixture is a wonderful thing to destroy fungi, but is absolutely harmless as an application on such insect life; and even the poison wouldn't affect the aphis. We don't poison San Jose scale because the louse doesn't chew and swallow. We have to spray that with a spray that kills by contact, because, it is a different sort of creature. It is an insect which sucks, so we have to remember, among insects we have two classes of remedies, because we have two classes of insects. I am talking in the presence of men who are entomologists. The point I want to make is, that we must have a knowledge of the foes we are combating. That is the first knowledge we must have. This man tried with Bordeaux mixture to destroy a sucking insect —it wasn't the proper application.

The proper application at the proper time and in the proper manner. The proper time, my friends, is a stumbling block. It is easy enough to tell men when to spray to destroy San Jose scale. We can make almost a cast iron rule for that. We spray in the dormant period, and as far as the application, I don't think Pennsylvania and Michigan will disagree, because I think you have been brought up to use lime and sulphur, and while I don't wish to say oils and other remedies may not be equally as good, I still say from the experience we have had in Michigan, that lime and sulphur is a good friend, and a friend that should not be cast aside at present.

Now, further from that, the proper time, there are certain things we spray for, when it is most difficult to tell the proper time, and especially in apple growing, in our section, is the exact time for spraying to catch the first brood of the codling moth. We have had in our section the advantage of having the United States Department of Agriculture man doing that laboratory work there for several years. Prof. Waite did his work there on the little peach, and Scott, Quaintance, Hammer and Hawkins, those men have all done grand work in our locality, and they have been of an immense amount of good to us. For instance, let me touch upon this question of spraying for the first brood of the codling moth. We know we want to spray the apple before the blossoms open, then after the

calyx drops, but the exact time depends on something else; that is, the time of the birth of this codling moth and the time of its action. In our section—we are located the same as your section at North East, and we are influenced by exactly the same weather conditions that Dr. Thorpe touched on this morning,—the matter of the lake being our protection, our cold storage and our supply of heat. Now, back from the lake six miles, where I am located, we have a different time of blossoming than they do right at the lake, more than you would imagine; sometimes fully a week's difference between the blossoming, and even the harvesting of some of our early fruit, like the strawberry. It stands to reason you have studied the history of the codling moth, the time of its appearance and disastrous work, would differ as regards locality and climatic conditions. This year we had an altogether longer period of blossoming than we have had in former years, and still it didn't correspond to the appearance of the codling moth. We naturally expect a forward season means a forward appearance of the codling moth, and I wonder, Prof. Surface, if you have noticed anything similar in Pennsylvania.

Prof. Surface.—I consider there are some instances like that. I think the point is well taken. You cannot fix this time at which to spray. You must depend upon the season.

Mr. Bassett.—We had Prof. Hammer, who worked with Prof. Johnson at North East, who was working the life history of the codling worm about eight miles from my home. We started to spray. Prof. Hammer knew it, and he telephoned up, "I think you are too early," so we desisted, and those who followed Prof. Hammer's advice this year had the best crop of apples, and I have no doubt that little bit of advice that Prof. Hammer gave us was worth $50,000 to that particular section.

Prof. Surface.—What was the state or condition of the blossoms when you sprayed that you got the best results?

Mr. Bassett.—A little later than we usually do. We want to be ahead of the closing of the calyx. We always supposed if we started when three-fourths of the petals had fallen, that was the right time, but this year he said he went to the cider mills and gathered up these codling moths, put them into boxes or wire nets right in the orchard, under natural conditions, and bred those. When they came forth, he knew they were coming forth in the orchard, because they were there in natural condition, so he could give us intelligent knowledge as to the exact time when they were coming out. Now, this is pretty difficult to do. I know in our state they advised the banding of the tree, and then watching the coming out of the codling moth from those old bands. We are trying to keep a scientific man there from the government, and hope to do so. But it is essential that this work should be done at the right time, not only the right material but the right time. The third element in this tripod of success is in the right manner, and there is where we often fall down. Now, nine-tenths of the men—and I am with

the nine-tenths, who think they have done a good job—don't do a very good job after all. The oil is a good lazy man's spray, because if you don't cover the tree completely over with the lime and sulphur, you haven't done the work, and the oil will do some of it, crawling for itself, but I don't suppose you are lazy men, so I am not going to talk missible oil. The use of this material depends on its application to every affected spot, the very spot where it is liable to be affected, especially on the new growth, with the San Jose scale. In order to do the work in the right manner, you must have the right tools. I want to devote a little time to a discussion of what I consider are of the improvements in the machinery for spraying, because I think it is practical and because I think you are interested in that.

When we first started in the spraying operation, we had what you might call a common "squirt gun," and we shot the stuff right and left, wasteful to extravagance in the use of the material, and not always hitting all the parts that were to be treated. We went on from that to the use of other machinery, which were improvements. I have something like about twenty nozzles here, but cannot call your attention to all, but I want to call your attention to some of the more common, because they are spray nozzles of a type that is good. Here is a class of nozzles known as the Vermorel, which I believe did wonderful work, grand work. Here is a triple Vermorel and here is the double one to be attached. The Vermorel was a good nozzle, no question about it, and it is a good nozzle today for the man who wants to use it, but the average commercial orchardist wants something which will throw more material, and which dosen't have these protruding parts, which are almost sure to catch in the limbs of the large trees. Those are absolutely bad, and those of you who have held the spray nozzle know it, because you ran that up into a tree to spray all the parts, and you have to be able to get them back without pulling very hard, because if you pull hard you are liable to get the thing out of order. These are also quite apt to clog. The aperture is very small and the capacity of the nozzle is limited. There has been a great change in the matter of machines for applying this spray. The old-fashioned hand pump was a crude affair, a common bucket pump, in some instances. From that we have developed a new pump, and I believe a man can raise as good fruit with the ordinary good improved hand pump as he can with any power pump that was ever made. He can do it, but the trouble is, he is not liable to do it. I know from experience that a person who stands and pumps and furnishes the elbow grease and the backache and the tired feeling that goes with the manipulation of a hand pump isn't going to stand there and give that tree all it needs. Sometimes he will think,—"I guess that has had all I care to fool with, and I will move on," whereas, if you can put that on with steam or gas or some traction power, whatever may be your best method, and not have to depend on your own muscle, you will stay until you have done a good job, so I say you had better have something to furnish the power, because the difference between a half job and a good job means the difference between failure and success and the difference in dollars and cents returned may mean even the price of a half a dozen good power outfits in the course of

one year. We have come to our changed styles of nozzles, partly because we have come to a changed condition and changed demand in our machinery. The large commercial orchardist today must get over a lot of ground. It has to be done promptly. This work isn't like a job of threshing, where you thresh for one man today and one man tomorrow. When we first started this power spraying, some one suggested we could buy one outfit for the neighborhood. That seemed good, but when you stop to think that time is an essential element in this, instead of one doing the neighborhood job, you may have to have three or four to do one orchard job, and I say from experience, I believe that it does pay a man to invest good money in good machinery, and then take good care of it, and you will get it back in one year, two years or three years, and it will come back with good big rates of interest added to it. When we were spraying, and we had the idea with the hand pump that we were getting about 85 to 150 pounds pressure, and we judged that by the pain in our backs instead of any gauge on that machine to tell that, we thought we were doing something, and of course we used small nozzles, but as I say, when we came to the idea that we wanted more pressure in order to force that spray, a large amount of spray under heavy pressure, so as to force the poison into the calyx and also carry it to every part of the tree in a fine mist, it required more pressure than could be furnished by any man, and there came the question of a power sprayer.

We have changed to a number of other nozzles and attachments which are good. Here is a spray called the long distance spray. Some of you know its type. It had its use and is adjusted by simply sliding this piece of brass here. Here are two large apertures set at an angle. Here is a solid one, quite large, to make a solid stream, and the pioneer one over here, that did very well. We have also here a class of sprays, in which the one, called the Seneca, has one hole that strikes at a different angle on a spreader that will get rid of a lot of material. It does very well. We have men in our locality today that stand by the old McGowan nozzle and the old Bordeaux nozzle. Now we come to a different class, and without mentioning any others in particular, I want to touch upon a class which is more adapted to our present needs, especially to the man who uses a power sprayer. It is a class of disc nozzles, in which a whirling motion is given to the mixture by the way in which it enters this chamber. It either enters through two holes, at an angle, causing this spray to whirl, then passing it through a steel disc, the nozzle being made of brass, or some other lighter material, and causes a whirling motion and breaks up the spray into a very satisfactory spray. These sprays have been manufactured to answer a demand for a large capacity by a number of different manufacturers, and they are all more or less good. They are all built upon the same plan. I don't know whether there is any infringement in the matter of manufacture, but they are practically the same thing, except that this little piece in the centre which admits the mixture and causes it to rotate or whirl, is made of different styles.

Another point I tried to illustrate to you yesterday in that slide, where I showed a spraying apparatus throwing the spray down,

as I said, it is impossible to throw down when you are below the point of application, unless you have a hook or angle in the nozzle that will cause that direction to be down, or in that general direction, so to meet that, the manufacturers have done two things, either one of which meets the trouble. They have placed the spray nozzle itself on an angle, and in that case we now have the possibility of throwing that spray down or, in fact, in any direction we see fit. In fact, by turning my bamboo rod, I can get any angle of application nearly as I want it. There is another way of applying that, even if you use the straight nozzle; that is by using this bent crook, attaching this crook and then putting the nozzle onto the crook. You get the same effect. I want to show you now another nozzle. Most of you have had the experience of holding a heavy spray rod and a heavy brass nozzle at the point out at the end and have realized you wished you had something lighter, and that brought forth one that is made of aluminum. As a matter of fact, the importance of that aluminum is not as great in my mind as another point. Those of you who have done very much spraying know this, that in spraying up high, you not only have the weight of the rod bearing down on your hand, but you have the reaction or the back pressure of that immense force that is going to force that out, but when spraying down you have just the opposite. You know you can hold a ten-foot rod in one hand like that, when spraying down because there is sufficient back pressure there to balance the weight of that rod, and you can hold it with one hand when spraying in that direction. When you turn it, you have the other way, not only the weight of the rod, but the back pressure pulling it down. There is another matter which I think is very important in the matter of appliance. In the days when you were satisfied with 85 or 100 pounds pressure, hose attachments were not important, because the pressure was not sufficiently great, and you could hold that hose upon the spindle very easily with the ordinary garden hose clamps. The important thing was to have a sufficiently long attachment, but now we have been using 200 pounds or more of spray, and you get it in the eye or down the neck when this thing breaks loose some day, and it will simply enforce upon you more clearly than I can the importance of having everything tight.

Answering the demand of the fruit growers, many of our best manufacturers of spraying machinery have manufactured something which is a big improvement, I think, over the common garden hose clamps. It is made of two cast brass clamps with two good, heavy screws to hold them together. Now, with a long nipple, with anything as long as that entering the hose, you see you have the full length for clamping, and this is something all ought to have.

Question.—Doesn't that have to be made with a special coupling?

Mr. Bassett.—Yes, the coupling has a shoulder. Those are certainly, I consider, one of the most important things.

Another thing which any of you who hold the nozzle and hold the spray will appreciate, is one of these drip guards, a rubber at-

tachment which you slide on your bamboo pole, for the purpose of catching any drip. There ought not to be any drip, but lots of things occur that ought not to occur, and sometimes you will get some drip from the attachment. One of the advantages of these nozzles lies in the fact that they have a large capacity, do not often clog, because the hole is quite good size, and they certainly answer the purpose better than anything else that I know of. The advantage in this aluminum one is not alone in its being aluminum. The wearing parts are steel. The disc is backed by a rubber gasket, but the interior part is hard rubber. This part which causes the whirling motion is on the same plan as a turbine water wheel. The importance of that is not only its lightness, which I think is exaggerated, because, as I say, the reaction of the pressure will readily lift it, but it has this great advantage of having a large capacity and at the same time being an anti-clogger.

One other matter is the matter of hose. The importance of that you will appreciate. You will have to pay a good price for hose that will stand 200 to 250 pounds pressure. I believe it pays to have sufficient hose. That depends, of course, upon your trees and how far you wish to spray. If you have perfectly level land, you might get along with two leads of 50 feet, but you want sufficient so you have no trouble, especially with a rod that is eight or ten feet long, you have to have plenty of hose, in order to manipulate it without trouble and kinking. I don't believe in buying the heaviest hose. We buy about a five-ply hose.

Another thing that is very important in this matter of machinery is the keeping of your machinery in proper condition. Every farmer should realize the importance of keeping the machinery on the farm in good condition, particularly hose, but remember this, most of the materials that we use are caustic or acid, or have a corroding influence. We always plan to go over our machinery and never put it under cover without going over all the brass parts and oiling them thoroughly and cleaning out the hose, although often when we do, the next spring it will not be in shape to use, but under heavy pressure they will sometimes give way. But above all things, if you invest $150 to $250 in a power outfit, or even in a hand outfit, if you invest $25, it will pay you not only for the life of the machine, but the ease with which you can keep it working. It is important that those parts be carefully cleaned and oiled, and when it goes in after the season's work, we spend a rainy day going over that machine and thoroughly cleaning it in every way. As to what machine, I have nothing to say. We are using in our locality thousands of machines, some purchased from manufacturers, and a large number that are assembled right on our own farm. While a one and one-half horse power engine will do the work, I think two and one-half is far better, because you have sufficient power; you will have no trouble, and it is not working the machine to its full capacity, which means wearing out. So if you are going to buy and assemble your own, or buy one manufactured by anybody, I prefer a two and one-half horse power gasoline engine, and then having the proper attachments. Of course, capacity in gasoline engines is more or less of an unknown quantity. You can figure steam engines, but a

gasoline engine will develop anything from nothing up to quite a little. You cannot tell exactly where that is going to land.

I have rambled over this field in a general way, because while, as I say, I would like to talk to the other fellow, I don't believe you people need this talk, but I want you to look this up. Possibly you will take home to your neighbors some of the features presented here. I am sorry it is necessary for me to leave before your sessions are over. I have to be in Detroit tomorrow. I have certainly enjoyed very much meeting these friends, as I have in the past, and I trust some of you will come to Michigan.

Question.—I would like to know where to get that aluminum nozzle?

Mr. Bassett.—The one I got is called the "Scientific"—from the Niagara Sprayer Company, of Middleport, New York.

Question.—Why had we a better crop of apples in the United States this year than we have had for the last five or six years?

Prof. Surface.—That is one of the questions upon which I believe an interchange of opinion is more likely to bring us to a correct conclusion. I think it is due generally to the almost total absence of a crop last year. The trees were resting last year and putting forth their energies this year. This is the principle Mr. Bassett spoke of yesterday of the trees overbearing one year and resting the next year. A year ago this last autumn we had no apples from the middle of Pennsylvania westward.

Mr. Roberts.—Mr. Bassett said nothing about spraying against the wind. Does he recommend spraying against the wind?

Mr. Bassett.—Yes, we spray against the wind.

Prof. Surface.—How far?

Mr. Bassett.—We can throw quite a little ways. If we wait for the wind to adjust itself to our troubles, we wouldn't get our spraying done. I don't like to face it, of course, but we grin and bear it the best way we can. With these power sprayers, we have no trouble in reaching the centres and tops of the trees. We used to have to wait for the wind, and we didn't get the results.

Mr. Tyson.—Are you satisfied to let that go as the spraying for that side of the tree?

Mr. Bassett.—No, we spray, from four sides. We go through both ways, and, for instance, if our winds are west and northwest, if we couldn't get an east wind, we would simply have to spray against the wind to a certain extent.

Prof. Surface.—Do you retouch them from the east when an east wind does come.

Mr. Bassett.—Our spring winds are all west and northwest. As far as retouching is concerned, we wouldn't generally be able to get an east wind.

Prof. Surface.—I would like to hear Mr. Roberts on this question.

Mr. Roberts.—The idea is new to me, because we have been waiting until the wind changes, and I was wondering what Mr. Bassett had to say on it. But it is a fact that in New York they gave experiments to show the advantages of spraying either way.

A Member.—Some seven or eight years ago, this incident took place along the Niagara River. It is very desirable to have the tree thoroughly covered, but the practice of many of the growers there was to spray one side of the tree and then wait for the wind until they could spray the other side, but in this particular season we had a period of over twenty days that the wind continued to blow from the west and northwest; consequently the growers that waited for that wind, waited until the buds commenced to put out. Then they were unable to make the full strength of the lime-sulphur application.

Mr. Thomas.—I would like to ask one of the professors why does it hurt to spray when the dew is on the tree in the morning?

Prof. Surface.—Do you refer to the dormant spraying sprayed when the bark is damp?

Mr. Thomas.—Yes.

Prof. Surface.—I have never known of any evil effects from it, only I don't think the killing effect of the lime-sulphur is so powerful when the bark is damp, nevertheless I have seen it done. I don't recommend spraying when the bark is wet.

Mr. Thomas.—Sometimes in the morning the bark is wet from the dew, especially on a calm morning. Our mornings are generally damp until nine o'clock, and if we have no wind, on a calm morning the bark is wet. My idea is that, when you are putting it on, that much extra water dilutes your spraying material too much.

Prof. Surface.—Your point then is, will it kill the scale when the bark is damp?

Mr. Thomas.—Yes.

Prof. Surface.—I think it will kill the scale all right. A great deal adheres and covers the surface of the bark after spraying and remains there. I have seen it as late as December from the previous dormant season. I have never known of any lack of efficiency due to that cause.

Mr. Thomas.—That would solve the wind problem in our section, to spray in the morning before the wind comes up. We spray a great deal for potatoes, and we always wait until about nine o'clock before we spray our potatoes, because we don't like to spray them when there is too much dew on the leaf.

Mr. Anderson.—I would like to know whether it is safer to buy lime-sulphur, or for the fruit growers to manufacture their own.

Mr. Bassett.—For the dormant spray, if you have a plant for cooking, I think it is a good plan to manufacture it yourself. When you come to the summer spraying—this summer we had the finest crop of apples we ever had. They were all lime-sulphur sprayed, and the point is right here, if you have the home cooked, how are you going to tell how to dilute it? If you have a standard article of a certain known strength, the average farmer can tell exactly how to dilute it. On our farm we have a cooking plant. We are not using it. We buy commercial goods, because we feel now we have a price where we can afford to buy it. We are now buying for $5.60. That is in a co-operative way, of course, Before we started that, we had the old time of $13, with $3 back—about $10. Now, we are buying it for $5.25 net, and they are glad to get our contract.

Mr. Thomas.—I would like to ask if you use any fungicide when spraying for the codling moth, or just the poison alone.

Mr. Bassett.—No, we use the lime-sulphur at that time.

Mr. Thomas.—And spray right after the petals fall?

Mr. Bassett.—Soon after.

Mr. Thomas.—Isn't there any danger of killing your fruit at that time?

Mr. Bassett.—No, not at all. In fact, we think we are in more danger if we don't do it. In our section, we have a great deal of loss of fruit from what we believe is a little fungus that attacks the stem of the apple. I want to know if any of you folks have seen that trouble in the east, a little fungus that attacks that apple and causes it to drop. Since spraying with lime-sulphur, we don't seem to find it. In Illinois they are still Bordeaux people. They say they have scab there so bad that lime-sulphur won't do any good. In our little town, I have unloaded eight carloads of blue vitriol at one time. Last year, I don't believe there were ten barrels used. It is lime-sulphur that is doing our work. We have seen no bad results from the use of the lime-sulphur reduced one to forty, twenty-five per cent. sulphur.

Mr. Thomas.—How strong do you use it?

Mr. Bassett.—One to forty.

Mr. Thomas.—What is the strength of your concentrated solution?

Mr. Bassett.—Twenty-five per cent. sulphur in solution, thirty-three degrees beaume.

Prof. Stewart.—That is about the strength we are recommending. We are recommending a solution in combination with lead-arsenate that will test about 1.207. 1 to 30, would be the maximum, and 1 to 40 would give the lowest amount.

I would like to make one other statement here. I don't believe the difficulty Mr. Bassett mentioned is an important difficulty at all. I don't think it amounts to anything; in other words, that difficulty of being able to test the commercial form and get it on better with the hydrometer than you would test and get it if made on the home farm. It is true, if the sediment rises a little, that is a bad time to test, but the sediment, if you make it up properly is a relatively small affair anyhow, and if you cannot get enough of your solution to test with a hydrometer, you better throw that batch away and make another, and you will still have money, because it is quite an important fact, and I believe there is going to be a much greater use of the home-made article this year than there ever has been before, judging from the amount of correspondence concerning it, and a lot of people who have been using the commercial form are getting ready to make the home preparation. We have been using them side by side for two or three years now, and we don't see any appreciable difference in the results when they are put on to a uniform strength of spraying material on the tree. There has been no appreciable difference, and I question a whole lot of statements that have been made with reference to the necessity for diluting the home-made concentrate a little differently from the way you have diluted the commercial forms.

The Chairman.—I don't think Brother Thomas' question was answered. He would like to know about the 25 per cent. sulphur, how much dilution you give to that in the dormant state?

Prof. Stewart.—Twenty-five per cent. sulphur, simply means a solution that has about 33½ degrees beaume density. On the average, that solution when you analyze it for sulphur will be found to contain around 25 per cent. of sulphur, and when we come to dilute it, we cannot take into consideration that percentage of sulphur at all, because we have to dilute on the basis of density. We have to assume that the material we are applying is lime, sulphur and water. We are not applying something with a lot of other solids in it. We have to assume that, and then we can base a system of dilution on densities, and the density of the material that will test 25 per cent. sulphur, will run about 33 beaume or 1.30 specific gravity which I prefer to get it into, and then you can dilute all those by simply dividing the decimal of the reading by the decimal of the spray you wish. If you are spraying for apples in the summer time, you would divide this 1.30, the .30 part by .007; and you get the result. It is a little over 1 to 40. It is so close it doesn't make any difference.

Mr. Bassett.—I don't want it understood I was advising 1 to 40 in the dormant time.

Prof. Stewart.—This process is explained in our bulletin 99, which anybody can get.

Prof. Surface.—We have used 1 to 40 in our demonstration orchard, and it has not injured anything but the peaches, to which it should not have been applied in that strength.

The Chairman introduced Prof. Fred Johnson, of the Bureau of Entomology, Washington, D. C., who delivered an illustrated lecture on

SOME FRUIT INSECT PESTS AND THEIR TREATMENT.

By Mr. Fred Johnson, *Bureau of Entomology, Washington, D. C.*

The investigation of grape insect pests in Erie county, Pennsylvania, was undertaken at the request of vineyardists of that section in the spring of 1907 and this work has continued without interruption to the present time. For the past five years the Bureau of Entomology has had three men in the field during the season of insect activity. A part of this work was carried on in co-operation with the Pennsylvania State Department of Agriculture at Harrisburg which during the seasons of 1908 and 1909 sent a man to assist in carrying out field experiments and demonstration work on the grape-root-worm and in addition bearing a part of the expense involved in this field work.

The insect which was occasioning genuine alarm to the vineyardists at the outset of this investigation was the grape-root-worm, Fidia viticida. The feeling of apprehension with which the grape growers viewed the inroads of this pest upon their vineyards was not without warrant for within the 15 years preceding this date the injuries of the grape-root-worm had reduced several hundred acres of vineyard in Ohio to an almost unprofitable state of production. It had also wrought a great deal of damage to the vineyards of Chautauqua county, N. Y. Although a great deal of experimental work had been undertaken against this insect by Prof. F. M. Webster in Ohio, Prof. M. V. Slingerland and Dr. E. P. Felt in New York there was still considerable uncertainty as to the most desirable and practicable methods of control.

The investigation was taken up by the Bureau of Entomology with a view to making a thorough study of the life history and habits of the insect and to ascertain and to demonstrate, if possible, the most practical methods of control. In order to obtain this data the investigation was carried on for a period of three consecutive seasons. During this time studies were made of the habits and transformation of the larva in the soil to determine the date at

which the transformation to the pupa takes place, the length of the pupal stage, and the position of the pupae in the soil, for it is in this stage that many individuals may be destroyed by stirring the soil about the base of the vines either with a horse hoe of by hand. It was also important to know the time at which the beetles emerge from the soil and commence to feed upon the foliage of the vine since at this stage the insect is susceptible to treatment by the application of a poison spray to the foliage. It was further desirable to know approximately how many days the beetles feed upon the foliage before the females commenced to deposit eggs since the object of the poison spray application is to rid the vine of the beetles before the eggs are deposited. Our observations indicate that the females feed on the average about ten days before depositing eggs so that there is ample time to spray the vines with a poison if the vineyardist has his spraying equipment in readiness to make the application immediately after the appearance of the first beetles upon the vines.

The female deposits the eggs under the loose bark of the vines, usually upon the canes of the previous years' growth. The larvae hatching from these eggs drop to the ground, enter the soil, and feed upon the roots of the vine. It is upon the roots of the vine that this insect does the greatest damage. Unfortunately, however, no practical means have as yet been devised for the destruction of the larvae in the soil. Our investigations indicate that many of the pupae can be destroyed by stirring the soil about the vines. By far the most effective results were obtained, however, by the application of a poison spray consisting of three pounds of arsenate of lead to 50 gallons of Bordeaux mixture. The Bordeaux mixture is not applied as an insecticide but for black rot and other fungus diseases of the grape vine.

Many acres of vineyards were treated in the course of this investigation and vineyards which had been reduced to a condition of unprofitable crop yield were brought up to a state of profitable production by the control of this pest in the manner just mentioned. The results of this investigation of the grape-root-worm are embodied in Bulletin 89, of the Bureau of Entomology, Department of Agriculture, Washington, D. C.

Other insects in addition to the grape-root-worm were found infesting the vineyards, notably at this time the grape-berry-moth, Polychrosis viteana. This insect is destructive in the larval stage to the fruit and produces what the vineyardist knows as "wormy" grapes.

Injury by this pest is not general throughout the vineyards of Erie county, nor is it uniformly destructive even in individual vineyards. Frequently, only a few vines on the ends of rows or, a few rows along one side of a vineyard will be badly infested. The infestation becoming lighter toward the centre of the block while the opposite side of the vineyard may be almost entirely free of the pest.

The adult of this pest is a moth similar in appearance to the codling moth, but much smaller. These moths commence to emerge in spring just previous to the blossoming of the grape and deposit

eggs on the unopened blossom clusters. The larva hatching from these eggs feed upon the opening blossoms and small berries, spinning a silken thread as they travel over the cluster, thus binding together the petals and stamens in a weblike mass which furnishes a retreat and shelter for the "worm." Where this early infestation is heavy these webs are readily observed. A study of the habits of this insect has shown that probably less than 25 per cent. of the first brood eggs are laid on the blossoms clusters since the emergence of the moth spreads over a long period during the spring. After the blossoms have fallen from the clusters the eggs are deposited on the small berries and the hatching larva feeds upon them.

While the berries are small a single worm may destroy several of them. Sometimes a larva will attack the stem of the cluster and boring into it will destroy a part of the cluster. Later, as the berries become larger the larva on hatching enters the berry and two or three berries at most furnish sufficient food for its development. When the larva is full grown it leaves the fruit and forms a pupa case upon the leaves of the vine in which it transforms to the moth.

During late July, August, and early September there is frequently a heavy deposition of eggs of the second brood. It is the larvae from the second brood eggs that are mainly responsible for injury to grapes just previous to the ripening period. In some instances where the infestation is very heavy the crop may be almost a total loss. Most of the larvae escape from the berries before the fruit is picked. Instead of making their cocoons on the leaves attached to the vines they drop to the ground and make them upon the few leaves that have fallen prematurely and have been held beneath the trellis either by sticking to the moist earth or by being held by weeds. Sometimes a dozen to thirty pupa cases may be found upon a single leaf plastered to the damp soil. In these leaves the insects pass the winter and from the over-wintering cocoons the moth emerges in the spring and deposits eggs on the blossom clusters and berries as described.

This insect has proved to be one of the most difficult pests of the grape to control. In field experiments conducted at North East, Pa., the most effective treatment has been the heavy application of a spray consisting of three pounds of arsenate of lead to 50 gallons of water driven forcibly into the grape clusters just previous to and again a few days after the grapes have blossomed. It is very necessary to curtail the development of larvae of the first brood since, later in the season as the berries increase in size the clusters becomes compact and the spray cannot be driven between the individual berries. In addition to this objection to poison applications for the second brood larvae, the poison leaves the ripened fruit discolored and in an undesirable condition for table use. Hand picking berries infested by the first brood larvae where limited areas are attacked will greatly lessen the number of the second brood. Since it has been ascertained that practically all of the overwintering insects pupate on a small percentage of leaves which have dropped prematurely beneath the vines, it has been suggested that an attempt be made to destroy these leaves, either by gathering them before the rest of the leaves have fallen from the vines, or by covering them

with soil by turning a couple of furrows under the trellis before the remainder of the leaves have dropped.

The Grape-Blossom-Bud-Gnat, Contaria johnsoni, is an insect infesting the blossoms of grapes which has attracted more or less attention during the past few years in the vineyards of Erie county. Although quite generally scattered through the vineyards of the eastern portion of the township of North East, Pa., no instances have come under our observations where it has greatly lessened the crop yield. In Chautauqua county, N. Y., in one instance it has been very destructive to the crop on a small block of Moore's Early vines for several seasons.

During the past season it was very destructive on a number of small Concord vineyards in the vicinity of Sandusky, Ohio.

The adult insect is a small gnat which deposits its eggs in the blossom bud of the grape. The larvae, of which they may be from a dozen to fifty in a single bud, get their full development before the grape blossoms unfold. Infested buds are readily recognized since they are much larger than the normal buds making a more fleshy growth, and taking on a yellow or reddish color. The maggots working inside the blossom bud injure the ovary, thus preventing fertilization. When full grown the maggots escape from the blossom buds and drop to the ground and enter the soil, where they remain until the following spring when the gnats emerge and deposit eggs in the blossom buds.

When a large number of the blossom buds in a cluster are infested the result is a very ragged cluster of fruit. Where the infestation is moderate, or light, sufficient berries persist to mature a well-developed cluster, as yet no effective means of control have been devised for this pest. During the past five years its injurious effect upon the grape crop of Erie county has not been marked. Yet it is so thoroughly disseminated through the vineyards that should conditions favor a great increase in numbers it may readily develop into a very serious pest.

The "Rose Chafer" Macrodactylus subspinosus is quite injurious in limited areas of vineyard on sandy soils along the lake shore of the township of North East, Pa. This insect is especially injurious to the Concord grape crop since in attacking this variety the insect does more of its feeding upon the blossom clusters and small berries than upon the foliage. Hence, even a moderate number of beetles infesting a vine may do a great amount of injury in a short time. Observations indicate that by far the greater part of the injury is done just before and during the blossoming period of the grape vine. Ordinarily the beetles are present on the vines for only a short period. This makes it necessary for the grape grower whose vineyard is subject to attack by this pest to have his equipment in readiness as soon as the first rose-chafers appear upon the vines, for it frequently happens that they will swarm into a vineyard in large number in the course of a few hours.

In the course of our investigations upon this pest spraying experiments have been conducted for the past four seasons using five pounds of arsenate of lead to 50 gallons of water or Bordeaux mixture. In several of these experiments the results have been quite

satisfactory. Observations indicate that arsenical poison applications to be effective against this pest must be very thorough and should be applied just before the beetles appear upon the vines in large numbers.

If the beetles are very numerous it is sometimes necessary to make repeated applications every day or two until the beetles disappear. In our spraying experiments of the past season a very marked decrease in the number of beetles was observed on vines sprayed June 5th and 7th. A count made on 50 vines on the sprayed plat showed 96 beetles as against 865 beetles on 50 vines in adjacent unsprayed plat. The result in crop yield in this experiment showed an increase of half a ton of grapes per acre on the sprayed plat.

Since it is desirable and necessary to spray most vineyards at the time of appearance of the rose-chafer beetles for other insect and fungus troubles there is no doubt that it is more economical and effective to resort to the spray method of control than to hand pick the beetles. Although on limited areas and where spray apparatus is not available the latter method will greatly reduce the destructiveness of this pest.

The Grape-Leaf-Hopper, Typhlocyba comes, is another grape insect pest that has greatly increased in numbers and destructiveness in Erie county during the past three or four years. It is now the most injurious insect to be found in the vineyards of that section. This insect injures the grape vine by sucking the juices from the foliage. The winged adult "hoppers" winter to some extent among trash and rubbish present in vineyards, but by far the greater number of them migrate from the vineyards in the fall and hibernate beneath leaves and dense grass in adjoining wood lots, sod lands, and fence rows. When the grape vines unfold their leaves in the spring these winged adults return to the grape vines and after feeding for a few weeks deposit their eggs beneath the pubescence on the underside of the leaves.

The nymphs or young "hoppers" commence to appear on the underside of the leaves about the middle of June. Usually by the end of June they are present in large numbers varying in size from those just hatched to those with fully developed wing pads. It is in this nymphal stage that this pest may be most successfully controlled by the application of a contact spray. Since the insect obtains its foods by inserting its probocis into the tissue of the leaf and sucking the juices therefrom, poison applications to the surface of the foliage are of no avail. The nymphs must be actually hit and covered by some spray substance which will cause death by contact.

In a number of field experiments which have been conducted in the township of North East, Pa., during the past two years, the tobacco extracts, such as Black leaf extract and a more concentrated form of Black Leaf 40, have given very satisfactory results. The chief requisites for success being that the applications be made before the nymphs have changed to the winged or adult form, and that the under side of practically all the infested leaves be made thoroughly wet by the spray.

The Black Leaf Extract was found to be effective at a dilution of 1 to 150 parts of water and the Black Leaf 40 at a dilution of 1 to 1500 parts of water. All of the applications were made by the "trailer" method. That is, a man operates a nozzle by hand to apply the spray to the underside of the grape foliage. This nozzle throws the spray upward by being set at right angles to a short rod held by the operator and is connected to the spray pump by means of about 20 feet of trailing hose. The spray is applied to the underside of the leaves by thrusting the nozzle into the foliage upon the trellis by a series of rapid movements on the part of the operator.

Effective results have been obtained by several types of sprayer. For economy and expedition, however, a pressure of not less than 100 pounds should be available. Although effective work can be done at even a lower pressure. With high power outfits two leads of hose can be operated thus greatly expediting the work. With a single lead of hose from 2½ to 3 acres of vineyards per day can be covered. With two leads this area can be about doubled. The amount of liquid applied varies from 175 gallons to 275 gallons per acre depending on the density of the foliage to be sprayed.

The total cost of labor and material varied from about $3.00 to $5.00 per acre according to the amount of liquid applied and the efficiency of the machinery employed. The net benefit in several of these experiments varied from $9.00 to $17.00 per acre in the increased yield of grapes as the result of one application for a single season.

This, however, by no means represents the total benefit derived from the control of this pest. For where the insect is controlled by this spray method the foliage continues healthy and a thrifty and hardy cane growth results, which withstands the severity of the winter, and is thus in condition to produce a good, or even increase crop, the following season.

This is illustrated by the results secured in an experiment covering two consecutive seasons. A portion of a vineyard upon which this experiment was conducted had been badly infested for several years and the vines were much weakened as a result.

The yield on this block of vineyard was as follows: In 1909, before spraying commenced, 262 baskets per acre; 1910, after one spraying, 423 baskets per acre; 1911, after one spraying, 796 baskets per acre.

These results show a yield three times as great at the end of the experiment as at the beginning.

The favorable results obtained in this effort to control this pest by the tobacco spray has attracted considerable attention in the vicinity of North East, Pa., and should the insect appear in injurious numbers during the coming season a much greater number of vineyardists are planning to resort to this method of control.

H. R. Fulton, Associate Professor of Botany, State College, Pa., delivered the following paper on

SOME IMPORTANT DISEASES OF APPLES AND PEACHES.

By H. R. Fulton.

Out of the numerous diseases that affect these two important fruit crops, more or less seriously, we must, because of limited time, speak rather briefly of the most important only. Most of them are old and familiar foes. However, I shall take the risk of reintroducing them because they sometimes bob up unexpectedly and we ought to be able to recognize them, as well as know what to do to prevent them.

Apple Scab is best known on the fruit; but it may be found on upper and lower surfaces of leaves, producing indefinite, circular, sooty spots of large size, or on the fruit spurs, or on the flower or fruit stalks, in the latter case interfering with the proper setting of the crop. When leaves are much affected, they curl and dry and fall, and always then is the interference with proper leaf functioning. The fruit is disfigured, or deformed, according to the earliness and amount of scab infection, and is inferior in keeping quality.

The earliest infection is during a period of several weeks beginning at blossoming time, and is caused by a particular type of reproductive body or spore, produced in large numbers at this time of year in fallen leaves that were infested the previous season by the Scab fungus, it having survived the winter in such decaying leaves. These spores cause no harm unless they reach susceptible apple parts, and this means a susceptible variety, and usually a young stage in development of leaf or fruit. Furthermore, the spores after reaching susceptible parts of the apple do not cause infection unless the weather conditions are favorable to the germination and development of the scab fungus. Moist and somewhat cool weather favor this, and such conditions prevailing even in midseason may sometimes result in a considerable spread of Scab even after the apple is past its most susceptible stage of development. Such late infection comes from the new crop of summer spores formed on leaves or fruit infected earlier in the season. Fortunately in Pennsylvania we suffer less from Scab than do sections northward and westward. This is due, I surmise, to differences in climatic conditions, and to the fact that many of our commercial varieties, such as Grimes Golden, York Imperial, Ben Davis, Jonathan, etc., are naturally less susceptible to scab than certain varieties extensively grown elsewhere.

We thus see that for Scab to develop three general conditions must be met: (1) There must be present the living spores or reproductive parts of the fungus; (2) these must reach susceptible parts of its proper host plant, the apple, and (3) the general environmental conditions must be favorable to the development of the fungous plant. These same general conditions must be met whenever any of our crop plants falls a victim to any fungous disease.

Effective and economical control of any fungous disease must take into account the peculiarities of parasite and host with reference to these three conditions. The devising of particular methods, and their most successful application will depend on intimate knowledge of all of these factors, which usually requires close study by the specialist.

In the case of Scab, it has proven possible, by burning the old leaves, or by turning them under before blossoming time, to eliminate the source of early infection thoroughly enough for the control of the disease; but this means is hardly practicable for general use. And so we resort to protecting the susceptible parts during the period when conditions are likely to be favorable to infection, with a spray mixture that is unfavorable to the development of such spores as may reach the parts. The life history of the fungus and experience shows that, on varieties highly susceptible to scab, in districts where scab prevails greatly, the first application should be made just before the blossoms open. In Pennsylvania, for most varieties and sections, and in an average season, it is sufficient to begin with the second application of the full treatment, made just after the petals fall, with the addition of arsenical poison for the codling moth. It is advisable to follow this with another application two weeks later. Lime-sulphur at a strength of 1.008 specific gravity, or Bordeaux mixture, 3-3-50, is a satisfactory material to use for this purpose. In considering fungicides, let us remember that the prime requisite is effectiveness for the intended purpose, which can be determined only after repeated trials under a variety of conditions and will vary for different fungi; closely second is non-injuriousness to the crop; and at a greater distance are such considerations as cost of materials and convenience, which, because they are apt to impress us more immediately, sometimes influence us too much. Bordeaux mixture is generally more effective than the lime-sulphur preparations, but it sometimes injures certain varieties of apples, while on others it is safe.

Apple Sooty Mold and Fly Speck, probably two stages of the same fungus, are characterized by irregular, sooty, black blotches that may run together, and by clusters of dots resembling fly specks. They develop superficially on the skin of the apple and may be easily rubbed off, but the disfigurement detracts from the market value of the apples. They may develop at any time from June to the end of the season when moisture conditions favor. The best control is from spraying begun as directed for Scab, and repeated later in the season, during the first half of July. Thick tops and moist situations, by hindering the rapid drying of the surface of apples favor infection. Selection of a proper situation for the trees, and proper pruning are important control measures.

Apple Leaf Spots are of several different kinds, caused by as many distinct fungi. All of them interfere, in proportion to their abundance, with leaf activities, which means with proper nutrition, and affected trees suffer more or less from retarded twig and limb growth, poor development of fruit, and of fruit buds. The Scab Leaf Spot has been referred to. Another that attacks very young leaves early in the season, is the Orange Rust or Cedar Rust Leaf

Spot. The fungus also infects the fruit, usually at the apex, producing rough areas with a yellowish cast. On the leaves the spots are also orange yellow to brownish yellow, and later develop a rough raised cushion on the under side. This fungus passes another stage of its existenc on the red cedar, producing the swellings we know as "cedar-apples." Apple leaves and fruit are always infected by spores from such a source. Unless there is wet weather continuously for about three days at the time when the apple leaves and fruit are young and tender, there will be little or no infection even though neighboring cedars are affected with the fungus. But the safe precaution to take is to remove, in as far as may be possible, red cedar trees from the vicinity of the orchard. Here, again, varieties differ much in their susceptibility. Spraying may be effective if properly timed; but is difficult to predict, in this case, the times when conditions will favor infection, and spraying has often failed.

Probably the most widespread type of Leaf Spot is the type commonly known as Frog Eye Leaf Spot, caused by the fungus that produces Black Rot of fruit, as well as a common type of limb canker. Abundant leaf infection, usually accompanied by too early defoliation, causes poor nutrition with weakened growth and poor development of fruit buds. It should be guarded against in off years as well as in bearing years. It may develop after the protection afforded by the early scab sprayings has worn off, and to insure its control, a later application or two should be made early in July. It is important to keep the Black Rot Cankers, that serve as a source of contagion, cut out of the trees.

The July spraying will control the Fruit Spot of apple, which is caused by a fungus, and is characterized by rather definite, small, brown, dead areas in the skin, with the flesh discolored only a little way underneath. At first such spots are merely a more intense green or red than the normal skin. This particular trouble, which attacks Baldwin, Belleflower and a large variety of apples as well as the quince, must not be confused with another trouble of Baldwin and others known distinctively as Fruit Pit, or perhaps more usually as Baldwin Spot, although this last name is sometimes used loosely for the Fruit Spot. This Fruit Pit is not caused by a fungus, but is probably due to deficiency in proper water supply, or to sudden change from periods of rapid growth to periods of retarded growth of the fruit. The spots here are larger and less definitely bounded than Fruit Spot, are more sunken, suggesting finger print bruises; the deadened tissue usually extends deeply into the flesh and is rather dry and spongy, and there may be discolored areas as well toward the interior of the flesh. It cannot be controlled by spraying, and the only suggestion that can be made is to practice a system of cultivation that will tend to equalize soil moisture conditions as much as may be.

Two other diseases that can be controlled by midsummer spraying are Bitter Rot and Blotch, both of which, fortunately, are as yet of rare occurrence in Pennsylvania. But we must be on the alert, lest they gain a foothold unnoticed. Both require midsummer or later spray applications, and for them, Bordeaux mixture gives decidedly better results than lime-sulphur preparations, and should by all means be used where these diseases are to be combated.

There are several Ripe Rots of fruit that midsummer spraying tends to check, although control of insects and care in handling are of prime importance in their prevention. There is good evidence that the keeping quality of apples is increased by spray treatment in midsummer.

Several fungous diseases of limbs, twigs or trunk, such as Twig Blight and Blight Canker, Black Rot Canker, Collar Rot and Root Rot, cannot be directly controlled by spraying, although the use of these disinfecting materials, or other stronger ones, may be helpful. The most important thing for these is to watch closely and recognize the trouble early; to remove the affected parts promptly and thoroughly so that they may not spread farther on the same tree or to other trees; and to protect all wounds made in the operation against possibilities of later infection by swabbing them with a good disinfectant, such as 1 to 1000 corrosive sublimate, and painting the larger ones with asphaltum or pure lead and raw oil paint. Large and valuable limbs may be lost from infection that has extended down a watersprout or fruit spur, when early removal of these last would have prevented the loss.

Last year I spoke to this Association about the trouble known as Apple Collar Rot. Continued attention has been given since then to the question of its causation and cure. I have seen cases of this sort of general trouble that could apparently be attributed to such causes as freezing, improper use of paint on trunks, borer attack, attack by the Blight bacterium, by the Black Rot fungus, by the Amillaria Root Rot fungus, and by the Schizophyllum Wood Rot fungus; but when all is said, there remain a majority of cases for which I have not yet been able to satisfactorily account. This work will be continued until we do reach some conclusion in the matter. Meanwhile, I am more than ever sure that these cases of Collar Rot require prompt and careful individual attention at an early stage, in the way of cutting away affected bark to a clean-cut, living edge, disinfecting the wound with corrosive sublimate or other good disinfectant, painting with asphaltum or coal tar or paint, and in severe cases covering the denuded area with a sheet of grafting wax to prevent drying and promote healing. The affected trees should be pruned to reduce leafage, and they should not be allowed to carry a full crop of fruit for a year or two, while the root-system is re-establishing itself. Attention should be given to conservation of soil moisture in dry weather by shallow cultivation or by mulching; and the soil should be of the best possible texture and fertility.

I have left for the last the emphasizing of general sanitation in the apple orchard, because it enters more or less into the control of all these apple diseases. It means keeping at a minimum the sources of contagion, and at a maximum the general well-being of the trees. And this means such things as cleaning up waste fruit, cutting out useless limbs, making way with worthless wayside trees, avoiding injuries and bruises on roots or trunks or limbs, skill in pruning, and the constant practice of such general good care as will make for the vigor and healthfulness and fruitfulness of the orchard.

Spraying, we may think, is a necessary evil. The profitableness of any spray application will depend (1) on the presence in the particular locality of the disease or diseases which it is especially designed to combat; (2) on the susceptibility of the variety to the disease; (3) on the general seasonal and other conditions that influences infection; (4) on care in selection and application of the spray material. For example, it would be manifestly unwise to spray for Bitter Rot where it does not exist, or on a particular variety of apple that is immune to it, or with a material that will not give the protection desired; if we could only foresee the kind of season, and be able to predict the occurrence or non-occurrence of our enemies, fortunate indeed would we be.

Most of the disease I have discussed do occur throughout Pennsylvania. It is for the grower to study his varieties and local conditions with reference to adopting the most economical and profitable means of prevention; and it is in these days for specialists to cooperate with growers in devising and putting into practice the most effective measures.

The most important peach diseases are Yellows, Leaf Curl, Black Spot or Scab, and Brown Rot.

The symptoms of Yellows are ripening of fruit a few days to several weeks ahead of the normal time for the variety which premature fruit is insipid, with perhaps red splotches on the surface or streaks through the flesh; premature development of leaf buds, giving slender pale shoots, or branched broomlike growths and abnormal development of leaves so that they are narrow and yellowish green, inclined to curl. The disease develops slowly and is hard to diagnose from any one symptom. It must not be confused with yellowed foliage resulting from such things as poor drainage, thin soil, winter injury or borer attack. As soon as Yellows can be identified, the affected tree should be marked for early removal and destruction. It is worthless and may prove a menace to others. Peach trees may be reset in places from which affected trees have been removed. Care should be exercised to get nursery stock free from danger of Yellows infection.

In Peach Leaf Curl the growing leaves show very decided distortions in the form of puckerings, and the color of affected parts becomes reddish or yellowish. Affected leaves may fall in June. Trees suffer in wood growth and in fruit bearing from interference with leaf activities. The fungus seems to be carried over winter by spores that lodge between bud scales, or in other protected places, and the very young leaves become infected, if weather favors, just as they are bursting from the leaf buds. The disease can be controlled by spraying the trees with a good fungicide before the buds swell. Where Scale is to be combated, the strong lime-sulphur, 1.03 specific gravity, used for this purpose will control the Leaf Curl if applied at the time indicated. If it is not necessary to spray for Scale, economy in materials, and as good results, can be secured by diluting to 1.02 sp. gr.; or Bordeaux mixture, 3-3-50 can be used.

Peach Scab or Black Spot is characterized by small dark spots on the fruit. When numerous, they coalesce to form a black area, under which the flesh is hard and insipid, and often traversed by cracks. The trouble is worse in moist than in dry situations and seasons, and on late than on early peaches.

Peach Brown Rot causes the familiar rot of peaches usually as they approach maturity; and at times it attacks new wood growth producing Twig Blight. It is greatly favored by warm, moist weather. The old brown rotted peach mummies of the preceding year are the common source of new infection, although the ability of the fungus to attack cherries and plums and other fruits, gives a good chance for the spores to become widely distributed before the peach season begins. This rot and Peach Scab can be controlled best by using the self-boiled lime-sulphur preparation, devised by W. M. Scott and made by stirring in sifted sulphur with slaking lime so that the heat developed in slaking will do all the cooking. The proportion to use is 8 pounds of sulphur and 8 pounds of best stone lime to 50 gallons of water. Only enough water is added at first to cause even slaking, and the necessary cold water is added immediately afterwards, so that the cooking will not be too prolonged. No artificial heat is used. This self-boiled preparation is applied to medium maturing varieties of peach (1) four weeks after the petals fall, and (2) four or five weeks before the variety is expected to ripen. The first application should contain arsenate of lead, 2 pounds to 50 gallons, for curculio, and the second should be applied lightly and as a fine mist to avoid coating the fruit with a heavy sediment that may not weather off before marketing. Late varieties in seasons favorable for rot, may require an application between (1) and (2); and on early varieties (2) should be omitted. Concentrated lime-sulphur, diluted to 1.003 or 1.002, avoids the staining of fruit, but is less effective, and there is some risk of leaf injury from its use.

Prof. Stewart.—I would like to call attention to one point there; that is, the use of asphaltum paint. That is recommended by some people, namely, entomologists, and I hestitate to call a question on it, but in the use of such cuttings, it has been found that all those things, asphaltum and tar paint, have been quite harmful in the healing of pruning wounds, and I certainly don't see why entomologists continue to recommend a thing that has that record.

The Chairman.—I would like to ask the professor whether we have a grafting wax made with alcohol, and put on by a brush. Isn't that all right?

Prof. Stewart.—Not by any means. Alcohol is one of the nicest things to kill plants tissues and preserve them in, but not to put on when we don't want to kill them. We have ruined a large number of grafts with alcohol. I wouldn't think of using it at all.

Prof. Fulton.—With reference to the use of asphaltum and tar, if you get a good grade of asphaltum, it can be used on wounds on apple trees. I have no doubt there are asphaltum paints that are more or less impure. I should have inserted that caution, a good grade of asphaltum should be used.

The Chairman.—I would like to ask the professor why some varieties are more subject to this collar rot than others.

Prof. Fulton.—I cannot answer that any more than I can why some varieties are more susceptible to scab than other varieties.

Prof. Surface.—I consider this address extremely valuable and up-to-date on these very important points, concerning which there is so much discussion. I would like to ask Prof. Fulton if he can help us with information as to how to determine whether or not we are getting healthy nursery stock of a peach tree, or is it something that must be left entirely to the discretion of the nurseryman?

Prof. Fulton.—That is simply a matter that must depend on the source of the seed. You cannot tell unless the first symptoms show, and then there is some question as to whether it is a definite case or not.

The Chairman.—I would like to ask if a peach tree is affected with yellows three years after being planted, would that indicate it was budded from stock that had yellows?

Prof. Fulton.—I don't think you could say certainly in a case of that sort. There are cases in which it is known that yellows infection—that it is presumed on what seems to be good evidence, that yellows was introduced in the budding in the nursery, where it did not appear until two or three years after the tree was planted. Of course that is a presumption. The evidence seems to point to the fact that the dormant period for yellows may be quite extended.

Mr. Bassett.—This matter of securing healthy nursery stock is a pretty hard proposition, and it has been pretty thoroughly discussed before our society, and we threshed it out with the nurserymen and they threshed it out with us. But our nurserymen are commencing to realize, and our growers are commencing to realize, that both have a duty. We have demanded a five or six or seven-cent tree, and the nurseryman has tried to grow a cheap tree because we have demanded it, and the result is, he has got his pits from the canning factories and his buds from the nursery row, and from any source easiest and cheapest. Now some are going to the other extreme, and just last week they visited my section, and one nursery took their parent stock of well known varieties and are now propogating at our request and our order, trees from this parent stock. In other words, we have gone from the cheap tree back to the well bred tree. I really think, my friends, that we should pay a little more attention to the matter of breeding, as well as dollars. On our farm we have trees we call mother trees, because they are trees we have had buds selected from. They seem to have traits that would indicate that they are traits worthy of propogation. I believe selection and restriction are our hope for the future for the upbuilding of horticulture, not only in Michigan but in Pennsylvania.

Prof. Surface.—I would like to ask Mr. Bassett as to the experience they have had in his part of the country with compressed air sprayers.

Mr. Bassett.—I am sorry I cannot give you any information, because we have had no real definite work that would be worthy of quoting at all. We are simply at the present time depending on gasoline engines in connection with the common pump. Ohio did some nice work in the neighborhood of Sandusky, and are still doing that, but Michigan hasn't done anything to speak of on compressed air.

Mr. Roberts.—One of my neighbors tried it, and it has only one objection. It will only work in one place at once. He used it with great satisfaction.

Prof. Surface.—One of my neighbors runs five or six streams from one big air compressor.

Mr. Roberts.—They do their work very quickly, thoroughly and economically.

PROCEEDINGS OF WEDNESDAY NIGHT, JANUARY 17th, 1912.—BUSINESS SESSION.

Chairman Eldon.—One of the questions spoken about in the meeting of the Executive Board was that of forming a co-operative association, to dispose of our apples, and the Chair is ready to listen to anything that anyone has to say on that subject. In many sections they have kind of a co-operative movement in selling their apples. New York State, I think, is starting out on something, but the matter is before you to discuss.

Prof. Surface.—In order to get a motion before us for discussion, I am going to make a motion. In making it, however, I wish it to be understood that my mind is open to conviction and argument on each and every side of the question, and I invite it freely, but the proper method of procedure is to discuss a matter when there is a motion before us, and in order to get an expression from different persons who may be interested, I am going to move that we organize a Pennsylvania Commercial Fruit Growers Society.

Seconded.

Mr. Tyson.—Do you intend that motion to mean that the organization of a Commercial Fruit Growers' Association shall be an official action of the State Horticultural Association?

Prof. Surface.—As soon as we come to discuss it, I would say my own opinion is that results might be obtained by two plans, either as an independent association or as a branch of the state organization. I am perfectly indifferent as to the plan.

Mr. Garrahan.—Wouldn't it be well to have Prof. Surface state the object of such an association?

Prof. Surface.—Mr. President, my object in making such a motion is that there has come to my attention by very considerable

correspondence and personal remarks by various persons interested, as to the possibilities of such an organization, not only for the members, but for the fruit growers of the State of Pennsylvania. In every state, in every region where horticulture, or practically any other industry, has successfully developed, it has been through some plan of co-operative action, generally from a business standpoint of persons who are interested in that industry. You see where the development of horticulture has been most successful in this country, and it has almost invariably been through co-operative action of those who are commercially interested.

This State Society was organized and has been conducted mostly as an educational organization that has promoted the interests of the fruit grower in a proper and commendable manner, along the line of educating the fruit growers and interested persons, and so forth, but now we have thousands of commercial fruit growers, or persons contemplating becoming commercial fruit growers; we have crops and persons are disposing of them at a great disadvantage, because they are not co-operating. The word has gone out over the world that the fruits of the far west can be grown best, when we know right here in this exposition we are showing the best fruits that can be grown. We know that in most of the varieties we have here, we have quality that cannot be equalled in the far west. Why have the fruit growers of the west been able to sell fruit away above that which we are able to obtain, for, in many cases, the same varieties and often the same size and a better quality? It is because they have organized to advertise, to promote the sales of their wares. They are succeeding because they stand together. I believe if the fruit growers of Pennsylvania wish to succeed, they must produce a good article first, and the second is they must advertise it extensively by every legitimate means. We ought to have a means of always holding before the public the value of Pennsylvania grown fruit, and then by convincing the public by putting those fruits on the market, promoting the sales made by the members of the association. You heard Mr. Bassett speak this morning on the value of co-operative buying. You heard his remarkable statement as to the prices they bought their lime, sulphur and other materials for, through co-operation. That is one of the possible features of co-operation. The co-operative selling of the products of the members of the Horticultural Society, a commercial exhibition of materials and propaganda, to aid in the dissemination of knowledge of Pennsylvania fruit, and possibly other benefits that might come from such an organization. It may be there are some things to be said against it. If it were wholly commendable, Mr. President, and nothing to be said against it, it certainly would have been done long ago.

I think the first thing to be said against such an organization is it would be considered unwieldy, large, because extending across the great area of this state. Some might say it could be done by county organization, but there are growers here and there in the state who cannot be in any county organization. You heard a gentleman say this afternoon, Rev. Mr. Johnson, if it was undertaken, he wished to be counted in as a charter member. He feels he needs the help such an organization can bring to him. On my own volition, as a

Pennsylvania fruit grower, I sent out some letters to persons concerning this proposition, and have received some replies, and I myself have been interested in the possibilities of the development of an organization for the promotion of the interests of the fruit growers of Pennsylvania, and I think such an undertaking might bring good results. In almost every case, from the letters sent out, I received replies that were very enthusiastic. Over two hundred persons anyhow, representing all parts of Pennsylvania, have replied very enthusiastically that they wished to be represented in such an organization. A few were very cautious in their reply, but not more than three or four appeared to think the time had not yet come for such an organization. That is the general thing I have in mind, and I feel in putting it before this body, I have at least performed what looks to me like a duty for the commercial fruit growers, and I being interested in that, feel I should help to get it started, if there be a sentiment and a desire for it.

Mr. Tyson.—We had this matter up in the Board meeting the other day, and there was some favorable comment there, and it was the feeling then that it was entirely proper to bring it before this meeting in some such way as has been done. I feel as if the proper course now might be, after some expression here, to refer it back to the Executive Board, to decide whether or not, in their opinion, it would be best for this Association to take any part in it. I would like to hear a discusion on that matter.

A Member.—If this Association took it up, would it be for this Association or all the growers of Pennsylvania, whether members of this association or not?

Chairman Eldon.—That is for the Association to say.

Prof. Surface.—It looks to me as if there were two features of benefit; one benefit the discounts on supplies, and the other the advantages of the propaganda of Pennsylvania fruit. The development of the desire for Pennsylvania grown fruits would be a benefit that would indirectly help any person growing fruit within the state. My attention was called to the possibility of such an undertaking through my desire to get some kind of discounts for the demonstration orchard work we are doing. Some dealers wrote if we had a definite society organization, they would give us as high as 30 or 40 per cent. discount on certain supplies. It opened my eyes to hear reputable manufacturers offering as high as 30 per cent. discount. If there were a definite purchasing head, some such plan as they have in Michigan, a committee could be appointed, Mr. Chairman, or it could be left entirely to the commercial fruit growers of Pennsylvania to appoint a committee of their own. There is a most excellent article on this general idea of co-operation in the last issue of "Better Fruits," where the various phases and plans are set forth very clearly and very nicely. It would be a good plan for the committee or committees to read that article carefully and get into correspondence with the various organizations, but the motion was made to bring it forward for discussion.

Mr. Frederick.—I believe that it would be a good thing for the Association to take a step of this kind. I think it would be in line with present day progress everywhere. I am particularly impressed with the idea we are now handling. Last week at the farmers' institute held at Spring Church, in Armstrong county, Mr. Lighty spoke on the subject of dairying. He told us that the people of Denmark are enabled to send to our country and ship cow feed across the Atlantic and feed it and send the products back again across the ocean, and sell them here at a profit, and he told us why that was. We wondered, of course. He said it is owing to the fact that those people over there are organized; they co-operate one with the other in this work. No one man could do a thing of that kind. It would be too big a business, but they co-operate, and because they do that, they are enabled to do this. It was additonal evidence to my mind that co-operation is a good thing. It strikes me this way, Mr. President, that if the members of this organization didn't wish to enter into an agreement of that kind now, perhaps it wouldn't necessarily need to be so, and if others who are not members of our organization, see fit to unite with us, it would be one inducement, perhaps, to bring them into our Association, if they felt they could be benefited by belonging to us. I think that co-operation is in the air. I look back and I remember it is not many years ago we didn't know anything about business men as they are doing today. We talk about the progress that has been made along industrial lines, and speak about the great Standard Oil Company and other industrial combinations like these, and of their success, and we wonder at what they have accomplished. It is all because they stood together, because business men found business too big for one man or a few men to handle. They stood together and co-operated, and we have the results, whether good or bad. Eventually they will be good, must be. Why can't we, as fruit growers, organize to help ourselves?

I have a friend, or an acquaintance rather, who moved some years ago from our country, (and he made a big mistake), down to Maryland, to engage in fruit growing. He began to grow strawberries. He got fine strawberries, and he sent twelve crates at one time to a Baltimore commission house. When he got his returns they were very low. I had heard this about our former neighbor. I said to our family, "How much do you suppose our neighbor got by way of returns?" I said, "Make it low." They began to guess. I said, "Make it lower." I said, "He got two two-cent stamps." I said, "If the fruit growers of Maryland were organized and our friend had belonged to that organization, that could not have happened."

Mr. Roberts.—Will you allow an outsider to waste your time? Two weeks ago, at the New York Fruit Growers' Association, Mr. Norman Penny delivered an address. He said it was most carefully prepared. He told me afterward he had worked on it for years. He had data of the associations all the way from East to West. He gave the keynotes any new association would have to observe to be successful, and he took that association just by storm. They had meeting after meeting. They are starting a good many all over New

York, but New York is ready for it, but if you want to get that good information, get that article by Norman Penny. He is one of the professors at Cornell. It is a good article.

I belong to an Exchange at home, just two years old. We have a paid in capital of about $18,000. Last year we did a business of about $650,000. The minute you combine and have a head, you can save thousands of dollars in commissions. The question is, whether you want to do it as a Horticultural Society. It is a pretty serious problem for a Horticultural Society. You have to bind yourselves to stand by that association; you have to be loyal through thick and thin to make it a success. You are on the right track, and if you follow up with the proper safeguards, it cannot fail. It has done us thousands of dollars worth of good. Whether we have used it or haven't used it, we have the benefit in our territory just the same. It improved those in it and those out of it. It improved our whole market condition. It is a step in the right direction.

Prof. Watts.—Mr. Roberts expressed some thoughts I had in mind. There is no doubt but what co-operation is more important today than ever before, and yet I think we should not lose sight of the fact that the Pennsylvania Horticultural Association is primarily educational in its character, in its object. It is a great educational society, and when we step aside to do busines on a gigantic scale, we are getting into pretty deep water. I think the time is not very far distant when we will have many co-operative organizations in Pennsylvania. I think there will be organizations here and there, located in certain districts, where certain supplies are needed and certain crops produced. That will be business on a large scale. I believe one of the most important things for this organization right now is to promulgate this co-operative spirit and idea of Prof. Surface has mentioned. We must come to it, but I don't believe we are ready for it. I think we must first teach our people to pack their fruits properly and put a little more science into production, so we can measure up to the requirements of the market. It is a great movement, and we must get into it. I wonder if all of us realize just what it means; the salary that must me paid to the manager of an organization of this kind. The Eastern Shore of Maryland Producers' Exchange pays its manager $10,000 a year. The Southern Produce Company pays its manager $10,000. This is a big business proposition, and I don't believe you are ready to enter into it yet as a society.

Prof. Stewart.—I have been paying more or less attention to this co-operative business for a good many years, and it is a thing, of course, we must come to. It is a good idea and all that, but, on the other hand, there is this feature that has to be considered,—in the first place, co-operative buying is one sort of proposition, and co-operative selling is an entirely different one. There has been a whole lot of successful co-operative buying, where there would have been absolute failure at the other thing, and a thing of this sort must not be entered into hastily. That is one of the absolute fundamentals of success in it. If you will study the history of these co-

operative movements, you will find many of them have been organized in the country, and that they have proved absolute failures. That is the co-operative selling. Study the history of the California organizations before the present organizations. It was largely as the result of a single man's efforts. You cannot get a man that can make an organization like that, without paying him a good deal more money than we are in a position to pay. The next proposition is that it would certainly be undesirable to undertake a thing like this and fail at it. If you are going into it at all, go into it to make a success, and you certainly cannot make a success of it if you go into it hastily. There are a few other things that have got to be considered here. When you come to co-operative selling, everybody wants to co-operate and get the benefit, but I wonder how many of those men will do absolutely everything that is required to make the product of that association bring them benefits. The reason the Hood River Growers' Association has really been a success to the large extent it has, is because they put up a thoroughly first grade product. We can say all we please against this far western fruit. They showed us how to market fruit, and we might just as well admit it, and the reason they have trebled the price on their fruit inside of three years, was because they put up a thoroughly sound, reliable package from top to bottom, and all the way through, and they did treble it. But whenever an organization like that starts up, there is an immense pressure brought to bear on the members. Buyers come in there and offer the members a little more to sell direct to them. If a man is in the association he has to sell through the association, and no other way. Didn't Mr. Penny make that statement, Mr. Roberts?

Mr. Roberts.—I did not understand it exactly that way.

Prof. Stewart.—I would say that is one of the fundamentals, that you have to stick to the organization; you cannot let these poachers come in and give you a little more money: That is one of the dangers. Men have got to stand by the organization, and secondly, they have to put up a product that will meet the standard, that will make that organization product worth while, and a lot of the people who would dash into this affair, have never produced fruit that is worthy of the organization. That is the way I would look at it. They would have to raise the standard of their own production very decidedly. They wouldn't stand for a moment the culling that is the practice in the Hood River Valley, and then they would probably not think of standing by the organization when these, what we might call poachers, come in and offer them a little more to sell outside the organization. Those are two things I think ought to be considered at this point.

Mr. Roberts.—In our exchange a person can sell direct to anybody, but the exchange is promised the produce, and he must pay his commission to the exchange for that stuff, just the same, whether he handles it or not. That is the rule of our organization, if we sell, we are liable to pay them five per cent. You are bound up to deliver

the goods. You appoint an inspector and you are subject to his rules. His stamp is put on your goods, and until they are right, they won't be stamped. And it is not hard to get at a uniform product that you will not be ashamed of. As far as the salary of the manager is concerned, it is an insignificant item. Very few of our members know the manager's salary. They don't care. They charge five per cent. on the goods sold; they charge a profit of five per cent. on the goods coming in. That is very small. The exchange sells right at home, and there is comparatively little loss, and the results are wonderful. We handle strawberries that way. It is a difficult proposition; still it has been a big success. Sometimes we have had our troubles, but it is a good thing. It is growing fast, and it is a wonderful help to us. The buyers come there. If the manager says that car is straight, it is sold. Every purchaser soon learns it is to his interest to make it right. You cannot afford to send the association anything that is not straight. One rule has been with us, that no one can take more than so much stock in the exchange. It is not a money making institution. We pay five per cent. dividend. The idea is to increase our business, and there is no reason why it should not work. It is working. No one can deal with the association unless he is a member.

Prof. Surface.—Does he pay a commission on the benefit he gets from his produce?

Mr. Roberts.—Both ways, five per cent. Just count for yourself. Our lime and sulphur, 33 per cent. beaume, costs 11½ cents per gallon, and we get a dollar back for the barrel. That is 9½ cents. That is, after the exchange price is put on. The same way with strawberry baskets and everything else along the line, we get that at a minimum price. There is no middleman in it.

Prof. Watts.—May I speak again on this question? I don't see how we could possibly enter into this matter of co-operation as a State Horticultural Association. We might make suggestions to individuals or communities to organize, and it seems to me the duty of this Association is to educate our people along this line. I am thoroughly in sympathy with the idea advanced by Prof. Surface, but I believe this State is too big, and the organization too unwieldly for anything of this kind. I want to make a substitute motion, that the Executive Committee of the Association be instructed to prepare recommendations upon this question of co-operation, to be made at the next annual meeting. Now, that is the motion, and I would further suggest that the Association bring in the best expert that can be procured to address this Association at the next meeting, and then follow the address with the special recommendations be made by the Executive Committee. Perhaps one of the members can look into it thoroughly during the next year.

Mr. Creasy.—I have had some experience in the co-operative movement, and we discussed it in the committee. We talked about having an apple show for the State, and having the buyers there,

but this has opened up into a bigger subject, and I agree with Prof. Watts, that this Horticultural Association, with is limited funds, couldn't go into this work, especially at this time. I feel in seconding the motion of Prof. Watts, to refer this to the Executive Committee, and instructing them to get some one here at the next meeting,—I think it was the object of Prof. Surface to bring it before the meeting.

Prof. Surface.—That was the only object.

Mr. Creasy.—And get it before the people, so they can do some thinking about it. I think Mr. Roberts has said some things that are very important on the subject, as well as some of the other gentlemen who have discussed the subject. There are a lot of things to look at. I feel like seconding the motion of Mr. Watts to procure some expert for the next annual meeting, and also have the Executive Committee in the meantime find out what they can in regard to this matter.

Mr. Frederick.—I believe I seconded Prof. Surface's motion. I don't wish to stand on ceremony. I am willing to drop the whole thing, if you can do that.

Prof. Surface.—Mr. President, I am perfectly willing to withdraw the motion, and I presume my second will withdraw the second; but I should like to bring the thought before us as a suggestion, that this be presented at the summer meeting, rather than the annual meeting. It will expedite the movement that much more. It will save half a year's time. I firmly believe it would give an impetus to the meeting. It would bring out more of the extensive growers. If you would see the more than two hundred letters I have, endorsing the proposition, you would see the sentiment for it.

May I call attention to two features that have not yet been emphasized in talking on this proposition. One is the possibility of having a grade mark and living up to it and using it and having it mean something. At present, we cannot sell our fruits on a grade mark. In Canada, they grade their fruits XXX, XX or X, and they mean just what they are marked. The Canadians tell me they have seen as high as fifteen marks on American fruit. In consequence, the marks on fruit grown in the United States mean nothing in England. Marks of the Canadian fruit growers mean exactly what they are, and sell for that without question, and the other is the protection we would have from disreputable buyers. I had an experience which may be of interest to others. A Pittsburgh commission man wrote me and wanted to know what about peaches. I had some which I thought as nice as grew. He said the price was $1.85 a basket; pretty good for half bushel baskets. I thought $1.85 was something pretty good, and if I would send out my fruit here with my stamp, and show what quality of fruit I had and develop a trade, I would be able to reach out and develop the business. I asked him to telegraph back returns. No telegrams came, but in a few days, a letter came stating it was the finest fruit they ever had, and they

wanted me to send some more. I said to send my returns and when they came back, netted me 19 cents a basket. I will give that man's name and address to anyone interested. With an organization, we could show up that kind of a fellow in a hurry and save ourselves from the possibility of such things. However, I withdraw my motion, and I understand Mr. Frederick withdraws his second.

Prof. Watts.—The summer meeting is usually quite local in character, and that would be an objection to bringing it up at the summer meeting. You wouldn't have the respresentatives from all over the State like you have at the winter meeting. We have had just one summer meeting.

Mr. Creasy.—I suggest the motion be so amended that the committee at the summer meeting invite any suggestions anyone may have to present on the subject. We might hurry the matter along for the January meeting.

A Member.—I would just like to tell a little story which a friend of mine told me not long ago. He said in the City of Wilkes-Barre, during the past year, there was in a window an exhibition of apples, half a dozen fine apples, nothing more. He said the first day a few people stopped and looked; then the newspapers took it up and wrote notices about the apples. This friend of mine said that a man told him he asked the man who put the apples in the window, why he made the exhibition of apples there, what was there wonderful about these apples. The man said, "Nothing at all. Simply some of our western apples, nothing more." He said, "The secret is, I belong to our organization out there, and there is an agreement among us that each member in every city he goes to must in some legal and honorable way advertise those apples. That is why I put the apples in the window, and the newspapers and public will do the rest."

The motion that an investigation be made pertaining to the advisability of an organization was carried.

The Chairman stated that the next thing in order would be the report of a nominating committee, and Mr. Garrahan, on behalf of the committee, made the following report.

Mr. Garrahan.—The committee has asked me to report. We have decided, without any hesitation, to re-nominate the old set of officers.

Mr. Garrahan read the list of officers.

It was moved by Prof. Surface, seconded and carried, that the report of the committee be accepted, and that the secretary pass the unanimous ballot of the convention for the officers nominated.

Secretary Tyson cast the ballot of the Association and read the list as follows:

Secretary Tyson.—I shall also read the names of the Presidents of County Associations who have become Vice-Presidents of the State Association for 1912.

President, Gabriel Hiester, Harrisburg, Pa.

Vice-Presidents, W. T. Creasy, Catawissa, Pa.; Robert M. Eldon, Aspers, Pa.; F. H. Fassett, Meshoppen, Pa.

County Vice-Presidents, Adams, R. M. Eldon; Bedford, A. C. Richards; Cambria, Abram Hostetler; Cumberland, H. A. Surface; Erie, Geo. W. Blaine; Lackawanna, A. B. Kilmer; Luzerne, W. J. Lewis; Perry, Wm. Stewart; Somerset, D. B. Zimmerman; Snyder,

Secretary, Chester J. Tyson, Flora Dale, Pa.

Treasurer, Edwin W. Thomas, King of Prussia, Pa.

Prof. Surface.—You know there was one more district organized last Saturday. It is Snyder county, organized with forty-six charter members.

Mr. Garrahan.—I would like to move that the Secretary be instructed to write a letter of condolence to our worthy President. I understand he is sick and unable to be with us.

Seconded and carried.

Secretary Tyson.—I am sure Mr. Hiester will appreciate that very much. I spent some little time with him last week, and you will be interested to know that while he has been very ill, he is slowly improving, and hopes to be about before very long, and he had counted very much on coming to this meeting. He said that so far as he could remember, he had not missed a whole session of the State Association for nearly forty years, and he seemed to feel very deeply the necessity of missing this meeting, and asked me to convey his regards and regrets to the Association. I know he will very much appreciate this expression.

Mr. Walton.—Is this the time when we take up the subject of our next place of meeting?

Chairman Eldon.—That is a matter for the Executive Committee to decide.

Mr. Walton.—I trust the Executive Committee will decide hereafter to have the meeting somewhere where we do not have so many other interests to look after, so we can have one of our old-time meetings, where we used to gather and be enthusiastic over our meetings. This is not a representation of the horticulturists of Pennsylvania. I do not know why they should not turn out, unless it is the meeting of the Dairy Association and the Live Stock Breeders, and so many places of amusement around the town for our members to go, instead of attending the meeting. I hope the Executive Committee will find some place, no matter where it is, some little town in Pennsylvania. Little Tunkhannock was a splendid place of meeting. We were not entertained as fine as we have been here, but we had some good brown bread and beefsteak, and went home feeling fine.

Prof. Watts.—I missed the opening session, and would like to inquire of the secretary as to the increase that has been made in membership during the last year.

Secretary Tyson.—Our membership for the year 1911, annual and life members, if I remember the figures,—and I am not sure that I do—is about 725. The membership for the previous year was 360. For the year previous to that, I think 130. Back of that, I think 113. I would like to say just a word in reference to Mr. Walton's suggestion. As secretary of the organization, I feel pretty badly about the attendance we have at the meeting, and there is a feature that may not have occurred to Mr. Walton and some of the rest of you, in reference to the fixing of a place of meeting. Perhaps we had too much in mind the commercial side of the matter, but there was a feeling by a good many members, and voiced rather strongly in the meeting of our Executive Board last summer, when we decided where to meet, that it was time for us to go to some large city where the consuming public was gathered, and hold a good big fruit exhibit, to show those people what Pennsylvania was doing. Perhaps we were wrong in that. I cannot say. Certain it is, that a fruit exhibit such as we have here, if held in Tunkhannock, or some other small place of that kind, would have little value in advertising the ability of Pennsylvania to produce good fruit. That matter was brought up and was quite an element in deciding where to hold this meeting.

A Member.—Last year the Ohio Horticultural Society met at Columbus, and instead of going out to the big show hall at the Fair Grounds, Lazarus, I believe, was the name of the dry goods store in the centre of the town, gave them a fifth floor. They had the fruit exhibited there, and that fifth floor was crowded practically all afternoon and during some part of the morning. They were not able to hold it there in the evening, because the store closed at a certain time, but the meetings were attended, I suppose, by 500 people at every meeting.

Prof. Surface.—May I ask the Secretary if he intended to bring up the amendment to the Constitution, concerning the time of meeting?

Secretary Tyson.—In our Board meeting, we discussed somewhat the advisability of meeting earlier in the winter, having primarily in mind that our members would have their fruit in better shape for exhibition early in November, possibly, or some time shortly after the harvesting time of the fruit, and our Executive Board took action to recommend that Article 6 of the Constitution, which fixes the date of our meeting in the month of January, the place to be fixed by the Executive Board be so amended as to eliminate the phrase, "in the month of January," and leaving it entirely in the hands of the Executive Board to fix the time and place of the Annual Meeting

Mr. Creasy.—I understand that cannot be acted upon at this meeting; that it has to lie over for action until the next meeting.

Secretary Tyson.—Yes, it cannot be acted upon at this time. We just give notice at this time for action later.

Mr. Creasy.—The object as stated by the Secretary was that if this meeting was held the last week in October or first week in November, the members could have their fruit on exhibition, and perhaps through that could make sales of their fruit. That was the object, but it was thought, of course, if we would have another organization formed to take up the matter of selling, then it would not be necessary to change the Constitution, but the thing that prompted the committee to take up that change was the idea of having the fruit on exhibition in October or November, and there might be a chance to attract the buyers, to sell the fruit. That was the only object I know of.

Mr. Garrahan.—I believe this is a State Horticultural Association, isn't it? It isn't a Fruit Growers' Association. The market growers have as much right, I believe, to attend this Association as the fruit growers.

Chairman Eldon.—It is not limited.

Mr. Garrahan.—If you put it in October, we market gardeners will have to stay at home. If it comes near Thanksgiving, we cannot come. You couldn't get many fruit growers out, I think, at that time either. I believe that would be too early. December might do, but most of us have a good deal of work getting ready for Christmas trade. I believe the date you have now is about as near right as you can find.

Prof. Stewart.—I might make one other suggestion; that is, that I believe it is the experience of such associations as those in New York, The State Fruit Growers' Association and The Western New York Association, that the date of meeting in January is satisfactory, and certainly earlier than December would seem to be out of the question, because of the work people have to do, and the thing I primarily wanted to say is this—if you expect people to give a report of the experimental work that they have done, and bring it up to that year, if they get it much earlier than you have it now, I shall have to beg to be excused in the making of a report of that year. That is merely speaking of it from another standpoint. I simply couldn't get the facts and figures together much earlier.

Mr. Walton.—Mr. President, our Association meeting wouldn't be worth anything hardly without our friends, Mr. Horace Roberts, of New Jersey, and others, and it would be impossible for them to get here during the months of October or November. From a selfish standpoint, I hope they won't change the date of the meetings. I have enjoyed these meetings very much for four years, and I look forward to them every year with a great deal of pleasure, but I couldn't get away in the months of October, November or December. My not being here wouldn't make a particle of difference to the Association, but it would make a whole lot of difference to me. I trust they will not change the date, and as far as the market for your apples is concerned, I don't believe it is necessary to have an exhibi-

tion to sell apples like we see down in the hall. If every grower will be careful in raising good apples and having a good pack, as they have there, and send those out on the market carefully, they will be sold. There is no question about that there is a demand for good apples. The fellow who has to try to find a market for his apples is the man who is growing the little runts and imperfect ones. The Association is not making a display of that kind.

Secretary Tyson.—There has been a lot of expression here on one side. The expression in the Board meeting the other day was nearly all on the other side. There are several persons here who felt the other way about it the other day, and I am rather surprised that we haven't heard from them at this time.

Prof. Watts.—May I inquire what date the Board had in mind particularly?

Secretary Tyson.—The Board had in mind that conditions might arise that would make it seem wise to change the date to some time before the first of January. They didn't have in mind at all settling definitely on an earlier date. They realized the Constitution as at present worded made it necessary to meet in January. They had in mind asking the meeting to leave the matter open for their judgment. I might say further, that this matter, as you probably remember, was taken up at our last annual meeting at the time our Constitution was adopted, and it was recommended then that the word "January" be cut out. It was discussed and it was decided by that meeting to leave the word "January" in, and whatever recommendation we make tonight—we cannot take any action unless it be to refer it back to the Executive Committee—it would merely be a matter of its coming up at the next Annual Meeting, to decide whether that word should remain in. Personally, I feel that January is a good time to meet.

Mr. Creasy.—One of the points was in regard to this commercial side, and since the subject is up and already referred to the committee about a co-operative movement, I think it would be fair to refer this matter back to the committee. I move that be done.

The motion was seconded and carried.

Secretary Tyson.—Another matter. These market gardeners in Pennsylvania are awful fellows. At the solicitation of friends, Garrahan, Watts and some others, I have been trying my best to get some of the market gardeners interested in our Association. I have tried it for three years, and I think we offered some pretty nice premiums this year. We have one pumpkin on display from the market gardeners of Pennsylvania. Now, I don't know whether they are too busy bunching celery in October and supplying their Thanksgiving trade in November and Christmas trade in December, and in January their stuff is all gone. I would like to have an expression here as to whether this meeting thinks it is worth while for us to devote as large a portion of our program to the study of garden-

ing questions, as we have been doing. I would be glad to hear from any of you, and glad for the market gardeners here to express themselves.

Mr. Schock.—In connection with the remarks made by the Secretary, I desire to state that during the horticultural show that was held in Philadelphia this fall, there was nothing on exhibition that attracted more attention than the display of vegetables. It was a revelation to the people of Philadelphia, and I think the point raised by the Secretary is well taken, and should receive liberal support at the hands of the market gardeners of Pennsylvania.

Mr. Walton.—I think my remarks just a moment ago, in regard to the good fruit, if we grow good fruit, we would have no need of displaying it to sell the product, holds good in the market gardening end of it. The market gardeners grow such good vegetables and they make a display every day in the year in the stalls in the market, and they are consumed, and they don't have any to bring around to any exhibition. It might be all right to bring them, but I don't believe it is absolutely necessary. Any person interested in growing vegetables, if they will go to our market gardeners and learn how they are grown, see the pains they take to grow them, they will be far more interesting to them than to see the display of the fruit on our tables in our exhibitions.

Secretary Tyson.—That brings up the question whether or not our exhibits of fruit and vegetables are worth while at all. It seems to me we wouldn't want to see that feature done away with. I feel as if I can get as much education along lines of fruit growing out of the careful study of a good fruit show as I can out of the lectures, and I cannot see why it wouldn't be the same with the vegetables.

Mr. Garrahan.—In regard to the Secretary's inquiry in regard to the time taken up by this Association, from my own heart I believe it is a waste of time. I believe the market gardeners coming here are wasting their time. What is the use of a man coming here and talking asparagus, for example, when I doubt if there are more than three or four men in the audience who care anything about asparagus; what use is there in a man talking about irrigation, when so few in the audience care about it. You are taking up your space on this program, possibly one-third of the time, with subjects that 99 per cent. care nothing about. Isn't it a waste of time? Wouldn't it be better to devote that time to something you are vitally interested in? A horticultural association is a misnomer. It is a fruit growers' association. I think you would get much more out of it by confining yourselves to the fruit growing feature.

Prof. Watts.—I would like to ask the age of this organization; when organized.

Secretary Tyson.—Fifty-three years ago.

Prof. Watts.—How long is it since we began to give vegetables any place on our programs? Isn't it about two or three years ago? Wasn't the Tunkhannock meeting the first meeting where vegetables received any attention? Just three years ago? Last year at Harrisburg we had a number of market gardeners who were interested. We have been unfortunate in this meeting, in drawing in market gardeners. So far as I am concerned, I should regret if these gardening topics were dropped from our program. Unless I am mistaken, the next season's report will show up the vegetable interests of Pennsylvania as being of as great importance as the fruit interests. If you want to organize a separate organization for the vegetable growers, that is a different proposition. I think the Horticultural Association should take care of this feature of horticulture. I do think it would be an advantage, perhaps, to hold separate sessions for the vegetable growers, and then the fruit men could go on with their discussion without being bothered with the market gardeners, but this industry is too important a thing in my opinion, to be dropped.

Mr. Creasy.—I agree with Prof. Watts. I think it is a very important industry, and they have been unfortunate here, and we have been too. We haven't had the people we expected to have here, so it is no use to find fault with the others. I think it is all right. We might want to grow vegetables some time between these peach trees or apple trees. This vegetable industry is a great industry in Pennsylvania, just in its infancy, and I think it is right to continue it in this Association.

Prof. Watts.—I would like to know how many people here tonight are interested in the growing of vegetables. I would like to see their hands.

Fifteen responded to Prof. Watts' question.

A Member.—I think the Secretary's point is good; if the gardeners are interested, they ought to bring their stuff to the exhibition. Why don't they bring their stuff?

Prof. Watts.—You have been working up an interest in the fruit growers for fifty-three years; you have been working up an interest in the market gardeners about three years.

Chairman Eldon.—Mr. Garrahan can furnish first-class seeds, and you can grow all the vegetables in a year. We must grow our Winesap trees for nine or ten years to get a sample. It is not a lifetime preparation for pumpkins and cabbages.

Mr. Garrahan.—The question here about the display of vegetables—Mr. Walton and I talked over that, and we were going to bring a lot, but we thought it would be complimentary to the market gardeners around Pittsburg to let them have the show and take the prizes.

Chairman Eldon.—That is not what we think in Adams county about fruit. We are going to all corners of the state and show them how. We would like to hear from the Dean of School of Agriculture at State College, Dr. Hunt.

Dr. Hunt.—I think you are taking a very unfair, advantage, in calling upon a man who hasn't anything to say. As I have said in the presence of some of these gentlemen, some times my wife tells me making speeches is not my long suit, and I have a good deal of respect for her opinion.

I just said to my neighbor here that this discussion had just reached the vicious stage, and he said he thought it was time it should close, and I thought so to. I will say, however, that I have become during recent years immensely impressed with the horticultural possibilities of both fruit and vegetables in Pennsylvania. As you know, the Station has been so fully impressed with the importance of the fruit interests, that a little over a year ago we asked the Secretary of Agriculture to loan us Mr. Wilder, to make a special study of the fruit soils of Pennsylvania. As you know, he spent a year. He came to my office and asked what I wanted him to do. I told him nine months later I wanted to see on my desk a report of the fruit soils of Pennsylvania. That is all I had to ask him. He was turned loose in Pennsylvania with money enough to travel and make this report. At the end of nine months that report was on my desk. It is now in press. The reason we are interested in work of that kind is this: if a man plants a wrong variety of corn, next year he can plant another crop, but if he plants a wrong variety of apples and makes a mistake, he doesn't find it out for ten or fifteen years, and then he has the trouble of working that over if he can, into something else that is suitable, and those of you in this audience who know about varieties, have no idea of the lack of information upon that subject. It comes to our office constantly. Two or three years ago a man came to me from Lawrence county and said he was going to plant eighteen acres of orchard. I asked him what he was going to plant. He said York Imperials. I said, "Isn't that a Baldwin section." He said yes. I said, "Don't Baldwins grow well there? Why are you planting York Imperials?" He said, "It is an institution. We have a Board of Trustees. One of the Trustees came from Adams county." I said, "Exactly, York Imperial is a wonderful commercial apple there, but it isn't the apple for Lawrence county," and so it comes to us from all directions, and I hope this report will be of some use.

As I say, I believe that Southern Pennsylvania, very much of Pennsylvania, parts of Maryland and Virginia, this whole apple region, has many opportunities for apples of the highest quality, as many of those western men see, that they are now at the top and they are selling their orchards and coming east and planting here in the east. I believe you are on the right track.

It was moved, seconded and carried that the convention be adjourned until 9:30 o'clock Thursday morning.

THURSDAY MORNING, JANUARY 16, 1912.

The meeting was called to order and the first number on the program was a talk by Mr. Horace Roberts, on

BERRIES.

Gentlemen of the Horticultural Society:—If yesterday morning you had me in the middle of the barrel, this morning I was booked to come between the Law and Gospel, Professor Surface and Mr. Hale. I will talk to you first about blackberries. I have raised them somewhat, and I always had a desire to have more blackberries. Once in a while you see a patch thoroughly healthy, paying three or five hundred dollars an acre. You go home admiring that patch, and you think you want some. A few years ago I actually bought a poor, old farm, with the idea of planting it in blackberries, but after getting it, I started to put out a peach orchard, and when I got the peach orchard all out, there wasn't an acre left for blackberries. I haven't trusted myself since then to buy any more blackberry land.

Now, as for raspberries; that is a nice crop, a crop that pays well, and I hope to plant more of them. In our section we raise the Welsh. It is a productive, hardy variety that yields well and is a good shipper. It is a local variety, and our berry men are almost exclusively sticking to that one variety. It just satisfies us.

Now, for gooseberries. A few years ago they passed a pure food law that meant where they served a syrup in soda water fountains, it must be pure fruit juice, and the gooseberries being sour, are exactly the kind of fruit they wanted, and right away the price of gooseberries went up, and the men who were lucky enough to own a gooseberry patch of even a few acres, had a bonanza. The men of our neighborhood that had gooseberry patches were the first to own automobiles. Two or three years ago I got close enough to one of them to get him to tell me just what he got for his gooseberries. He had two acres, and they netted him $2,600. The future of the gooseberry is something we are not quite sure of. Our only market is the canners. They take the juice out. How soon they will be supplied we cannot tell. The price is still very high. Each year we expect it to drop a little, but it don't, and they are still reaping wonderful profits from gooseberries. It may be supplied next year or year after, but the rate they are returning per acre is simply astounding.

Question.—How long does it take to raise them?

Mr. Roberts.—Oh, they get right to business; bear some second year; in three or four years get to their height. They are very easily raised, easily gathered. You have a couple of weeks to market them in. It is one of the ideal crops. The canners are the only market and when they get an oversupply, they will put the price down.

Question.—What variety did you use?

Mr. Roberts.—Houghton and Downing. The canners want a sour berry. The Downing is not quite sour enough, but if you have the Houghton too, they will take a lot of them. The ones that bring in the dollars and cents are the Houghton and Downing. You can sell them by the car load as fast you can produce them. The canners have not been supplied. You could sell them if you had them in quantities.

Question.—You would have to ship them away from these markets here?

Mr. Roberts.—It is no further from Pittsburgh to Baltimore than it is from our section of Jersey. I cannot guarantee the future of the gooseberry business, but I have just planted quite a patch of them. The prices we are getting is absolutely ridiculous, but if we had to put them on the market, a few would go a good ways. It takes a lot for the canners. How much it will take in the future, you don't know and I don't know. But anyhow, we have enough faith to keep on planting.

Now, I will take up the strawberry, and when I get to strawberries, I am right at home. We have 68 acres to pick this year, and will have more next year. As for planting, we plant them just as soon as we can in the spring. Early planting is an important matter. When I planted my berries last year, the ground would be frozen an inch or two in the morning. If it thawed at eight o'clock, we would start to plant, and plant for the rest of the day. Some of my neighbors laughed at me, but before the season was over, we had a dry spell and they had trouble getting their plants to live.

As for planting, the best method we have found is to make out the rows with a corn planter. It marks out two rows at once and the furrower leaves the ground in nice order to get the roots in well. We like to put a crop in between the rows of plants when we set them; for instance, a crop of peas. We put the berries five feet apart. The peas get out of the way, and it helps to pay the expense of farming the first year. One thing you must be careful of, the planting of those berries. It is not worth while to replant them. If you take the proper pains in setting, you won't lose one in a thousand. Get the roots down well, if it does take a little longer it is not waste time.

A word as to fertilization. I have tried various fertilization for berries at time of planting and whenever I put a commercial fertilizer on them, I get stuck. It is pretty sure to interfere with the berries. We take fairly good land and plant the berries. After we get them planted, we put half a ton of ground bone to the acre. That is the only place I use bone. There is nothing in it to hurt the berries, and it is on top of the ground, and we like it. A little later in the season, we put on 500 pounds of tankage.

Question.—How do you raise them, in rows or in hills?

Mr. Roberts.—We set them in rows. We farm the berries well, keep them thoroughly tilled. A weeder we find is a big help. It saves hoeing. We take out a tooth, so we can keep the weeder close up to them without hurting them. About the first of June we plant tomatoes right in the berry rows, so by August I can tell people that is my strawberry patch, but it looks like a tomato patch. Between every other hill of strawberries we plant a tomato. That may look live vandalism, but it protects them during the hot weather of August. It keeps them from getting too thick, and we get the finest kind of tomatoes, often get a hundred dollars an acre for our tomatoes, and we don't find it interferes with the berries.

Another thing, any man that raises tomatoes for market, soon learns to make it pay, he must spray them thoroughly, and while spraying those tomatoes, we are spraying the strawberries, too. We do that two or three times, and our strawberries go into their winter quarters in fine shape.

Question.—Do you never have to thin any?

Mr. Roberts.—Not very much; the tomatoes, in a measure, keep them from getting too thick. We are not bothered much with their getting too thick. The strawberries run under the tomato vines better than you think.

Question.—What strength do you spray those tomatoes?

Mr. Roberts.—Just ordinary orchard strength, one gallon commercial lime-sulphur to thirty gallons water, two pounds arsenate of lead to fifty gallons of water.

Our best market for berries is the exchange, and in dealing with the exchange, we have learned a few things. All my neighbors raise them largely, as I do, and if all shipped to the Philadelphia market, we would glut the market. So we built up an exchange there. We have sold from Moorestown alone, $100,000 worth of berries outside of what went to Philadelphia. In raising for the exchange, we want to raise a good shipping berry. For instance, we use the Superior. That is not a big berry; not particularly a high-priced berry. It is a little the same as the Gandy. It is a wonderful grower, a good shipper, a little small, may not bring quite the price some of the others do, but it is a money maker. Then the Gandy is a standby, but it doesn't give us quite enough berries. The Stephen's Late Champion is a little soft. We are looking toward the Bethel as a good variety, but that is a new one. I will tell you why we stick to those three berries, the Superior, the Champion and the Gandy—those berries are sold by our manager and sold ahead. If he has a car of Superiors, see what nice shape he is in. It is a whole lot easier to sell it than it is a mixed car. He can sell it and do it easier. When we send a shipment into the exchange and they are busy—they sell maybe fifteen cars from ten o'clock in the morning to three in the afternoon,—if we send a mixed lot, three or four kinds of berries on one wagon, those busy men don't have time to separate them. They put them in the mixed car, and they are all

consigned to New York. We get more money for the berries sold at our station than where they are consigned. So we are learning to plant a few varieties, study those and develop them up to their very best, it pays us better to specialize. We try experiments, but for a business proposition, we stick to a very few varieties.

Question.—What time do your spray the tomatoes?

Mr. Roberts.—First we spray them in the beds, before they are set out. After they have been out a couple of weeks, we spray them again. We spray them two or three times. It pays us to do it. As long as we can keep the foliage on tomatoes perfectly healthy, we get the highest colored fruit.

A Member.—I buy my tomatoes and put them out in cold frames. If tomatoes are perfectly healthy in the cold frame, what would be the idea of spraying?

Mr. Roberts.—Diseases are carried by the winds. It is in the ground. It is in the manure. It is in lots of things. Not only that; there comes along spells of bad weather, when fungus diseases develop faster, and we simply insure against them. The cost of doing this is very small.

A Member.—I never spray my tomatoes.

Mr. Roberts.—Then some profits you should have had haven't come to you. I spray all mine, and it pays us well.

Question.—You don't spray them after the fruit starts to growing?

Mr. Roberts.—Why not?

A Member.—I wouldn't like to put arsenate of lead on them after the tomato begins to form.

Mr. Roberts.—We put poisons on practically all our vegetables and find it no harm at all. We spray our cabbages with poisons. We have to do it. We don't find it dangerous. The reason I mentioned cabbage, you think that is a dangerous proposition. The outer leaves are generally torn off. The housekeeper does it if you don't. Now, grapes are a proposition. Every good vineyardist sprays his grapes. They went into the New York market a few years with Bordeaux mixture clinging to them. They analyzed that mixture, and the report was, a person would have to eat four tons of grapes, and do it at a single sitting, to have any serious results.

Now, the strawberry patch is the only thing I buy manure for. We use manure for a mulch. It has a fertilizing value and it has a mulch value. We aim to put on ten to twelve tons of manure per acre in the winter time. It is not too late to do it now. It does away with heaving in the spring. Of course, our manure is on be-

fore this time of year. We try to get it on before Christmas, but it is not the winter freezing which hurts the strawberries as much as the spring thawing. We find a mulch is a great help.

Question.—How do you avoid turning your strawberry patch into a meadow by using stable manure?

Mr. Roberts.—We simply pick our berries two years, and we don't have much trouble. I have a lot of Italians, and they take the weeds out as soon as we are done picking.

Question.—What is your soil; sandy?

Mr. Roberts.—That is a point; that is why I am raising strawberries, rather than blackberries. The blackberry grows in the same kind of land as peaches, and I would rather raise peaches. We use clay lands, low lands, but it is land a little too close to water to be best for fruit like peaches, apples and pears.

Question.—What does manure cost you?

Mr. Roberts.—$2.25 cash a ton, delivered at Moorestown.

Question.—In the spring what do you do with the mulch?

Mr. Roberts.—If it is too heavy, we shake it up a little, but the berries come through better than you think. If we have a variety like the Superior, a solid berry that sets too heavy, we fertilize very heavy in the early spring; after giving it all the manure and fertilizer it had the year before, we put on half a ton of good fertilizer in March. We do it early. It pays us well. With a berry like the Champion, that is inclined to be soft, we have to be a little more careful of our ammoniates.

Question.—How many bushels per acre do you consider a good yield?

Mr. Roberts.—5,000 quarts is a very good crop. The Superior will sometimes reach as high as 8,000; 5,000 is a good yield. It will not average that year in and year out.

Question.—Do you get as large an amount the second year as the first year?

Mr. Roberts.—Not ordinarily. The Gandy will probably give you a better crop the second year than the first, if you take good care of it; but the Superior will not do it.

Question.—How about the William Belt?

Mr. Roberts.—It is a good variety, but I don't raise them.

Question.—What is the best soil for the Gandy?

Mr. Roberts.—The Gandy prefers a strong soil, clay lands suits them.

Question.—Won't the Gandy mildew?

Mr. Roberts.—There is one point I haven't got to, and that is our spring spraying. Just as soon as the berries begin to come up in the spring, it is essential to spray them. The first spraying we put in arsenical poisoning, and then we spray them later than that at least once or twice with lime-sulphur. We find those sprays do a wonderful lot in keeping away the mildew and fungi troubles of strawberries. You remember, I told you to put the fertilizer on in March. The earlier you put it on, the more good you will get out of it. Some say in spraying, just as soon as they get up, spray them, and you will keep the fungus troubles from developing.

Question.—Do you mulch your berries?

Mr. Roberts.—Yes, with manure in winter.

Question.—How long do you leave it on?

Mr. Roberts.—We don't take it off. We aim to leave it on.

A Member.—Several years ago, our berries pushed out and bloomed, and those early plants got frozen. In another patch, I left the mulch on late, and took it off, and they were not very good. The early berries were killed. Those that were mulched later didn't have any core, and they weren't more than two days later than the ones that were early.

Mr. Roberts.—I tried an experiment last year with the mulch. I had a variety of berries, the Heritage, a very large berry. It needs a little more careful attention to bring it to success. After giving a mulch manure, I had a lot of oat straw that was wet, and where we used that straw mulch I had my best crop of berries.

A Member.—Where I had the best berries that year was where I had chaff. There was ice under that chaff in May.

Mr. Roberts.—If you remember, last year was a very dry year.

A Member.—This was last spring a year ago.

Mr. Roberts.—Last year it was exceedingly dry. Some of my neighbors put in irrigation plants; some of them got gasoline engines; some simply had men to hold the hose and they sprinkled their beds. After investigating their plants and finding where they had spent one or two or three or even more hundred dollars than that, per acre to do this, I went home and looked at mine. Mine

were in level fields. On each side was a ditch, a good big stream of water. It would only have taken me a few hours to dam that and bring that water up to within six inches of the berries. It shows we must be alive and awake and do the best with the opportunities we have. I never thought of it, that was my fault, but it won't happen again. We won't just sit down and see our berries dry up for want of water, when we could dam a stream so easy. We will do better next time.

I am very much obliged for your attention.

A Member.—I would like to ask Mr. Roberts whether the manure he buys in New York produces weeds.

Mr. Roberts.—We are not afraid of weeds. It may bring some weeds. If they bring us weeds they bring us results, and as long as we get the results, we will take the manure, weeds and all. The New York manure is heated more or less on the cars. I don't think but a small part of the seeds ever germinate, and we don't have any serious results from them.

A Member.—I think the heat would kill the seeds.

Prof. Stewart.—This injurious effect Mr. Roberts speaks of from fertilizers is right interesting, and I am wondering if it might not be possible to correct that with some lime applications at the same time or a little before. I would suggest there is a possibility of doing it and making it possible to even use those fertilizers instead of the manure in certain cases anyhow, along with the lime.

Mr. Roberts.—It is an old adage among strawberry men, and it may be correct or wrong, that lime and strawberries are not congenial. I won't say it is, but I will tell you this, that the strawberry men are a little careful about using lime. We use lime on almost everything but watermelons and strawberries, and we are a little cautious there.

Prof. H. A. Surface delivered a lecture on

THE FIRST FIVE YEARS IN THE ORCHARD.

By Prof. H. A. Surface, *Economic Zoologist, Harrisburg, Pa.*

(This address was illustrated by Prof. Surface with illustrations from photographs taken chiefly in his own orchards, and the following article is not a verbatim report of his remarks, but an abstract giving some of the main points set forth by the illustrations and the address.)

The question is often asked "Is orchard planting being overdone?" In answer to this it must be said that it depends upon the planter. If he be a man who knows his subject and has proven that he is competent to produce first-class fruits and eliminate the culls

and low grade fruit, and to place these fine fruits on the market in perfect condition, he can safely plant as much as he can care for,—which, however, will not be nearly as much as most persons now appear to think. It is undoubtedly true that there is, and will continue to be much more profit in a comparatively small orchard well kept and producing fancy fruits, which can be sold at a high price, than in a large orchard, poorly kept, and producing only ordinary fruits, which must compete with many other fruits of the same kind and must be sold at a low and often losing price.

The great need of the orchardist of this country is to place quality before quantity, and no man's success should be measured by the number of trees he grows, nor by the number of bushels he produces, but by the quality of his fruit. Too many persons think that it is easy to put a tree in the ground and go to it in a few years and find it productive of fine fruit. This is the most serious mistake being made by the planters in this region. To produce good fruits at a profit demands proper care from the time the soil is selected until the fruit is placed on the market. There may be questions occasionally which the grower may need to ask of the expert, and in this capacity the expert consultant can render valuable service, but there is no man, however, expert, who can tell the inexperienced grower what to do in every detail to produce satisfactory results. The person who thinks he can depend entirely upon the instructions given him by some official or expert who may be willing to give all aid within his power, will find that there are many unexpected conditions or problems arising which must be mastered only by the person on the spot, who understands the situation and can handle it immediately.

Many persons apparently believe it possible to plant an orchard, hire a man to conduct it, and expect profits in the course of time. This is also a mistake. If a man is able to grow an orchard for another man he is able to do this for himself, and he will do so and have the benefits of it. If the land owner is not able to direct the details of his orchard management he will find that he was overplanted, even though he has planted but a few trees. The conditions for success are such that the owner must help with the work himself or let his shadow fall on those who do it. Stories of disastrous failure are already being told, and these will increase in the future by those who, at present, have the planting fever developed to such an extent. However. there is such a thing as "ague in horticulture." While planters have the heated head during one season they may get "cold feet" at another. This, of course, applies to the man who has not spent years in studying his subject and in practicing what he has learned. The man who knows the subject and knows that he can produce a good article, is justified in gradually planting as much as he can give proper attention but no more.

It would be far better for the quality of fruit produced in Pennsylvania, and consequently for the reputation and final price of our fruits, if the planting were done more slowly and gradually, and if the planters would learn the art of producing fruits of quality by placing quality before quantity. The great need of the fruits of this country is a reputation, such as the best of them deserve. To

obtain this, seconds and culls should be eliminated. To do this again requires expert knowledge skilfully applied. No man should plant extensively until he is satisfied that he has such knowledge or is determined to acquire it immediately by application in hard labor, both mental and physical. Fruit growing is no sinecure for either the head or the hand. A beautiful apple has demanded the application of both brains and muscle for its production, and "plenty of money" to put into the business cannot possibly be made to take the place of these.

For the production of such fruits as we should grow in this region several elements are necessary, but the first is a well grown tree of the proper variety. During the first five or ten years the orchardist should devote his attention to growing good, large, healthy trees rather than attempting to grow crops between his trees or forcing them to bear young. It is true that the more vigorously a tree grows the later will it come into bearing, but at the same time it is true that it will be forming a large top which will give a greater quantity of fruit, and within a few years will be yielding a far greater income than will be obtained from a stunted tree which commences to bear remarkably early. The more a tree is neglected and injured by borers, skinning with farm implements and otherwise, the earlier will it commence to bear; but bearing while young means limiting its growth, reducing its vitality, and shortening its life. There is no profit in attempting to produce large crops on very young trees. The purpose of the orchardist should be to grow good-sized, well-shaped trees before the time for them to commence to bear, and then change his methods of cultivating, fertilizing and pruning to such an extent that they will afterward devote their energy to bearing fruit instead of producing wood.

Keeping in mind that the purpose of orchard growing during the first five to ten years is to produce fruit, we may, however, at the same time grow certain crops between the trees without injury to them, and if the tree row itself is properly cultivated, and the intercrop receives the right kind of cultivation, this may really be the best treatment for the orchard and can give returns for helping to meet the expenses of tree-growing, which so few persons reckon with before planting. These annual expenses before the trees come into bearing are indeed heavy, as they include the cost of such operations as pruning, spraying, fertilizing and cultivating, and generally continued without income from the trees just about twice as long as most planters believe at time of planting.

During the first three years in the orchard any cultivated crop can be grown between the trees (peach) with successful results if properly fed and cultivated. Between apple trees they can be continued twice as long. The best of such crops are those in which the cultivation ends by mid-summer and which can thus be followed by crimson clover to grow and remain on the ground as a winter cover crop, to be turned under the next spring. Among these are early cabbage, peas, beans, sweet corn, tomatoes, early potatoes, etc. One large orchardist in the State of New York makes a business of growing soup beans in his orchard and considers it very successful. It must be remembered that the bean is a legume and has the power

of enriching the soil. The more of any legume that is grown in the proper manner in any ground the richer in the fertilizing element of nitrogen does that soil become. This is one reason why beans, peas, cow peas, soy beans, etc., and clovers of different kinds are used in maintaining soil fertility.

One of the largest orchardists of this State regularly grows field corn between his trees the first year. It is a good plan to follow this with crimson clover sowed at the time of the last working of the corn. There are orchards in this vicinity that show the beneficial effects of this method.

Potatoes can be grown between the trees, but the chief objection that has been offered to the growing of potatoes is that it is often not until fall that they can be raised from the ground, and digging them results in the same conditions as late cultivation for the trees, which means increased growth of the trees in the late fall, after which they are more liable to be injured by winter freezing. Actual conditions of orchards in this region at the present time show that there is justifiable foundation for this theory. When potatoes are used as the intercrop it is advisable to harrow the ground immediately upon raising them and seed it with rye and winter vetch to remain as a cover crop on the soil during the winter, to be turned down in the spring as a fertilizer.

An apple orchard can be intercropped a greater number of years than a peach orchard. Crops should be grown between peach trees not more than three years, while between the apple trees they can be continued for five or six years. Under certain conditions as to sufficient moisture and fertility a cereal crop can be drilled in strips between the trees if the tree row itself is kept cultivated. The speaker has done this successfully in some of his own orchards. If, however, the season is dry and the trees reach fair size, there is danger that the cereal crop growing between the rows may take too much of the moisture from the ground and thus injure the trees. Just as soon as it is seen that this condition is approaching the cereal should be turned down and used as a soil fertilizing crop, and the moisture should be preserved by frequent cultivation.

After the orchard becomes sufficiently advanced that the owner does not grow crops between the trees it is best to cultivate by clean cultivation until mid-summer and then sow a cover crop of crimson clover, or some other cover crop containing or mixed with a legume, to remain during fall and winter growing fertility, preventing washing, covering the roots of the trees, and giving other benefits from such crop.

In plowing the ground in the spring it is best to use a one-horse turning plow, commonly called a "bar-share," for plowing two or three rounds nearest the trees. There are several advantages in a one-horse plow in turning the soil near the tree rows. For this purpose one can get nearer the tree without injuring them, and plow shallow, and can control the plow better than with a two-horse plow. Two or three rounds, turning the soil toward each tree row, will be sufficient. These should be followed with the heavy breaking plow or farm plow, drawn by two horses, and continuing to turn the soil toward the tree rows until the finishing furrow or dead furrow is

made in the middle. This furrow is best filled by using a disk or cutaway harrow, so set as to draw the soil from each side into the furrow. After it is well filled, by running about two rounds in each middle with this implement, the operator should harrow across the orchard with a spring-tooth harrow, going at right angles to the direction of the original plowing. He should next follow with a spike harrow or smoothing harrow, thus putting the ground in good condition for further cultivation or intercropping. If a cultivated crop is to be planted it should be across the direction of the original plowing, to thus further level any slight elevations and depressions that were made as ridges or furrows. When breaking the soil next year the plowing can be in a direction at right angles to that followed this year, and thus avoid constantly throwing higher ridges toward the trees. Even should the slope of the land prevent breaking across the direction of the previous year's the ridges can be drawn down by the use of the disk harrow or cutaway harrow, which will be found the most valuable implement in orchard work. By setting the disks of the two sides at different angles, such as must be learned by actual practice, the disk harrow can be used with good advantage, even on hillside cultivation.

It must be taken for granted that all young trees should be cultivated, excepting, perhaps, the cherry and pear. If one has any hillside land he wishes to put in fruit he should particularly avoid planting this in peaches or plums, as these need cultivation during their entire life. Apple trees need cultivation while young, but when older can be grown by the sod mulch system.

Mulching to a great extent takes the place of cultivation. If one has all the leaves, straw, straw and manure, or other litter that he can use he can get along without cultivation, especially on the hillside.

One plan of hillside cultivation that is very good is to bring down the soil with a hand implement so that it will be built up like a basin below the trees, with the lower edge higher than the upper, and let the rain water settle in it and bring fertility and water the tree, over this basin one can scatter straw or grow clover to prevent its washing away.

Spraying and pruning are subjects of special attention, which are fully discussed in the Bulletins of the Division of Zoology of the Department of Agriculture at Harrisburg. It is impossible at the present time to elaborate upon these features of orchard management further than to say that the young orchard is improved by spraying once every dormant season with strong lime-sulphur solution either commercial or home-boiled. Trees should be pruned from the beginning with a view of making the tops low and open. The successful orchardist of the future will be the man who grows his fruits on very low-headed open trees, learns the business for himself, and does the work or lets his shadow fall upon those who do it.

A RAMBLING ORCHARD TALK.

By J. H. Hale.

Mr. President, Ladies and Gentlemen of the Pennsylvania Society:—Prof. Surface says he has given my talk.

Prof. Surface.—That is, a rambling talk, Brother Hale.

Mr. Hale.—So that relieves me from saying anything I really intended to say had I really intended to say anything.

I haven't received your program, Mr. President, but I do remember that in some correspondence with your worthy secretary, it was hinted I would take that for one subject, because he knew I would ramble anyway, and might as well start the subject right, as well as for some others, and let me get away from it. I hardly know where to begin, and I am sure I shall hardly know where to leave off. The orchard subject is such a broad one, and it is coming so much more to the front within the last two or three years than at any time in the previous history of this country, that it is worthy pretty thoughtful consideration from a good many points of view.

The early settlers in our country all planted a few trees, plants and vines about their homes for the family supply, bringing seeds, and in some instances trees, from the old country. The Massachusetts colony and also the Jamestown colony in Virginia, offered premiums, prizes and relief from taxation to the settlers who would plant orchards and vineyards, but the whole purpose of those bounties, and the main purpose of the tree planting of our New England parents was for the purpose of growing fruit that they might make something to drink. The early orcharding in this country was based on a drink proposition, with a moderate home supply of food as incidental; and as the march of civilization spread out over our country, from the Atlantic coast towards the west, tree planting went along with the march of civilization and progress, but for the first two centuries, almost, there was little thought of orcharding as a commercial proposition. The growth of villages and cities in a small way created a demand for a little fruit as food, and where there was a surplus from the home planting, a certain portion was sold, but no thought of it as a great commercial proposition. Within the last seventy-five years there was some commercial planting of orchards in New England, in Western New York, a little in Michigan, in your own State and in New Jersey, but always as a side crop to the farm, just a side issue. Trees were planted and taken care of, if there was an opportunity, or not taken care of at all, but even the great commercial apple orchards of Western New York and Michigan were always, up to a few years ago, a side crop to the farmer, and it has only really been since the planting of the orange groves in Florida, which began forty years ago, and later, the deciduous fruits in California, that there has been any specializing in orcharding and any serious thought given to it as a business or a profession. Later the orange groves in California, and then the apple orchards of the

Middle West, and within twenty or twenty-five years, the large commercial peach plantings in Georgia and Western Maryland, the lower counties of your State and New England and Western New York, and so on, have grown into a special busines, and even then, when we started in at that, there was very little commercial orchard knowledge. All the horticultural meetings I attended, Mr. President, in my early days, the whole talk—I was living in Connecticut, as I do, not far from Boston, and the old horticultural society there, one of the largest and best maintained in the early days—but the whole talk at those meetings was about varieties.

When I went to worship at the feet of Marshall P. Wilder, the first thing he did was to take me out to his home orchard, and show me with great pride his 813 *varieties* of pears; but he didn't know any more obout commercial orchard culture than Surface does, not a bit; didn't talk about it. (Laughter.) The only thing in the early days, was simply *varieties,* and the knowledge of the fungus troubles and insect pests, the science of feeding the plant and the tree with the necessary plant food to build up the perfect tree and the perfect fruit, wasn't known or understood by the growers, and had hardly been touched upon by the scientists. I remember when the first talk in any public meeting in America about the establishment of an agriculture experiment station, to study the science of agriculture plant foods and the influence of the soil on the plants, and the gentlemen there, the few that were interested and talked about it, when they began to talk about nitrogen, phosphoric acid and potash, it was simply a drug store talk to us farmers who were there. We hadn't knowledge of it. But with the coming of the first argricultural station in my own State, and their later establishment in every State of the Union, the establishment of the agricultural colleges, the great number of studious men and women who have gone into the science of agriculture and horticulture, we have a knowledge that has come to the aid of orcharding, and it has come to be a profession within recent years, but even then we haven't lived up to our privileges; we are only just beginning to think around the edges of the great orchard opportunity there is in this country. Of course, a few progressive orchardists, following out their own practical ideas, and supplementing them with all the science they can get from the experiment stations and colleges and agriculture departments of State and National government, have gone farther ahead than some of the rest of us, and there is almost, I might say, a science in orchard practice today, but only in a very limited way. In the handling of our fruit for market, we had very little intelligent business idea about it, and it took our fellow fruit growers of the far west to turn the trick —they were stimulated in two ways,—first, by the scientists, to produce the most beautiful and attractive fruit possible; and being 3,000 miles away from the great markets, they must put their very best foot forward. They had to pay $250 or $300 a car to get into our markets. They couldn't afford to do that with inferior grown fruits, or crates or packing, and so within the last ten years, practically, has come about a show of fruit in our fruit stands and markets and upon our tables that has opened the eyes of the land owners of the east. We have to give credit to the far northwest for the

great stimulus that has come into apple orchard life and management within the last few years. They are sending us very beautiful fruit, and to get anybody's pocketbook open, you have to get their eyes open first, and the northwestern people in their apples have done this. We in the far south—I say "we," because in my orchard ramblings I have gone 1,200 miles away and planted another peach orchard in Georgia—being so far away from the great markets, having to pay such excessive freight rates, having other conditions to contend with, we have had to grow the best fruit possible, grade it, pack it in the best possible package, the Georgia peach and six basket carrier upon the market in June and July, has been the greatest stimulus to the peach growing in this country, and it is spreading out all over the country.

Question.—Those wise men in the west, where do they come from?

Mr. Hale.—They came from Connecticut and Pennsylvania and New York. They went far away from home before they got their eyes open, and I am sorry for them, and yet it is necessary for men to get into trouble to help the rest of us out. The question of the brother on my right, where did those people come from—they were people who had no faith in the Pennsylvania soil, who had no faith in the New England soil, and so they went away off and bought land. They have been buying it the last few years at $300, $400, $500 and $1,000 an acre, and there is better land within ten miles of where they went away from, that can be had for $15 to $50 per acre.

To go back some years ago, a man in my neighborhood sold his farm land at $16 an acre, to go to Florida, to get rich growing oranges. He bought land in Florida at $200 an acre, and in the course of time, the man who bought the $16 an acre land from him sold it to me, and I bought it for $25 an acre, and I planted peaches and apples thereon, and last year I sold apples from his $16 an acre land, which he ran away from, they were retailing in the store of New England at 75 cents and a dollar a dozen, and his oranges from $200 an acre land were retailing in the same stores at 30 cents a dozen and had to pay ten times as much for transportation to reach the market. I say, God pity him. He is in a fix. That is just the story that has gone on all over this country. Measure it in dollars and cents, and his oranges, he had to pay 50 or 75 cents a box freight. His oranges sold by the box for $2.50. My apples sold at $4, and I paid ten cents freight to market. So that is the general story of the growth and development of this ample industry in the far west, the peach business in the south and middle west. There has grown up a feeling in this country that there is a tremendous lot of money in the orchard business. With this wonderful orchard development in the far south and far west, and the growth of cities and towns, and the wealth of the people and their understanding of the value of fruit as food and all the talk of high retail prices, there has grown up a tremendous atmosphere of the profitableness of orcharding, by western railroads and land boomers, and they were the ones that got

your friends away from here and all the east. There has been a lot of yellow literature published in relation to orcharding in the west and south on certain plans, and it is being circulated all over this country today, and so there is a boom on in that direction, which has been going on for eight or ten years, and now we have just got it in the east, and the whole country is afire on orchard propositions, but some of us are so green we won't burn. The country is going wild on this orchard proposition. It has already sprouted. It is already planted in the hearts of western promoters, who have got to the Pacific coast pretty well overworked. They are coming back, the western promoter, or a relative of his, the land boomer, the fellow looking for suckers, the promoter who is out for your money, this back to the land theory, these farm stories that are in all the magazines, and the beautiful yarns being told everywhere, have got the people crazy to go back to the land, but this back to the land idea that is in the minds of the people in the city, going back to get rich out of this business, going to get a piece of land and have an orchard and everything is lovely, I say this boom is coming on here in the east, and you will see a lot of yellow literature circulated in Pennsylvania and all over the northeastern section of the United States, it is started now, and in the next few years you are going to see much more. I say, gentlemen, watch out; hang out the red light, the sign of caution, there's danger ahead to the legitimate industry, danger ahead to the people who go into it unthinkingly, and danger ahead in so many ways. I, as one who have been interested in a large plantation, two thousand acres or more of peaches, have watched a lot of the large operations in the south, somewhat in the west, know something of the large plantings that are hinted of, at least, and attempted to be carried on in States south of you, and hinted at in New England. Those large orchard propositions are doomed to fail.

Prof. Surface.—Some of them.

Mr. Hale.—Well, all except yours and mine. I say, beware of those things, and yet there is a legitimate field for the investment of capital in orchard propositions, and while these wildcat schemes are in the way and bound to be carried on, yet there will be some legitimate. Only yesterday morning in my mail was a letter from one of the most reputable and sound bankers in Wall Street, a man whose name is good for millions anywhere, and who can put his hand on it any time, through his association, sending a clipping from a Vermont country weekly, tell of Mr.—I don't know the name—a Mr. Somebody, Smith or Brown or Jones or Surface or Hale—I don't know—but that last year he had 125 apple trees, and they bore seven or eight barrels to the tree, and they had sold for four dollars a barrel at the station—I haven't the exact figures, but the net profit was something like $200 an acre, which looked good on paper to the banker, especially as in another column of the same paper the William C. Hill farm was for sale, 160 acres, of which 110 acres was clear and ready for immediate planting; the buildings on the place could not be duplicated for $8,000, and the farm was for sale for

$5,000. The banker said, "Mr. Hale, isn't there an opportunity in this? See what this 125 trees brought the man. Here is the Hill farm for sale, and not only this, but there are others in that township, and so on through the next county. Won't you call on me next time you are in New York, and let us talk about your going up there and buying eight or ten or a dozen of these farms, or a hundred of them, and we will start capitalizing the scheme, and some they have partly planted, and we will catch the suckers that have been going to the northwest." Now, there is a proposition from a legitimate banker. He believes he sees a great big opportunity there. Is it there? Yes and no. It is there in the land. It is there in his Wall Street capital The only other connection it needs is to get *the man.* Orcharding is a question of the individual man almost entirely. That is the big thing. Don't think, my friends, those of you who don't own orchards, and wish you did, and wish you had some of the wonderful "profits" that Surface and I are getting out of it—don't think you can simply buy a piece of land and you have money to buy trees, and money enough to pay for a spraying outfit, and so forth, don't think that will make you an orchard. It never will. There must be a man. I recollect when Cecil Rhodes died in South Africa, Rudyard Kipling wrote an ode to him, and I don't know what was said in it, except one single line, "Once on a time there was a man." That is what made South Africa. Cecil Rhodes made the great South Africa of today, one man with a knowledge and belief and faith and ability to handle other men; and so whenever you see any great business going on successfully in the country, don't think it is running itself, but back somewhere is the soul and spirit of a great man, or a great woman, and so in every orchard enterprise that is going to be successful in this sharp competition that is ahead of us, it means men and women who can stick, who have faith in the ultimate success, and who never know failure; men who can go out and see the frost kill their blossoms on the trees, and think, "It is only 365 days to another blooming time, when there won't be a frost, and that time can be hurried up by putting notes in the bank to pay for fertilizers, spray fixtures, labor, etc. If that man is back of the orchard, he will finally arrive and make some. There are mighty few people who have that grit and knowledge and all the things necessary, so I want to say, this great big orchard boom that is in the air now is going to spell failure to many people. Perhaps I ought not to predict that. The fellow who says, "I told you so," is despised, and I ought not to make any predictions, but from a life's work in fruit culture and a life looking over the horticultural interests of America, I feel that the present orchard boom that is now on, is a great big crazy mistake, which means loss to so many people, and especially where carried on in a larger way. It is going to be the individual man and woman who can know every tree on his place, who can learn to love it, who can say every individual tree is a personal friend and acquantance, and every bug and fungi an enemy to be met and fought by the general in charge. That is just a general whack at the whole proposition. Yet mighty few of you will believe me now.

Now, assuming we are going on with orcharding. There are

a good many things to be considered. The place most of us will take, the land that is at hand; that is, our own farms. Most of us succeed best right at home, where we are known, and know the land and know the condition, and the orchard lands on our own place, those will be the ones probably best for us to develop, but if we are foot loose and can go where we like, then the selection of location is of first importance. The elevation of the land in relation to that which surrounds it, is of importance; the character of the soil and its ease of tillage and natural fertility are to be considered, but of all things, what is our market going to be; the market conditions; are we going to market with our own wagons or auto truck to some nearby towns and villages within a radius we can reach? If so, the question of good roads or the possibility of the development of high class roads is an important consideration. If we haven't within accessible distance what seems to be markets enough to take up the product we intend or hope to produce, then the matter of railway lines of transportation is important. I recollect some years ago at Washington the Agricultural Department recommended a certain gentleman to me for advice as to the handling of a product of an orchard in the south. It seems he was largely interested in the cotton goods trade in New York; a man that handled cotton goods by the millions of yards. When they began to establish cotton mills down in the Carolinas and through the south, his firm and others became interested in those mills, and it came about that he had to go to the Carolinas once a month, and on one trip he went hunting into the mountains of North Carolina. He thought, wouldn't it be a nice place to have a bungalow, and so in the broad way of doing business, he got an agent to buy him a tract of land, and then he built his bungalow, which you and I would call an elegant mansion, and as he loved to see the apple tree blossom, he decided he would have an apple orchard. And so he hired men to clear the land, and he hired a horticulturist to look after the planting, and got a nurseryman who was glad to sell trees, so he had his apple trees planted and by and by they came into bearing, like Surface trees do, but it wasn't but a little while until his orchard was filled with good red apples. What should he do with them? He asked the Agricultural Department at Washington, and finally somebody put him onto me, and he hired me to go and look the thing over. We got on the train and I went to bed and went to sleep, but the next morning in the dining car I broached the subject of his orchard, and he told me about it. We got to Salisbury, N. C., then off on a side line and got off at a little station and drove twenty-five miles up the hill. That was the first start off. I said, "How many trees have you?" I supposed he had three or four hundred. He said, "I have about thirty thousand trees loaded with apples." (Laughter.) Twenty-five miles up hill! We got off at the station, and we were met by an elegant pair of Kentucky horses and a buckboard, but the road was so rough that it took us four hours with that team to get up to that orchard. An ordinary farm wagon might take forty hours. Of course, to get material up there to pack your fruit in and haul to the station—It didn't take me long to tell him his only chance was to put up cider mills and build a pipe line and run his cider to the vinegar station at

the railroad station. That is a true story, but it is an exaggeration in the orchard business. So a thing grows on us. Don't get very far away from the railroad station, or a good line that will carry you quickly to market, because while good Pennsylvania apples may be worth money in Pennsylvania today, they may be worth more in Chicago or Denver next week, or Boston week after, or Atlantic City or Minneapolis. The markets today are way out, possibly across thousands of miles of ocean.

Another big feature in this possible development of orchard business, has been the development of railroad lines, the development of the refrigerator car, co-operative work, so the location of the land for your orchard along right lines is one of the biggest elements. The preparation of soil, of course, means clearing off brush that may be on it, and the best sort of plowing that can be done, sub-soiling where there is hard underlying soil; a thorough preparation of the land as for any garden crop.

Prof. Surface.—Dynamiting in all cases?

Mr. Hale.—No, dynamiting only in cases of hard sub-soil. Dynamiting for each tree. There is another fact. The dynamite people are slick advertisers. Our friends, the Dupont's have got millions. They are glorious people, no higher class business people in America than the Duponts, of Wilmington, Del., and that big state road that Senator Dupont has given to the State of Delaware, and it is a blessed monument to leave behind, but it is going to take millions to build, and you cannot get those millions unless you sell powder, or dynamite, and you see it in all the papers now, rip up your land with dynamite. I told one of their managers the other day I had a certain tract of land I was going to plant next spring, and had expected to dynamite it. But this summer Mr. Woodchuck began to work down there, and as I went about I saw Mr. Woodchuck, Mrs. Woodchuck and all the little chucks had been bringing up some of the sub-soil, and they told me I didn't need to dynamite in that light underlying soil and Dupont's manager said "darn those woodchucks." Well, if there is a hard sub-soil, I would advise you to dynamite under every tree. I have carried on dynamiting in my Georgia farm. It wasn't a woodchuck; it was a nigger, taught me breaking up the soil under some particular tree, and I first tried fifty or a hundred trees, and then five hundred, and last year five thousand, and just at the present time we are planting 8,000 peach trees, and every one is being dynamited, because it is hard clay subsoil.

Prof. Surface.—Does dynamiting shatter or merely batter?

Mr. Hale.—I don't know the difference. I am not a "scienttist." It breaks it up.

Mr. Roberts.—That is simply turning the sword into a ploughshare.

Mr. Hale.—You must be a Christian. There is the preparation of the soil first; then the laying off of the trees, for the distance,

the planting and so forth, is a local question. There is a temptation to too close planting of the trees, the original trees, the trees that will stay there. There is a general tendency to too close planting, on account of this desire for a quick money crop, and the man in need of funds is tempted to do certain inter cropping, that perhaps he ought not to do. But the other thing more particularly, is the interplanting of other trees too closely; the planting of the original apple tree at 32 or 40 feet; so don't be led away into too close planting of the original trees, because if they grow as they ought to, they are going to take up a great deal of ground. The spraying machinery needs room; so be careful about close planting.

Do you think you will have an over production of apples? If any of you have gotten the apple orchards going, and have got good fair No. 1 apples, and expect to get any such price as apples have brought in the last ten years, you are going to slip up. Take the average prices of the last ten years, and cut them right in two in the middle.

That is my belief. I may be mistaken about it, but I do think those who are going to invest money and are looking for dividends, should take the average apple price of the last ten years, and cut it in two. If you get any more than that, it will be extra dividends on the common stock. That is a cold blooded business proposition. It is easy enough to talk about four or five dollars a bushel for apples and so forth, but the average grower is not going to be able to sell his fruit at those prices.

Last week I went down to New York to the meeting of the National League of Commission Merchants. I met gentlemen I know from all over the United States, and sitting there in the Hotel Astor was a group of people, big apple operators, two or three dealers, and so forth, and one showed figures of a return he had received that very day from three shipments of apples he had made to Europe. I may not be accurate about the figures, but I think it was 3,200 barrels in all, the average returns 90 to $1.10. He said it would figure out a little better than a dollar. That was simply a business deal in a large way of eastern apples from old orchards poorly cared for. There has been a lot of over-planting. I wish I had stayed in the nursery business.

Prof. Surface.—Are you planting any more this spring?

Mr. Hale.—No, I am not as green as I look. I am never going to plant any more apples. Three hundred and fifty acres is enough for any one man.

Prof. Surface.—You didn't take the banker's proposition in New York?

Mr. Hale.—No, if I take that it will be on a salary like you get at Harrisburg. I should want to differ with Prof. Surface about the advisability of planting peaches with apples. I am speaking now from my own experience, it wouldn't have been possible to own the large orchards I now own, if it hadn't been for interplanting the

peaches. They paid the bills. So if the land is suitable for peaches, I believe it is the one interplanted crop that the apple orchardist can get the most money out of in the shortest time, unless he be a market gardener.

Mr. Frederick.—Would you plant both apples and peaches at the same time?

Mr. Hale.—Yes, at the same time. Then of course there are other crops like the dwarf pear, possibly grapes and farm crops like corn, for the first year or two, if you do as Prof. Surface says, give plenty of room for the tree, give the tree a chance and give it cultivation. The question of plant food is a local one, according to the character of the soil, but the most wondrous growth I have had is where it was possible to dig the holes the fall prior to the planting, and fill them with stable manure, leaving that until spring and throwing out and planting the trees there. I have had the most remarkable results in growth of trees that way than any other. The first planting I did that way, resulted in such splendid growth, where the trees had failed the year before, that I followed it up and have got for myself the most satisfactory result, but I believe the life of an orchard is dependent largely upon the grand good start you get the first year.

Prof. Surface.—What do you do with manure when planting?

Mr. Hale.—Oh, just throw it out and put it back around the trees as a surface mulch, until the first cultivation begins to carry it away. Use whatever good fertilizer is convenient and cheapest for you, only something that won't burn the tree roots at the start; some liberal feeding of the tree at the time it is planted; give it the best cultivation you know how from the start, and if at the end of the first summer, you haven't a good vigorous tree, pull it out, throw it away, and buy another tree. It is cheaper to buy a new tree. I have tried doctoring weakling trees, and you can make trees out of them, but the cheapest way in the world is to weed out the scrubs at the end of the first summer; weed out the scrubs and put another good tree in there, and if you have any scrubs at the end of the second summer, weed, those out. I am talking about trees of all kinds.

Question.—How old an apple tree would you plant?

Mr. Hale.—If I could get good, strong, vigorous ones, a one-year-old tree is right. I would rather have that; I would prefer it.

Mr. Roberts.—Is phosphoric acid in the form of basic slag better?

Mr. Hale.—I don't know whether it is better or not, but the trees grow better where you use it. Basic slag is the best form of phosphate I have ever used. I don't know why. Basic slag on young trees, on corn and cotton and on fruits, is giving me better returns than any form of phosphorus I have ever used.

Question.—Do you dip your roots in lime-sulphur before planting?

Mr. Hale.—No, I dip the tops, and I prune the roots off pretty close. I am a good deal of a crank in close root pruning in planting a tree. After a tree is planted, right then go in for cultivation real lively. Prof Surface told you that cultivating along the line of the row the first two or three years was what the trees needed. I absolutely believed that myself once. But let me tell you, I believe that too, and I used to believe that the roots went out only a little ways the first year. I absolutely believed that until several years ago I planted an apple orchard. Some of you have heard me tell of it before. I bought a piece of rough, cheap woodland, chopped the wood down and burned it on the lot, and planted my orchard, the apple trees 36 feet apart. While we were planting the apples there, my Italian foreman asked me why I didn't plant peaches between the apples. I said the ground was too rough, and peaches required better tillage than we could give on that rough lot. He said that it was fine peach land, some of the best peach land I had, and he said, "You give me one interest in the crop, I plant the peaches and I make the peaches grow like hell." I knew Louis' hell meant like heaven. When he went out, my secretary, who is a close observer, said I had better listen to Louis; whatever he says about making trees grow goes. I made a contract and gave him an interest in it, and we did interplant with peaches in this apple orchard. Louis said, "I grow the olive in Italy in rough land; I grow the coffee tree in Brazil. I make the peach tree grow," so in the planting he dug a good big hole where the dynamite wasn't used, and where dynamite was used, it dug it for him, and where the tree was planted, he grubbed around about four feet in diameter. He dug away down under and stirred it up and worked it up. I thought that ought to be enough for first year, and I believed it was sufficient. The orchard was well started. I was down in Georgia till the middle of July. About the 20th of July I came home. On the opposite side of the street was land that had perfect tillage, plowed, harrowed and cultivated nicely, had new trees on it. The first day I drove up to this orchard and was going to point out to my Italian friend the difference between full tillage of the land and the grubbing around the tree, and as I drove up, I saw these trees, where Louis had been grubbing, were growing as big as those in the cultivated land. That grubbing close about the tree was all they needed around the tree, I thought. Then I looked; the first six rows, land between the tree, was all grubbed over; the balance was as I left it in the spring. I found Louis and asked what was the matter. He said, "Well, you see, I had two or three friends come from the old country. They to stay with me, to find a job. After the first day, I say, 'You take a pick and grub hoe; I give you something to do,' and I lead them myself." (And when Louis leads, he leads; he is a regular Maud S.) "I take one row and another man dig the next row, and I keep count of the time, and they dig these six rows clear across the lot." I asked him what he paid them for it, and he told me what he paid them. They soon got another job. I guess they got tired of visiting.

I said, "You told me when you got me into this proposition you were just going to grub around them." "But, Mr. Hale, I didn't tell you how far I would grub around." I couldn't believe it until I saw it, you and I say the roots they only go out a little ways the first summer and so it matters not as to tillage for any but the little tree. This was in July. I don't know whether there were any roots out there or not, but on the land he tilled all over the trees were twice as big as where he had grubbed around them four feet. There was no growing crop there. They had the whole field to themselves. That taught me a lesson in tillage. I will never forget the wonder of it. So when I see your oat crop and your rye crop, I say, don't teach the people of Pennsylvania or anywhere there is even a possibility of their getting into the orchard heaven when they have a grain crop in the orchard. The trees may live and grow and be moderately satisfactory, when you haven't something better to compare them with.

Prof. Surface.—You use rye for a cover crop?

Mr. Hale.—It is all right in November and December, but it is the devil's own to get rid of in the spring. It is a dangerous thing. And so I say don't use rye as an orchard cover crop.

Question.—Do you use turnips as fertilizer, to leave them in the ground?

Mr. Hale.—Yes, I sowed nearly 300 acres of turnips last summer and they are all in the ground now.

The secret of orchard success; that is, the growth of trees, is *early tillage*. Begin every spring the minute the frost is out of the ground, and you can get on the land, and give the most thorough cultivation. I would rather pay $10 a day for teams in April, just as the growth begins, than to have them for nothing in July, if I couldn't have both. Early tillage, thorough tillage of every bit of the land that can be worked, early in April and May and June, and then if your orchard grows all to grass and weeds, the rest of the season, it is no great detriment. God bless the weeds then. But early tillage; get at it, *sure*.

Prof. Surface.—What do you use for the first stirring of the soil?

Mr. Hale.—It depends upon the land. Each different field has to be handled with a different implement, but whatever tillage that field can have, get at it early. If you can only do one plowing in one season, do it early. There is the great trouble with the farmer orchardist; it is left as a side issue; he wants to get in his corn crop, and the orchard comes by and by. There is the danger with the farmer with various crops, having an orchard. The tree will live and produce something; therefore, he thinks he can neglect it. The most important tillage on the farm is the tillage for the orchard.

The question of pruning Prof. Surface touched upon.

Question.—Is it necessary to prune early?

Mr. Hale.—I would prune while in a dormant condition, if possible. I am speaking as a large orchardist. We prune all the year around. We prune when we can. Of course, I would rather do all my pruning after the coldest weather of winter is over and before any growth begins in the spring. If you can do it before, if not, do it when you can. Vigorous, strong growth of trees in their early years, for peaches especially, when they have got to proper size, if they have been well fed, nourished and cultivated, growing rapidly, nothing will help fruitfulness like *summer pruning*. Cut out the extra branches in July and shorten in the others. It is a cruel thing to do to the tree, and any cruel thing you do to the tree shocks it. It is one of the greatest things to develop fruit buds. Some people say their orchards have got to full size and don't bear. Good sharp summer pruning of either tops or roots will cause greater development of fruit buds. Don't be afraid to thin the fruit from the trees. Don't let a tree over bear, but thin it well—well as you think, and then do it over again. Thorough thinning of the fruit is essential. When the fruit begins to ripen, pick it. Take apples. Winter apples want at least four pickings over. The old way was to wait until the early ones fall on the ground. The average winter apple tree wants picking over at least four times over a period of practically a month. With me it takes a month to get apples off any one apple tree. Pick them as they mature. The same way with the peach. When there is a dozen, fifteen or twenty, come to maturity harvest them. In a week or ten days later, there are two or three hundred apples to nice maturity, and then a little later, 80 per cent. of the crop is mature. Get that, but leave all the green ones on the under side, and sometimes six weeks from the original picking, you will get a bushel or two that would have been green, if picked in the ordinary way. So the picking of fruit as it matures, and the careful handling of it, and the proper, honest grading of it into proper sizes, the packing of it in the best packages you can get, the most attractive packages, honestly packed from top to bottom,—if you have any poor specimens, put them on the top; then stand there and say, "There is the poorest in that package." Sell it on that as a basis. Stand for your price; let your commission man stand for price, because you guarantee it all the way down through, and make the public pay for that guarantee. They are willing and glad to do it. They have been humbugged too long with a few good ones on top and inferior ones on the bottom. Don't have any poor ones in the package if you can help it.

I thank you for the patience you have shown.

Question.—As I gleaned from your talk, you think apples will be over produced. How about the very first class apples?

Mr. Hale.—You and I would want to sit down and talk what very first class apples are, but the kind of apples we have called No. 1 in the past, I think if these trees that are planted are only half cared for, there will be over production.

Question.—Then we don't want to plant any more trees?

Mr. Hale.—A good many of us don't. But I am talking about beginning five years from now, and carrying it for ten or fifteen years.

Question.—You think there will be a lot of them drop out?

Mr. Hale.—They will be weeded out. Not for the present.

Question.—When is the most benefit derived from a cover crop?

Mr. Hale.—I don't know, but I should say the earliest time in the spring. In the spring you go in the orchard, and you see that cover crop of clover looking beautiful. Then you don't go for two days. She is up here. Let us leave it until next week, and it grows, and we wait until it gets in bloom. It has pumped all the moisture out of your land, and you have lost more in the drying of your land than you have gained in gathering of nitrogen.

Prof. Surface.—Do you spray with lime-sulphur both summer and winter?

Mr. Hale.—Yes.

Question.—What degree will kill buds?

Mr. Hale.—It depends on the atmospheric conditions; physical condition of the bud at the time. It depends on so many things that you cannot say. My mother-in-law heard me say about 15 below zero was all they would stand, so the other day when we were talking about 13 degrees, she planked it at me and said, "I thought you said it took 15 degrees to kill them."

Prof. Suface.—How many years do you keep this cultivation up?

Mr. Hale.—As long as the trees live. Never quit.

Adjourned until 2 o'clock, p. m.

AFTERNOON SESSION.

The meeting was called to order at 2:00 o'clock, Thursday afternoon, by Mr. Blaine, who announced that the first number on the program would be a talk on Asparagus," by Prof. R. L. Watts.

ASPARAGUS CULTURE.

By Prof. R. L. Watts, *Professor of Horticulture, State College, Pa.*

Ladies and Gentlemen:—I think you might call this a succotash session. We had peaches and cream this morning, and apple pie and dumplings, and so on we have had all along the road. This after-

noon we will have asparagus and cabbage. There is one very comforting thing about the vegetable industry. Mr. Hale said this morning that the apple industry would be over done. I heard him say at a meeting recently, beginning in five years and extending fifteen years more, there will be no money made in apples. That is very comforting to the man who has a young orchard just coming on. It is something for him to think about in the night when he is a little sleepless. The market gardener has the advantage over the fruit grower in this respect. The market gardener can switch around from one crop to another.

Now, seriously, the market gardener in Pennsylvania has not given the attention that the importance of the subject demands. I am certain when the census report is completed and you see copies, you will find out that the market gardener interest of Pennsylvania represent more dollars than the fruit industry. I may be mistaken, but I will be surprised if the market gardening is not ahead of the fruit industry. But as Mr. Hale said this morning, people are wild on the planting of fruit. There is more poetry in it. Some way, the growing of onions and cabbages, and so on, does not sound quite as poetical as growing peaches and apples with red cheeks. This afternoon we are going to take up asparagus culture, and I am going to talk with a view of trying to give information to the beginner. I know some men in this audience are expert growers. I see on my right Mr. Horace Roberts. Really, he is the man you should have spoken on this subject this afternoon. And there is Mr. Garrahan back there. I don't expect to say anything this afternoon that will be helpful to them.

It affords me great pleasure to discuss the culture of a crop which ranks so high in the esteem of both grower and consumer. No vegetable is more appreciated in its season and few, if any, offers greater possibilities for field culture. There is a tremendous demand for this crop on our city markets and the demand is increasing annually. Very few of our markets, however, are well supplied with asparagus and it is hoped that our vegetable growers in various parts of the state will take a keener interest in the growing of the crop for commercial purposes. The most wonderful truckers of New Jersey are obtaining a gross income of from $300 to $500 to the acre and there is no reason why the progressive farmers of Pennsylvania should not realize just as large returns. This vegetable should also be much more generally grown for the home table. Every village garden should have a plot cultivated by the most intensive methods. The kitchen gardens of the 225,000 farms in the State should also contain a few rows of asparagus. It is ready for the table early in the spring, long before onions and other early vegetables in the open ground are large enough and cuttings may be made daily until about the first of July. No other vegetable will take its place at this season of the year.

Varieties.—While many varieties are cultivated, only a few are grown extensively. Palmetto is by far the most important variety. It is grown most extensively in all of the large producing districts. The shoots are of good size and of fine quality. This variety seems to be more resistant to rust than any other and this is perhaps the main reason for its popularity.

Argenteuil, a French variety, has attracted considerable attention in recent years. There are two strains of this variety, known as Early and Late Argenteuil. The varieties are not apparently well adapted to clay soil but they have been at least fairly successful in the sandy types of New Jersey and elsewhere.

Conover's Colossal is an old variety which has been grown extensively in Pennsylvania and other States in the Union. Because of the smaller shoots, the variety should not be recommended for general cultivation.

Barr's Mammoth, Reading Mammoth, Dreer's Eclipse and California Mammoth White are excellent varieties for either the home garden or commercial plantation.

Soil.—While a sandy loam is unquestionably the ideal soil for the growing of asparagus, this crop is grown successfully on a great variety of soil types. A sandy soil is especially desirable for growing white or blanched asparagus because the sandy soils offer no resistance to the stems and they make perfectly straight shoots. It is possible, then to reach several inches under the surface of the ground with a knife in cutting, thus securing long, white shoots. The largest plantations in the East are upon soils of this type, although there are many profitable fields on the heavier types of soils. Our markets are demanding green asparagus more and more every year and this may be grown with great success upon any moist, fertile soil. It has been said that any soil that will produce a good crop of corn will also grow good asparagus. While a field of average fertility will not produce maximum profits, it will return as large profits as any other garden crop which may be cultivated with a horse. As previously indicated, the most important factors in soil selection are the constant and abundant supply of moisture and the never failing supply of avaible plant food.

Seed Selection.—The selection of good seed is just as important in growing asparagus as any other garden or farm crop. This matter is too frequently neglected with the result that growers are realizing from twenty-five to seventy-five dollars less an acre than would be possible were seed selection practiced. Amateurs or beginners should procure the very best stock from specialists who have practiced seed selection for a number of years. Then, after the plantation is established, seed should be selected at home for any further planting that may be contemplated. The individual plants of the field should be carefully studied, marking those which are the largest and most vigorous and free from rust. It is exceedingly important to select plants that produce several large shoots rather than many small shoots. Our markets are demanding and paying for large shoots and this matter can be controlled to a great extent by intelligent selection of seed. The propagator should bear in mind that there are both male and female plants and that it is just as important to select strong male plants as the very best female plants. These must also be in close proximity to each other, so that the pollination of flowers will be perfect. After locating plants, most growers prefer to lift them from the plot and remove them to a special breeding plot at some distance from other plants. This is an excellent idea for the same plants may then be kept for many years to produce the seed

required and there will be no interference with tillage operations in the commerical plantation. The seeds are ripe when the berries have turned red. The berries are then picked and the seed washed and dried. The seed may be preserved for several years under condition such as are found in ordinary living rooms.

Growing the Young Plants.—Young plants are so easily raised that every commercial grower should produce his own. Ground for this purpose should be highly manured and plowed in the fall. It should then receive a top dressing of a complete fertilizer as early as possible in the spring, be harrowed thoroughly, and the seeds drilled in rows not less than eighteen inches apart if to be worked with a hand wheel hoe or thirty inches if to be worked with a horse. If the seed is very choice and the grower is anxious to obtain the best plants, the seed should be dropped three inches apart. If a large number of plants are desired, the seed may be sown with a drill, although the hand method is preferred by some because it secures equal space for the development of the roots and tops. Do not cover the seeds with more than one and a-half inches of soil. As the asparagus seed is very slow to germinate, it is desirable to sow a few radish seeds with the asparagus so that the young radish plants will mark the rows and cultivation may be begun a few days after sowing. If a radish plant grows every four or five feet in the row, they will be sufficient to enable the cultivator to keep between the rows and thus avoid disturbing the asparagus seeds or young plants which may be coming up. The asparagus nursery should receive thorough tillage until late in the fall. If the plants do not grow rapidly, nitrate of soda should be applied at intervals of about three weeks at the rate of one hundred pounds to the acre. In small nurseries an excellent plan is to top dress with fresh horse manure about the 25th of July. The mulch of manure should be heavy enough to prevent weed growth and conserve soil moisture.

Plant Selection.—Experiments at the Pennsylvania State College have shown that the strongest roots are very much the most profitable. In an experiment which has been in progress for several years, No. 1 roots have produced $100 more to the acre than No. 3 roots. Practical growers in many sections have had the same experience and this information shows how important it is for the commercial grower to produce probably twice as many plants as will be needed to plant his fields, and then to select and plant only the strongest. No information can be given in this talk which will count for larger profits than the proper selection of plants.

Soil Preparation.—A heavy clover sod provides the best conditions for the growing of a good crop of asparagus. The field should be heavily manured in the fall and also plowed in the fall, so that the vegetable matter will be partly decayed at planting time the following spring. It is necessary to plant at the earliest possible date in order to secure the greatest growth the first season. There should be no delay in harrowing the land and preparing it for setting the young roots. The grower should not lose sight of the fact that the field is to remain in this crop for not less than ten years and probably for twenty and that too great care cannot be exercised in plowing and harrowing.

Planting.—Most commercial growers in New Jersey and elsewhere allow not less than five and a-half feet of space between rows. The most successful and intensive growers in Pennsylvania are making the rows only four feet apart and setting the plants about two feet apart in the row. This is ample space to grow green asparagus and the returns per acre at these distances will be greater than when more liberal spacing is provided. The universal practice of the most successful growers is to plant one year roots. It has been clearly demonstrated by experiment stations and hundreds of practical growers that one year roots are more satisfactory than older roots. If two year plants could be lifted from the nursery row and transplanted to their new home with no interference with the roots they would produce just as good results. This, however, cannot be done so that the universal practice is to plant strong, vigorous one year roots.

The grower should bear in mind that the buds of the crowns come closer the surface every year. This is due to the fact that the new buds form slightly higher each year and it is therefore an advantage to plant as deeply as the soil will permit. Under no circumstances, however, is it desirable to set the crowns or roots in the sub-soil because this will invariably interfere with root development for the roots grow laterally rather than downward. A safe rule is never to plant deeper than the land is plowed unless shallower plowing is practiced than is expedient considering the character of the land. Under conditions as found in most fields where this crop is grown, it is preferable to plant from six to eight inches deep. Because of the tendency of the crowns to get nearer the surface of the land every year it is an advantage to plant ten or twelve inches deep, providing the soil will permit planting at this depth.

Care of Plantation.—There has been much dispute upon methods of fertilizing asparagus, although some points have been well established. There is no question about the importance of maintaining the supply of vegetable matter. It is highly probable that not less than twelve tons of stable manure annually is necessary to provide the soil with the proper amount of humus. A common practice is to apply the manure any time after the tops are cut in the fall and the first tillage operation in the spring. This is a safe practice in light soils but on heavy soils the better plan is probably to apply the manure about the first of July or immediately after the cutting season. Heavy applications in the fall or winter may make it almost impossible to harrow the plantation early in the spring because heavy mulches of manure retain the moisture in the spring and thus prevent early tillage. Heavy applications of commercial fertilizer are undoubtedly essential to the best results. The most successful growers of the country are using from one-half to one ton of a complete fertilizer to the acre. It is possible that the largest returns cannot be realized with less than a ton to the acre of a fertilizer carrying four to six per cent. of nitrogen and eight to ten per cent. of potash and phosphoric acid. A safe practice is to apply one-half the commercial fertilizer early in the spring and the other half immediately after the cutting season. Some growers contend that it is better to apply all of the fertilizer after the cutting season. This plan is en-

tirely satisfactory, provided there is abundant rainfall after the first of July, otherwise it is better to apply the mineral elements early in the spring so that they will be well distributed through the soil in case there is a light rainfall after the first of July. Nitrate of soda can often be applied to advantage as a top dressing, using from 75 to 150 pounds at each application. It is often profitable to use as much as four or five hundred pounds of nitrate of soda to the acre. The asparagus plantation should be kept free from weeds throughout the season. Rust is the only disease that gives very much trouble in growing asparagus. Although some spray materials have been more or less valuable in controlling the disease, it is generally conceded that the most practical means of control is to cut the tops in the fall as soon as the leaves begin to turn yellow and burn them. With good treatment, an asparagus plantation will last for twenty-five or more years but it is not considered desirable to retain the plantations more than fifteen years, and many growers destroy them when they are ten or twelve years of age. The shoots get smaller as the plantation become older and this is the reason for making new plantings at short intervals.

Marketing.—With soil of high fertility, careful seed and plant selection, and the very best treatment, it is possible to cut $50 worth of asparagus to the acre the second season from planting. The grower should be very careful to avoid heavy cutting the second season as this will cripple the plants during the following years. Even the third year the cuttings should not be too heavy, but the fourth and succeeding years it is permissible to cut until about the first of July. Asparagus is still regarded a luxury by many city consumers and it pays to place the product on the market in the most attractive form. Many growers have found it an advantage to tie the bunches with red tape. The tape can be secured at a very low cost and it certainly pays to use it. The bunches of asparagus are eight to ten inches in length and the average weight is two to two and a-half pounds. In warm, growing weather it is necessary to look over the plantation every other day and sometimes every day in order to catch the shoots before they break or become too long for marketing. In order to avoid cutting on Sunday, some growers remove the marketable shoots Saturday afternoon and after washing and bunching they are stood in trays with the butts standing in about one-half inch of water. This will keep the asparagus perfectly fresh until Monday morning when it may be sent to market.

Question.—Do you use salt in the spring of the year on the asparagus bed?

Mr. Watts.—No, we don't use salt. In former days, salt was used very largely, and it keeps the weeds down, if you put enough on. Its fertilizing value is not of any account, so that the policy these days is not to use salt. If you want to use salt, use nitrate of soda, something that will feed the plant.

Question.—Speaking about raising the seed, and digging out the strong plants, how do you designate the male and female?

Prof. Watts.—The female will produce berries; the male will not. You could apply nitrate of soda to advantage at least three times a year, until the close of the cutting season, until the plants are well matured. You could probably put on to advantage 100 pounds to the acre each time. The thing to do is to hurry plants along; push them so as to get good, strong, vigorous crowns, ready for next year's crop.

Cutting of the plants is an exhaustive process. We know that is the best way to eradicate weeds, so we start in the spring and cut its top off over and over again, until the middle of the summer, and then we want that plant to recuperate enough to make a good crop the next year, so it should be fed very liberally.

Question.—Do you cut it right close to the ground?
Prof. Watts.—Yes.

Question.—What exposure?

Prof. Watts.—I don't think it matters. Any good well drained soil; of course, on a southern or southeastern exposure the crop will come on a little earlier in the spring. The more sunlight, the better for the crop; especially after the cutting season. Some prefer having their rows sun so as to catch the maximum light during the day; that is, north and south.

Question.—What have you to say for the Colossal?

Prof. Watts.—Colossal is an old variety that is out of date. It isn't grown any more by commercial men.

Question.—In regard to cultivation, how often did you cultivate?

Prof. Watts.—Often enough to keep the weeds down.

Question.—One of our large growers cultivates, I think, every time he cuts.

Prof. Watts.—It requires just as frequent cultivation as any other crop.

Mr. Roberts.—Cultivate after each rain, if it rains every other day. Hasn't your conscience hurt a little for saying that green is better than white asparagus? The green keeps better; doesn't get stale like the white, but we don't think anything is better than fresh, white asparagus.

Prof. Watts.—You cannot tell what those New Jersey people are going to do. I am well aware there is a difference of opinion on this question, but why is it, Mr. Roberts, if that is the case, that the demand for the white asparagus is getting less every year.

Mr. Roberts.—The people don't know how to prepare it quite so well and the market pays bigger prices, and we cater to the market, but the white asparagus, properly raised, cooked fresh, is the best in the world.

Prof. Watts.—You pare the stalks, do you?

Mr. Roberts.—Yes.

Prof. Watts.—If the stalks of white are pared, I know the quality is excellent.

Question.—How low do you cut?

Prof. Watts.—That will depend altogether on what you are putting on the market. I presume most of the commercial growers cut an average of four inches under the ground; some not more than two inches; some barely under the surface.

Question.—Do you think in the middle of the season it pays to cut everything in sight?

Prof. Watts.—Cut everything; don't allow anything to grow until you stop cutting, and then let them grow.

Question.—I mean, in the middle of the season, when the weeds get pretty high, cut off everything in sight and thoroughly cultivate it? I think it more than pays for what you destroy.

Prof. Watts.—You mean go right in with a disc harrow before the cutting season is over. That might be justifiable if the weeds got a start, to do that.

Question.—Would you eradicate the beetle by doing that?

Prof. Watts.—I shouldn't think so, to any great extent. That is my greatest trouble in growing asparagus, is fighting the beetle.

Dr. Thorpe.—I would like to submit the following resolution:

"*Resolved,* That the members of the Pennsylvania Horticultural Society convened at Pittsburgh in annual session have learned with profound regret of the sickness of Mr. Gabriel Hiester, President of the Association, and hereby request the Secretary to convey to Mr. Hiester their wishes for his speedy and complete recovery. His absence from the meeting has been keenly felt. For many years he has been closely identified with the horticultural interests of the State and Association hereby goes on record in appreciation of his services. We trust that he will be with us as usual at future meetings."

I move that this resolution be adopted.
Seconded and carried.

EARLY CABBAGE.

By R. H. Garrahan, *Kingston, Pa.*

In order to produce a good crop of Early Cabbage there are a few conditions with which the grower must comply:

1st. We *must use good seed.* And here the grower does not have to take any chances. He has no one to blame but himself if he uses poor seed.

2d. We *must have a supply of well-grown plants.* Here again the grower takes absolutely no chances. It's his own fault if he does not raise good plants.

3d. We *must have the soil in the best possible condition* in regard to fertility and mechanical condition. As a rule it's up to the grower to have his land in suitable condition.

4th. We should have *freedom from disease and insect pests.* Here we have to take our chances. We haven't yet been furnished with any sure panacea for all the ills that plant life is heir too.

5th. In order to have a successful crop *we must receive a good price for the finished product.* The fixing of prices is usually beyond the grower and here he sure does take a long chance.

I said that we had absolutely no excuse for using poor seed. You say there is lots of poor seed on the market and that the seedman is liable to sell you some worthless stuff. I'll agree with you but don't buy such trash.

I was talking with a gentleman during the National Convention at Boston last fall. He said he had a contract to furnish a quantity of cabbage seed for a large dealer. I asked him if the dealer ever visited his farm and inspected the cabbages he had saved for seed purposes. He said he had never seen the dealer. His plan he said was to produce as much seed as possible, per acre, and as cheaply as possible.

We don't want such seed as that and there is no occasion for using it. In order to be dead sure of the strain of seed you are using the best plan is to grow your own.

Many of our agricultural writers have given us to understand that seed raising should be done by experts that the ordinary run of market gardeners don't know enough to raise their own seed. We have had this drilled into us so often that many of us have come to accept it as the truth. With the exception of *the Livingstons I cannot recall any really first-class varieties which have been developed by the so-called professional seed* growers. Practically all of our improved varieties have been developed by careful selections by the practical gardeners. We have also been given to understand that seeds can be grown in certain favored locations. There may be some truth to this statement but I know that just as good cabbage seed can be produced in Pennsylvania or any of the northern states as can be grown in Europe, California, Puget Sound, Long Island or any other out-of-the-way place.

Our plan of raising is to sow seed about the middle of July in hills where we want the plant to grow, thus avoiding transplanting.

When a few inches high they are thinned out to one in a hill. The development of these plants is watched during the fall and only those marked for seed purposes, which show a *tendency to head early, a uniformity of type* and which *have a vigorous constitution,* about 1 in 100. *The health and vigor of a plant is one of the most important considerations.* It is just as important to have strong vigorous plants from which to raise seed as to use vigorous animals for stock breeding. On the approach of cold weather these selected cabbages are taken up carefully, placed in a trench, roots downward and covered to protect from severe freezing. The following spring they are planted in a well-prepared piece of ground and fertilized heavily with potash and Phosphoric acid. When the seeds begin to ripen the seed stems are cut off, placed on sheets and if weather is favorable they are left in field for a few days. They are then hauled in, spread out on a tight floor and when thoroughly dried the seeds are pounded out and cleaned up with a fanning mill. The seeds are then screened and all small and immature seeds taken out.

Peter Henderson in his book, "Gardening for Profit," tells of an old German gardener who was always first on New York market with Early Cabbage. His neighbors couldn't understand how he managed to beat them out year after year. One day he confided his secret to a friend. His plan was to mark the stumps of the earliest cabbages which he cut—the suckers forming on these stumps were removed, rooted in sand as florists do soft cuttings. They were then wintered over in cold frames and the following spring set out for seed purposes.

If one does not care to go to the trouble of raising his own seed he should at least purchase a supply a year in advance and test in a small way before planting extensively. Cabbage seed is good for several years.

Raising the Plants.—There are several methods by which we may obtain a supply of early plants. The old-fashioned way was to sow seed in the open on the 15th of September. When the plants were two or three inches high they were transplanted into well-drained cold frames, about 200 plants per sash. When the weather became cold sash were placed on the frames and careful attention paid to ventilation. If the weather became very severe the plants were still further protected by covering the sash with mats or boards. The plan was to let the plant make the necessary development in the fall and keep them in a dormant condition during the winter. This method, however, is rather unsatisfactory in many respects. The plants need looking after almost every day during the winter, and often considerable number of the plants run to seed on being planted in the field. This was especially true if the seed was sown prior to September 15. If sown much later the plants did not have time enough to make the proper development before cold weather.

Spring sown plants have almost entirely taken the place of the wintered-over ones. They can be produced cheaper and if properly grown are much superior. If a green-house is not available the seed may be sown in hot-beds and when a few inches high the plants are set in cold-frame, just as with wintered-over plants. A somewhat better plan is to sow the seed in flats, place the flats in the hot-bed.

When the rough leaf appears the seedlings are transplanted in similar flats 1½ x 1½ inches apart. These flats are then watered, placed in cold-frames and, if necessary, shaded a few days until the plants have struck root.

A green-house is much more desirable in every way. It need not necessarily be an expensive affair. A house 12 x 60 feet need not cost over $200, if one is handy with tools. Having a sufficient number of sash one could run through such a house 100,000 cabbages and the same amount of celery and tomato plants.

In our section we make the first showing of cabbage seed early in January, varieties used are Early Jersey, Charleston, Glory of Enkheisen, Succession, etc. We sow in flats rather than in solid beds as the moisture conditions are under better control. The seed is sown in drills ¼-inch deep and covered with sand. We prefer to transplant before the rough leaf appears as we get a more even stand of plants by using them when quite young. They are set in the flats 1½-inches apart but for the very earliest it pays to plant them 2 inches apart. In order to get all the plants a uniform distance apart we use a spacing board. This consists of a ½-inch board large enough to cover the entire flat, ½-inch holes are bored the desired distance apart. The board is placed over the flat and a handy boy punches the holes with ⅜-inch iron dibber. With a little practice the kid becomes mighty expert at the business. Other children then place plants in the holes and a careful man shoves a little dirt with a pointed peg around the roots to fasten them. They are then watered and placed in the green house. When the room is needed the first lot is shifted to cold frames.

A little *practical experience* is necessary in order *to grow* good plants. It is *hard to say, without being on the job,* just when to ventilate, or how much water to apply and watering and ventilating are the two most important points in plant raising. As a rule the beginner is liable to coddle his plants too much and as a result his plants are liable to damp off on account of not having sufficient ventilation or too much water. The soil used should be of a loose porous nature to allow perfect drainage. If the soil is inclined to be too heavy it will be greatly improved by the addition of fine ashes (anthracite). The soil should be rather dry and not packed very tightly in the flats. The temperature in the house should not go above 50 degrees at night.

The greatest loss in plant raising is due to the "damping off" fungus. This disease usually attacks the young plants in the seedling box, causing the stem of the plant to turn black and rot off. It is due to too much heat, lack of ventilation, to heavy watering, cloudy weather, or the use of old soil. This trouble can be almost entirely eliminated by careful attention to watering and ventilation. Loosening the soil slightly between the rows of seedling is also very beneficial. We have had practically no trouble in this regard since using sterilized soil. The soil can be sterilized either with steam or with a solution of formaline, 2 pounds to 50 gallons water. It will take about 2 gallons of the solution to sterilize a cubic foot of soil.

The plants in the cold frames should be ventilated every day, the amount of ventilation depending upon the age of the plants and

the condition of the weather. During warm days the sash are removed and the plants gradually hardened so as to stand a temperature of at least 20 degrees. A well-developed plant will be short and stalky, having 5 or 6 leaves of a reddish hue and having an abundance of fibrous roots. The soil for green-house purposes should be prepared at least a year in advance. Where sods are obtainable it is a good plan to pile up a layer of sods, say a foot deep, then add a foot of rotten manure, then another layer of sods and so proceed. Where sod is not obtainable select a good piece of land, manure it heavily, plow and harrow until ground is fine, then add another coat of manure, plow, harrow and roll again, continue this process until sufficient manure has been worked into the soil and the groud is in fine mechanical condition. Then screen the dirt and haul to green-house or store in protected place until needed.

The flats used are made by sawing in sections tomato cases or other second-hand canned goods boxes. We try to buy all tomato cases as this gives us a uniform sized flat and one which fits in nicely in the green-house, cold frame and wagon. Years ago we used the old "Armstrong" method for sawing the boxes, but now we hitch a gasoline engine to a circular saw which makes short work of the box business. Large-sized shoe cases are purchased, taken apart and used for bottoming the inner sections. For cabbage plants the flats are made 2½ inches deep, for tomato plants and especially for re-transplanted plants we prefer to have the flats an inch deeper.

We use double cold frames in preference to the single frame. They are made deep enough to allow ½ foot fresh horse manure in the bottom, this furnishes some bottom heat which is very desirable while the plants are young and the weather severe.

Instead of using mats to protect plants on cold nights we use steam-heated cold frames. These frames are built so as to pitch 4 inches in 100 feet. A 3-inch main feed pipe runs from the boiler across the ends of the frames and a 2-inch pipe carries the condensation back to the boiler. At the centre and lower end of the frame a 1½-inch raiser is taken off the main flow pipe and runs directly around the frame, and connects with the main return pipe. Valves are placed on the flow and also on the return pipe and a pet cock placed on lower end of return pipe to allow escape of air. We first tried the automatic air cocks but found them to be unsatisfactory. Steam-heated frames have proven entirely satisfactory and much more economical than the use of mats.

Cabbage is not at all particular in regard to soil, it will do well on most any kind of land providing it is not wet and soggy. The ground should be well drained either naturally or artificially, land with a loose gravely sub-soil, however, is not desirable. Cabbage is a rank feeder and the main thing is to have the soil filled with available plant food. If sod land is used plow it early in the fall and during the winter apply 30 or 40 tons manure per acre. It is a good plan to "cut-away" the ground early in the spring. This allows the sun and air to dry the land and we are thus enabled to plow much earlier than we otherwise could. Most of us vegetable growers know the value of getting our crops in early and very often we get in too much of a hurry and as a consequence we often set out

plants without first getting the soil in the proper condition. This is one of the worst mistakes we can make. If the land is not properly fitted before planting it never can be after the field is planted. Plow the ground just as soon as it is dry enough, then cut-a-way, harrow and roll, if necessary, until the land is in the best possible condition.

We then apply the following fertilizer, per acre, 600 pounds tankage, 600 pounds acid phosphate, 400 pounds potash; this is applied broadcast and worked into the soil with an Acme harrow. The ground is then smoothed and marked out 2½ x 1½ feet. The plants are dumped from the flats and separated very carefully so as to retain as many of the fibrous roots as possible. They are puddled in thin mud, stood upright in boxes and hauled to the field, Children are used to drop the plants and men and women armed with dibbers fasten them, care being taken to get the soil tight around the roots. The plants are set as deep as possible without covering the hearts; this is a great protection if the weather should turn cold before the plants have been established. The cabbages are cultivated and hoed as soon as they have struck root. A small handful of nitrate of soda is then applied around the plant, usually from 200 to 500 pounds per acre. All that is necessary from now on is to keep the cultivators going and hoed occasionally to keep the soil loose around the plants.

Some growers, where land is very valuable, will inter-crop their cabbage. The usual combination is to set lettuce between the plants and sow one or two rows of radishes between the rows of cabbage. To my mind this is a very questionable practice, it sounds fine to say you are producing four or five fine crops per year on the same land, but we prefer one or two good crops to half a dozen poor ones. The constant tramping over the ground in order to pull the radishes or cut the lettuce is very detrimental to the cabbage and does not allow the necessary cultivation for the best development of the plant.

The market gardener may not have a monopoly on all the bugs, blights and other diseases which attack plant life, but he has enough at least to make the job interesting.

(I am reminded of that famous quotation:

"The Chinch-Bug eats the farmers grain
The Bee-Bug spoils his honey,
The Bed-Bug fills his nights with pain,
And the Hum-Bug gets his money.")

After the cabbage plants are set in the field they have to take their chances with the maggots, wire-worms, cut-worms and the like. Our experiment stations have experimented considerable along this line and have advocated the use of a number of different mixtures for the eradication of these pests. But as a rule the remedies so far advanced cost too much to apply, the game is hardly worth the powder. The supply of cut-worms can be somewhat diminished by the use of poisoned mashes.

Plowing as late in the fall as possible is often of some benefit as the worms or their larva are thrown up and killed by freezing.

Anything that will promote growth will lessen the effect of those insects. Early planting, an application of nitrate of soda, plenty of cultivation and hoeing are about the best remedies. Club root often causes considerable loss, especially on poorly drained land, a heavy application of lime the fall previous to planting often proves very beneficial. Little or no trouble is to be feared from this disease if cabbage or any plants of the same family are not grown oftener than once in three or four years in the same piece of land.

Many growers imagine that when they have grown a good crop of cabbage they have done about all they can do. If cabbage is scarce and the price high they are lucky and if the market is overstocked they are unfortunate. There is some truth to it, but the same principles which apply to packing apples are also true in regard to cabbage. There is such a thing as having a reputation even for growing cabbage and a good reputation is worth money. Nine times out of ten the man who is condemning the commission man the loudest is the one who is not familiar with the market requirement or who is not putting up an honest package. Most commission men are desirous of getting consignments from growers upon whom they can rely, not only for an honest pack, but one who can supply them year after year. It is to their advantage to give such a grower a square deal. For my part I cannot see how we could do business without the commission men. What we want is a strong organization which will weed out the unreliable ones.

Question.—Did you ever find out that nitrate of soda would check the cut worm?

Mr. Garrahan.—I have never demonstrated that fact. It might do it. I don't know. We don't put nitrate of soda around to kill the cut worm. It may be beneficial; I don't know. Prof. Surface has done some work in that line, and we will ask him to tell us something about his experience in regard to maggots and wire worms.

Question.—I mean the ordinary cut worm.

Mr. Garrahan.—I have seen wire worms crawl up cabbage plants and cut leaves off. They will do it sometimes. If the plant is well hardened, tough and woody, you will not have much trouble with the cut worm.

Chairman Blaine introduced Prof. J. W. Gregg.

Prof. Gregg.—I wanted to come first on the program, but they wouldn't let me, and I think the committee which had the program in charge had some method in their madness. I have been trying to find out what it was, and I think they thought that after you had all this asparagus and cabbage, you would probably want a little water to aid in digestion or wash it down.

Now, you will notice, also, that the two previous lecturers did not refer to irrigation or the use of water. They probably did not do that out of due courtesy and respect to the present speaker.

They probably thought they would steal a great deal of my thunder if they mentioned that. They did mention pure seed, fertilization, cultivation, deep plowing and all those things that go to make a successful crop, but what would the cabbages be without water; what would the asparagus be without water? Just what Niagara Falls would be without water. Some people are raising cabbages, of course, without any irrigation, overhead, sub-irrigation or surface. Asparagus is being raised where we are depending on the natural rainfall to furnish water enough.

GARDEN IRRIGATION.

By Prof. J. W. Gregg, *State College, Pa.*

The experience of the farmer in every century and age has shown that the productiveness of the soil depends to a great extent upon an adequate supply of water; no water, no crops; no crops, no animals; and in the case of countries like India, often times a loss of human life.

Some form of irrigation has been known and practiced in the older European countries for hundreds of years, and even in our own country the idea is not new and yet it is safe to say that sixty years ago the practice of irrigation on a commercial scale was practically new to the people of this country. Conditions are now rapidly changing and there are hundreds of market gardeners and greenhouse men that are making use of some form of irrigation to produce for them the maximum returns from a given area. With all this rapid progress that is being made by many up-to-date growers, there are those who still depend upon the natural rainfall to furnish enough water for their growing crops. These men are not awake to the improved methods now in use by successful truckers and still associate irrigation with that vast area of parched land west of the Mississippi, and little do they realize the importance of some form of irrigation in their own constantly varying climatic conditions. These same men may not be questioning the extensive use of manures and chemical fertilizers, neither do they undervalue the practice of thorough cultivation or drainage, yet with all their diligent culture and generous fertilization, they are annually incurring losses amounting to thousands of dollars because they are unable to supply water when needed by the growing crop. It is too often the case that the grower sees the returns for his year's labor and expenditures fade away in a few days or weeks of uncontrolled drought.

The question that naturally arises is why are so many growers neglecting the use of some method of irrigation? There seems to be three reasons: First, the prevalence of the old idea that irrigation is of value only in the arid sections of the west; second, the general ignorance of the ease and cheapness that some form of irrigation may be installed, used, and maintained as compared with the great annual loss without such practice; and, third, the failure to recognize or realize that a constant supply of water promotes in growing crops a more complete development of the crop, more luxuriant and uniform growth and early maturity to say nothing of

increased quality or, in other words, many do not know the agricultural duty of water and fail to align the practice of irrigation with fertilization, cultivation, and drainage as a factor in intensive culture.

In order that we may fully appreciate the importance of some form of irrigation, let us consider briefly what has been called the agricultural duty of water as it is concerned with the growing plant. Soil water carries mineral and organic matter and is to the soil and plant as blood to the human body. A soil may become aenemic, lacking in water, so may a plant and in both cases they become dry and many, many times the plants die. The soil loses its sub-organic character, but given a certain amount of water and it is at once alive or vitalized. We know that the great bulk of some plants is nothing but water and that much of the substance of a plant is taken from the soil water, yet many fail to appreciate the fact that for every pound of solid matter thus added to a plant in growth, it is necessary that several hundred pounds of water must be taken in by the plant. Many plants on hot days exhale their own weight in water in the course of a few hours, while others may exhale tons in a few days. In some cases it has been possible for scientists to measure such water and they tell us that there must be on an average of four hundred pounds of water pass through some plants for every pound of dry matter added and furthermore that there seems to be a direct relation between the quantity of water supplied to the soil and the quantity of the crop yielded. This fact is illustrated very plainly by comparing the cacti growth on the dry lands with the luxuriant forests in other sections where the soil is supplied with more water. It is still further noted in the variation in crops from season to season. This ratio can, of course, only be approximated as soils differ in composition and texture as do the yields of tender vegetables and fruits as compared with grains, nuts and dry forage. At present, however, it may be briefly stated that the agricultural duty of water may be to produce 1-1000 part of its weight in the average crop and 1-4000 of its weight in grains.

So far it has been inferred that water is needed only to bring crops to maturity and nothing has been said as to the need of water to promote even and rapid germination of the seed in the ground on the value of water at the time of setting plants in the open ground from green-house or cold frame. Uneven germination produces an uneven crop and how many thousands of plants are lost every year at transplanting time because of two or three hot days, when water cannot be supplied fast enough by the soil. It is appropriate at this point to present a few results that have been obtained by two or three of the state experiment stations.

Results of Experiments.

Experiments at the Michigan Station have shown that cabbage yields have been increased to the amount of $150 per acre, some varieties doing better than others.

Tomato yields were increased to an average amount of $100 per acre, while potatoes showed a gain of 150 bushels per acre.

The New Jersey Station reports the following results with beans: Non-irrigated plots, 17 pounds; irrigated plots, 45 pounds. Peppers, non-irrigated plots, 717 fruits; irrigated plots, 1,277 fruits; or at the rate of 80 pounds on the non-irrigated plots and 147 pounds on the irrigated plots. Celery, non-irrigated plots about 136 pounds; or 1 to 8 in "market" value of the crop, the irrigated plots yielding 329 pounds.

The Report of Ontario Experiment Farm.

Each row, 25 feet long.

Lettuce.	Date sown.	Date harvested.		Irrigated weight.	Non-irrigated weight.
		Irrigated.	Non-irrigated.		
Leaf	May 13	June 22	July 4	20 lbs. 5 oz.	11 lbs. 3 oz.
Head	May 13	July 10	July 26	26 lbs. 15 oz.	9 lbs. 1 oz.
Cos	May 13	June 28	July 10	16 lbs. 3 oz.	5 lbs. 9 oz.

The quality of the irrigated lettuce was excellent, while that of the non-irrigated was decidely inferior owing to bitterness developed under the very hot and dry conditions. The non-irrigated plants remained in edible condition only a short time and began showing seed stalks at a very early date. The irrigated plants were not only ready for use considerably earlier (as will be noted by reference to the table above), but it seemed to be comparatively easy to hold them in good condition for a considerable time. These results go to show that in times of drought, artificial systems of irrigation may prove of the very greatest value to the market grower.

Greater results than these have been obtained by many practical growers but in all fairness to these results and to the practice it must be stated that in normal seasons the increase in pounds, bushels or tons may not seem worth the cost of irrigation, but if quality is considered worth anything today, the increase in that direction alone will always pay a profit on the investment. In dry or abnormal seasons greater differences are of course shown and then it is that prices are higher and the man who irrigates wins out.

It may be even now some of you are asking yourselves "where would I get the water to irrigate, supposing I wanted to." Many of you may be located near small rivers, or creeks where a lift of 20 or 25 feet by means of a windmill, gasoline or steam engine or if near an interurban trolley line an electric motor will do the work.

Many insignificant little brooks will often flow five gallons in

two minutes or 3,600 gallons in twenty-four hours, 108,000 in one month or equal to four inches of rainfall on an acre.

There are many wells from 20 to 50 feet deep capable of furnishing 275 gallons per minute if we only knew it and at this rate it would take only a four-horse power engine 24 hours to cover four acres four inches. Suppose you don't have such a constant supply, then the question of storing the water in tanks or reservoirs becomes necessary, and in most cases it is not a difficult problem to solve, especially when one can make use of a low, boggy place where with a little excavating and the use of some concrete a first-class storage may be made to hold sufficient water to not only pull a crop through two or more weeks of dry weather but might prove of inestimable value to nearby buildings. Those who are trucking or who are in the green-house business in or near large cities or towns can easily afford to make use of the municipal supply at rates ranging from 4 to 10 cents per thousand gallons.

Having briefly disposed of the preceding question of supply, we are now confronted with the question as to what is the best method of applying the water to the growing crops. There are three methods being used here in the east, all more or less successful according to kind of soil, lay of the land and crops grown.

Around Boston we find many growers prefer the water through large mains and then apply with large hose. The objections to this method are, too much labor required, uneven watering and water liable to be applied too rapidly, thereby having a tendency to pack some soils and break down many tender plants.

The furrow method is open to the same objections with the addition that soils of uneven contour will not permit of its use. The ovehead system seems to be the best and the one that is rapidly replacing other methods. With this method the water is applied in a fine mist-like spray from nozzles set in galvanized iron pipe arranged on posts in rows at given distances apart. These pipes are capable of being turned either by hand or automatically thus producing an even distribution of water over the entire space. These nozzles are usually placed four feet apart in the pipes and the pipes are about 40 or 50 feet apart according to the water pressure at the nozzle.

This system, known as the Skinner System of Irrigation, costs only from $90 to $150 per acre to install and will pay for itself in a single season.

When shall I irrigate and how much water shall I apply? are other questions to be answered and indeed in most cases they are the hardest ones of the whole practice. In order to determine just when crops need water and when to apply it so they will not suffer from drought or, on the other hand be damaged by too frequent or too generous applications requires practice and a knowledge of the needs of the plants under irrigation. Plants may suffer as much from having the soil kept too wet as too dry. Plants usually do not show the need of water until a great deal of damage has been done and therefore one should never wait for the plants to tell of their need. Frequent sprinkling of the surface soil at irregular intervals is not watering. The surface soil may look moist when the roots

of the plant are drying up. The rule seems to be not to water too often but give a good soaking when you do water, if the surface looks dry, dig down to a level with the roots and get a handful of soil, squeeze it and if it holds together there is plenty of water present, but if it falls apart quickly water is usually needed. The amount of water to apply depends upon the kind of soil, crop and climatic conditions. It has been stated that about 3-5 of the volume of clay soils and 2-5 of sandy soils is open space, while good garden loams may range between these figures. There is in all soils free water and water around soil particles and as it is the free water that plants depend upon it is a question of how much free water should soils contain to produce vigorous growth in plants. An answer that has been given to this question states that one pound of water to ten pounds of soil as it is taken from the field will supply enough water for the average crop. We can only approximate this, however, and in practice must resort to other means of determining whether there is sufficient water in the soil for the growth of the plant. Cultivation must go hand in hand with irrigation in order to conserve all the moisture possible and to prevent the soil from baking, forming a crust on the surface or becoming hard. We have been told that spraying is crop insurance, this is equally true of irrigation because it insures against drought and in thousands of cases has spelled profit where without it the word would have been loss.

Adjourned to meet at 9:30 o'clock Friday morning.

FRIDAY MORNING, JANUARY 19, 1912.

MARKETING PROBLEMS.

By Paul Work, *Ithaca, N. Y.*

(This lecture was fully illustrated.)

The successful marketing of horticultural products involves a multitude of problems. Beginning with the time the orchard site is chosen, or with the laying of the plan for the vegetable garden, the questions arise in unending array until the last check is received and the last freight claim is settled. With old-time conditions, when almost every householder was a gardener, and when wants were soon satisfied, the problems of marketing were simple and easily solved. But now the sky-scraper and the apartment house have banished the little garden plot, and at the same time the demand has grown, until a great variety of product must be supplied at every season and in every city. Thus we have been forced to deal with transportation and storage and refrigeration, and with the hundreds of considerations that make for success in these. We have been forced to meet new conditions of selling. The grower no longer meets the consumer, save in dealings on a small scale. Nor can it soon or ever again be so.

Of the dozens or scores of problems which arise, the solution of each one having its bearing upon the success or failure of the season, we can consider but three or four. One of the earliest to pre-

sent itself is the package problem. This should be solved before the rush of the season is upon us. Take advantage of the slack time of the manufacturer in securing rock bottom prices for large quantities. Take advantage of your own slack time for hauling and nailing up and storing. Let us then consider the points that should be sought in our package, for upon this much depends. It is impossible to lay down absolute or even very definite rules, because every producer must meet his own conditions, and there are as many different conditions as there are growers.

In the first place, the package should be strong and should protect its contents well. In this respect, the Boston box, which is approximately 17 x 17 x 8 inches in dimension, and which is used for almost every form of produce, is good. However, the six-basket carrier is better. The small container within the large crate offers a great advantage, protecting from external shock and from internal pressure.

The second requirement is an attractive appearance. Almost any package looks well when it is new, but no package will long remain so. A moment on Washington Street, New York, or on South Water Street, Chicago, is sufficient to emphasize this. The Jersey tomato box makes trip after trip to New York. It is handled and tumbled and broken and repaired until its appearance is more that of a wreck than of a package. Such a policy costs cents for every crate that is so shipped. If returnable boxes are used, as, for instance, on local market where the grower drives in, they should be substantially made, and should be kept painted. This reduces the cost of the packages, and aids greatly in keeping up the appearance of both package and load. Rochester is the one large market with which I am familiar where this is the regular practice.

In the third place, the produce should be displayed to advantage. The better it is presented, the better it sells and the higher the price. The Western New York cauliflower box, which, when the lid is removed, shows each snowy head surrounded by a border of green, is a splendid example of this. It is a far better advertisement than the Long Island barrel. Handle packages attract buyers, and sell the product in larger quantities than would otherwise be the case. One who would ordinarily ask for two pounds or a quarter peck will often purchase a whole basket.

Fourth, it is ordinarily best to use a package that is standard on the market to be served, provided it is a good package. If it is not, try another. People soon rocognize merit even in new array. This array then becomes your distinctive mark, and helps sell your goods.

Fifth, the package should be easily handled and should not invite abuse, as is true of the barrel. Crates and baskets are usually handled with a good deal of care.

Sixth, the first cost of the package should be carefully looked into. If possible, use a cheap one and make it a gift package. It is always fresh and bright and clean, and there is no trouble about its return. The use of returnable packages is always accompanied by a great deal of loss and annoyance.

The seventh requirement is that the measure shall be exact

AT THE EVAPORATOR,
A good place for the culls.

TYPICAL ROCHESTER (N. Y.) MARKET WAGON.

when the vessel is well filled. Few defects will turn away a buyer more quickly than slack measure.

Eighth, empties should be capable of compact storage. This makes easy hauling, and a good supply can be secured early in the season. In this connection, it should be suggested that it is never good policy to leave packages in the open for any considerable length of time. New wood loses its attractive whiteness within a very few days, and the selling value of the package is thereby decreased.

Finally, a high grade product must not be put in a package that is ordinarily used for low grade stuff. Some of our best lettuce growers are coming to use a box which carries two or three dozen heads of the best grade. These men put their lower grades in the ordinary bushel hamper. Producers of other sections use this same bushel hamper for their first grade, and neither of them uses a distinctive mark. As a result, the one who is packing good lettuce in the hampers is not getting the best results.

Every year sees the work of grading cutting a larger figure in the work of marketing than it did before. Grading was once unknown. Today the producer of fruits and vegetables is following close upon the trail of the manufacturer, who long ago realized the necessity of uniformity. The citrus people took the lead in this. The western apple packers were next, with the vegetable shippers close on their heels. The progressive market gardeners are awake to the fact that two gnarled cucumbers cut the price of the whole bushel. Hundreds are still asleep.

Every community must make its own plan of grading. What suits one market does not suit another. Many are discouraged in setting the standard high, because the lower grades are becoming increasingly difficult to sell. During the last season we had to discard a considerable proportion of our second grade tomatoes at Cornell, but it paid. At one time, ordinary run-of-the-field fruit was bringing twenty-five cents a basket. Our primes sold at forty cents, and many of our seconds at twenty to twenty-five cents. However, seconds are not wanted in large quantity on most markets. Many hold that the moral of this is, "Don't grade. If the consumer doesn't want seconds, make him take them with the best." But the true moral is, "Don't grow seconds." Of course, there will be some inferior fruit,, but if, by selecting a well bred strain of a good variety, and by giving the best culture, we can reduce the seconds to very low proportions, we will not object to leaving a few culls in the field, or to hauling a few loads to the evaporator.

One of the most common mistakes in grading is in reducing the standards when the price drops. When markets are glutted, the question ceases to be one of securing a high price, but it becomes a question of moving the crop, or letting it rot. People continue to use the product, and that in large quantities. They are willing to pay a price which will cover marketing cost and a good share of production, but the question is, which grower sells and which does not? Naturally, the one with the best sells. The following clipping, which is typical of a large number that appeared in our trade papers during the season just closing, furnishes good evidence on this point:

"Lettuce from State points has been in free receipt and much has been sold for less than charges. Fancy headed stocks is worth fifty to seventy-five cents per basket, but average grades are neglected at ten to twenty-five cents per package."

The time of over supply is just the time when grading counts. The grower has established his trade on a basis of quality, and by maintaining that basis, he is able to hold on while the other fellow drops out. Moreover, Mr. Grader still holds the trade when the market picks up.

It is by no means easy to maintain a standard of grading. One naturally desires a maximum of primes and a minimum of seconds, and he even unconsciously tends downward. With hired help the problem is much more difficult. The first essential is to form a mental image of the standard for each grade, working it out carefully and making it neither too high nor too low. Fix these standards as far as possible by the use of sizing boards and the like. Constant and rigid inspection is then necessary. If a large quantity is handled, each worker should have a number to be placed in each basket. Thus responsibility is fixed. Just here is one of the greatest advantages of machine-grading. A machine is freer from the failings of human nature.

The problem of packing cannot be separated from the problem of grading. The requirements are two. The first is that the package shall be snug and firm. Every apple should rest tightly against each adjoining apple. This is secured in the barrel by jarring and by the use of the press; in the box the elasticity of the sides serves to keep the fruit firm. Failure to observe this results in bruises and in a slack pack. The other requirement is a pleasing finish. The buyer's first test is the test of the eye. If this results unfavorably (and the question is soon decided), no further test is made. Our illustration shows two baskets of tomatoes graded alike. Careful arrangement of the surface of the one basket adds to it attractiveness and to its salability. Nor does it increase the cost a half a cent. A tomato is as easily laid in place as out.

Thus we have raised the whole question of facing. The baskets of tomatoes which are shown in our illustration are both honestly packed, for the fruits that appear on the top are true samples of the entire contents of the package. Presentation of goods in attractive form is not a misrepresentation. In fact, the grower of asparagus who brings his product to the city untrimmed, irregularly bunched, and tied with untidy twine, is doing himself injustice. Such a product in Ithaca last year brought lower prices than the California asparagus, although the former was of higher quality. The Westerners had observed all the details of good preparation for sale, and had gone so far as to enclose each bunch in an attractive lithographed wrapper.

Turning from mere facing for a neat finish, we may glance at the other extreme, as illustrated in a practice that has grown up among the orchardists of some sections. As the barrel is being packed, very fine specimens are placed on the bottom. A metal stovepipe of perhaps ten or twelve-inch diameter is then set within, and is surrounded by very good fruit, while the interior is filled with

culls. The stovepipe is lifted out, and the barrel is finished with good fruit. It was a wise (?) farmer who evolved such a scheme as this. We are all agreed as to the rank dishonesty of such a practice.

Having agreed upon our extremes, it might be well for us to describe the ordinary practice as a starting point. As the apples come to the grading table, a sufficient number of the very finest are selected out to make the upper layer. These are placed in the head of the barrel, neatly arranged. Upon these are placed perhaps half a bushel of specimens that are considerably better than average. Care is taken that a brightly colored cheek is opposite each opening in the top layer. The rest of the barrel is filled with fruit that is just barely within the legal requirement for the grade. Double facing is occasionally practiced.

What is to be the attitude of the good grower—the man who thinks—the man who does things for reasons better than "It was always thus?" In the first place, we cannot dismiss the method just described without a hearing. Many good growers use it, men who have given the matter careful thought. While the practice certainly originated in the desire to deceive, these men have dismissed the moral question, the question of honesty, because the buyer understands fully the plan of packing, and there is absolutely no misrepresentation so far as he is concerned. Two chief reasons are given for its use. First, "The trade demands it," and second, "A barrel on the open market is considered as containing fruit averaging about twenty-five per cent. poorer than the face." In dealing with the first statement, we must probe deeper into the reasons underlying this undoubted fact. Why do the dealers demand overfaced packages? Can we find any reason other than the hope that it may enable them to sell it for better fruit than it is? What other possible gain might there be? On the other hand, does the grower gain anything? He has gone to the labor and trouble of sorting out a half bushel of the very finest from three bushels. The barrel is judged and priced according to the other two and one-half bushels. Thus he loses the difference between ordinary No. 1's and apples that are good enough for box packing or for barreling for the finest of trade, plus the extra labor. As to the other point, ordinary apples packed straight would be discounted fifteen to twenty-five per cent. below the face value. This is true of the open market under ordinary method. The difficulty can be met by observing two factors. First, grow good fruit. A letter from a New York producer includes this sentence: "I think it would be inexcusable in a farmer who sprays thoroughly, cultivates, trims, and fertilizes, to put out anything but good apples." If the producer follows the methods that have been so widely preached and so successfully practiced, he will be able to pack barrels that are as good from head to head as are the ordinary facers and packers of the ordinary grower. As stated before, if sold through the ordinary channels in the ordinary way, the package will be discounted fifteen to twenty-five per cent. from the face, and the other fellow will come out just as well. That we may avoid this difficulty, we must observe our second factor, namely, to be sure that there is an adequate distinguishing mark. A catchy label is

effective; it inspires confidence. The prospective buyer feels that if the producer thinks enough of his product to put it up well, and mark it well, it must be better than the average. A guarantee is of especial value. If the label does no more than attract attention, it does much. Some months ago, I stood upon a railroad platform, waiting for a train. My attention fell upon a box of celery that was different from anything I had seen before. It was about half the size of an ordinary crate, and the end was printed with a neat legend. I took the address, and when I was engaged in preparing an exhibit on marketing methods a few weeks later, I sent for a crate of this same celery, confident that the quality would be there. I was not disappointed. You may be sure that a grower does not care to put his name upon a product that is not good.

Of course, one must choose well his selling agent, and must use sound business judgment in his dealing. Good produce well packed will not bring results if dumped on the market, and the grower who will ship to any Tom, Dick or Harry who presents a big card and wears a checkbook in his pocket, must expect to be swindled.

Before we leave this subject of facing, let us look at it in another light. Suppose you enter a store with the idea of purchasing a half dozen shirts. A box is placed before you, and you examine the upper garment, finding it to be about what you want. Is it at all probable that you would purchase the box without examining all the others? The only circumstance under which you might do this would be that you know the dealer and have full confidence in him. At any rate, you would make yourself very sure as to what you were getting. Now, to turn to the fruit question. You may be just as sure that the buyer is not going to take a risk as to what he is purchasing. Particularly when the reputation of growers is no higher than it is. Mr. W. H. Underwood, an exceedingly extensive orchardist in Kansas, puts it this way:

"We have got over believing that all the stuff we sell goes to suckers, in fact, we give the buyer the benefit of being just as bright as we are, and we haven't yet found a buyer who will not look in the centre of the package if he is going to invest $5,000 to $20,000 of his own money."

Another fruit man states it thus: "The age of the wooden nutmeg is past. We must give value and stand behind it." These remarks come from actual and thoroughly successful growers. Now, to return to the shirts. Suppose upon lifting the first garment, you found that the others were of a much lower grade and distinctly inferior in quality and workmanship. What would you do? The chances are you would be outside the door in ten seconds and you go to another store where you hope another attempt to swindle you will not be made. Is not this just exactly what the fruit dealers have done? As evidence, witness the following clipping:

DEALERS HANDLE WESTERN APPLES.

Complaint of Dishonest Packing in the East.

ORDINANCE IS SUGGESTED.

City law to go with proposed federal statute compelling honest packing urged. Cold storage full of eastern fruit.

With thousands of barrels of eastern apples in cold storage, the big retail dealers in Rochester are handling western fruit, if not exclusively, then nearly so. They have frankly admitted that this is true, and they are not backward in saying why it seems likely to remain true.

Men thoroughly in touch with the situation say that an honest barrel of apples from New York packers is rare. There are honest packers, of course, but they are in the minority. Barrels that look faultless in the facing show up anything but faultless in the middle, say retail dealers. No. 2 quality is allowed to partially fill No. 1 barrels. Digust over this condition has grown so great that many dealers along the main thoroughfares of this city will not buy a barrel of fruit grown in New York as long as the western apples can be purchased, notwithstanding that the price of western fruit is considerably higher.

However, the progressive grower need not conclude that all is ruined. Correspondence with one of the best known retailers in Philadelphia has brought the information that eastern fruit of really first class quality and high grade pack will bring just as high prices as the western fruit. Nor does the individual need to hold back until the whole fruit industry is reformed. A man will very soon gain a reputation and will receivve the reward of his prudence and foresight.

Are we not then ready to conclude that when the producers of the east pack straight, face for a neat finish, sell seconds as seconds, and feed the culls to the pigs, that it will speedily regain its place in the markets of our cities?

Much has been said during the past few years regarding efficiency and scientific management. The cry of the factory manager has been for the increased use of machinery, for the elimination of unnecessary motions in handwork, and for the saving of time and energy at every turn. This means nothing more nor less than the lowering of the cost of production, particularly in respect to labor. There is no field in which a little attention to the principles of scientific management will yield greater returns than in the marketing of produce. The preparation for market is the greatest single item in the cost of any of our commodities. Time, that factor in crop production which is every year becoming costlier, may be gained or lost at a hundred points, many of them insignificant, but in the season amounting to hundreds of dollars.

To illustrate this, let us glance at some of the ideas that have been worked out by a Western New York grower, in handling his spinach crop. His operations are in no way unusual, and schemes

similar to his can be developed for practically all conditions. In the first place, the labor force which is used in cutting is well organized. A large gang works back and forth across the field, keeping together and leaving a swath of baskets. The baskets that are used for cutting are cheap, and a very large number are employed. If a wagon is delayed for a few moments, there is no halting in the work. The wagons that are used for hauling from the field are of the low-wheeled type, equipped with a broad, flat bed, and built for short turns, a type that should be used almost universally for work on the farm itself. The spinach is hauled to market in large cubical crates, holding about 500 pounds each. Four of these boxes are placed on a wagon which goes into the field. They are filled, and the wagon is driven off the muck to a position beneath a large trestle. The team is hitched to another wagon, and another four boxes are similarly loaded and brought to a place beside the first wagon. The trestle carries a chain hoist similar to that which is used in the litter carriers of the dairy barn, and in this way the boxes from one wagon are transferred to the other. A two-ton load is then ready to go to the cannery. Formerly, celery crates were used to handle the crop, but the present method is found to mean a very appreciable saving, not many cents on each load, but amounting to a great deal in the course of a season. One notable feature of this place is the excellent farm road. It is not a fancy road, it is not paved or macadamized, but it is always good. The secret of it is good grading at first, the use of a scraper at the beginning of the season to give it proper form, and the use of wide-wheeled wagons, which are highly efficient in maintaining it in good shape. The farm road is often used as much or more than the public road, and if it is in poor shape, every load that is hauled over it is limited. A large load over a good road can be hauled just as cheaply as a small load on a poor road. By the use of these ideas, all of them quite simple and within reach of anyone, this grower saves literally hundreds of dollars each year.

The importance of good public roads in reducing the cost of marketing cannot be over-emphasized. The producers to the south of Buffalo have the advantage of brick pavement in two directions for eight and twelve miles, respectively. The growers in other sections that do not enjoy these advantages should make their demands heard, and in course of time the problem is sure to be solved. Another factor of great importance in making possible satisfactory marketing conditions is the market wagon itself. It should, in the first place, be well planned. It should accommodate the different types of packages that are used without waste of space. This renders the determining of measurements somewhat of a puzzle, but can usually be worked out to good advantage. Convenience in loading and unloading should be very carefully considered. Time is precious when sales are being made, and the salesman-driver cannot afford to use many minutes in rummaging around among his load or in re-adjusting it every time anything is taken out. The wagon should be very substantially built. It will be called upon to stand a great deal of rough usuage. The market gardener, with his load of perishable produce worth anywhere from fifty to two hundred

dollars, cannot afford a wreck, and a single accident may cost more than enough to secure the very highest grade of wagon. The auto truck is now thoroughly established as a practical form of equipment for the large producer. It requires feed only when it is working, and has been developed until it is thoroughly reliable. Market gardeners and fruit men are using the trucks in increasing numbers each year.

The packing house is an important factor in the economical preparation of produce for market. It may be simple, consisting of no more than an open air shed, or it may be large and complex, providing facilities for washing, grading, packing, loading and storing. In any case, the straight line principle of operation should be observed, that is, produce should come in at one side or end, and should progress through the house as it is worked over. You cannot afford to have your workmen sorting out the graded from the ungraded, and climbing over a stack of empty packages to take the finished ones to the loading platform. This is very well illustrated in the celery house which is represented in the diagram.

The packing house of the market gardener should be light, and very careful provision should be made for sanitation. Much water is ordinarily used, and the floor should be of cement with adequate drainage facilities. Light should be abundant, as it is often necessary to work late, and it is not desirable to have recourse to artificial lighting.

In the preparation of most crops for market, it is necessary to handle individual fruits or vegetables. This work offers opportunity for gain or loss at every turn. If a laborer insists on taking four motions to an act that should be accomplished in three, that laborer is costing just thirty-three per cent. more than he should. You would not stand for such in increase in the interest on a loan. It is no more logical that you should accept such a loss from a laborer. A study of the most effective motions by which a given piece of work can be done almost invariably yields returns in time saved. This principal can well be illustrated by the method in handling tomatoes. One who knows how will pick up a fruit with the left hand, will give it a quick rub with the right hand, while the third or fourth finger of the left hand removes the stem. It is then placed in the basket in less time than it takes to tell it. An inexperienced one will take up the fruit, will turn it over two or three times, rubbing it in several directions, and will perhaps use the thumb and finger of the right hand to remove the stem. In this way, time is lost.

Equipment should be carefully arranged for convenience and comfort. If workers can be seated and do their work well, benches or stools should by all means be provided. Anything that makes for the contentment of the help is a good investment.

The last few years have seen the introduction of a great many mechanical devices to aid in the work of preparing for market. The citrus people of California were the pioneers in this, and the visitor in the west finds in an orange packing house a most complicated array of belts and pulleys and tanks and conveyer. Just as little as possible is left for the hand to do. One of the favorite devices is

the rope sizer. This consists of two ropes moving over pulleys at the same rate of speed, and spreading a little further apart as the fruit passes along. Separate receivers are placed under the ropes at proper spacing, and each size thus drops to its place. The same principle is worked out in a grader which is used for peaches in Western New York with a high degree of success. With fruit that is not adapted to mechanical sorting, much is gained by the use of sorting belts. Unsorted fruits pass along a central belt, and the different grades are removed by skilled hands and placed on other belts, which carry them to their respective places. These are mere examples, and there are dozens of others, such as the different washers for bunched stuff, the bean cleaners and the onion topper. Finally, under the head of efficiency, I would call your attention to the importance of large scale marketing in making workable the many economics that may be devised. Labor may be much more readily secured, and the force may be much more thoroughly and efficiently organized. Individual helpers are given the kind of work at which they are most expert. To illustrate, in a cucumber packing house in New York State, it has been found that certain girls are very quick at cleaning the fruits, but do not seem to have the type of judgment which makes good graders. Others, while not quite so nimble, are experts at the sorting. Where a large amount of work is to be done, these two processes can be carried through separately, and full advantage can be taken of individual differences. Large scale production makes possible the use of the larger and more complex machines that would otherwise be out of the question. It also involves great advantage in securing favorable transportation facilities. A man or an organization that is using twenty or fifty cars a week has far less trouble in securing them than one only using an occasional car. He also has great advantage in pressing claims, and in securing adequate service all along the line.

Thus far we have considered distinct ideas and phases of marketing. I wish now to bring to your attention two exceptionally good examples of systems of marketing, worked out in accordance with the principles I have suggested. Both have proved successful in the first degree.

Ionia, New York, has for a number of years been an important centre in the production of cucumbers for market. Until two years ago, each grower did his own marketing, either by shipment on commission or through local buyers. It is needless to detail the difficulties and dissatisfaction of this system. Many of us are still laboring under it. All of us have so labored at some time or other. Two years ago the growers of this section were brought together under the leadership of Mr. C. R. White in the Ionia Growers' Association. Mr. White has worked out a plan of marketing that has proved nearly ideal.

Baskets of the ordinary type are bought in large lots at unusually reasonable figures. These are issued to growers, and a record is kept by means of punch marks on a duplex ticket. The baskets are used for picking, and the grower brings his load directly to the packing house of the Association in Ionia. His load is tallied on another set of duplex tickets, the punch indicating the number of

NEAT FACING IS NOT DISHONEST PACKING.
Both Alike to the Bottom.

AN ATTRACTIVE GIFT PACKAGE.

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baskets, run-of-the-field, which he has brought. They are then ready to be graded and packed. The equipment for this work consists of four tables, each accommodating eight workers. They consist of frames bearing two sheets of canvas. The upper sheet is fastened only at one edge to permit of the easy removal of dirt. Two tables stand in each of two rooms, which are managed as separate units.

The cucumbers of a single grower are brought and emptied upon the tables, and the work of wiping and grading begins. Each worker wears a fleece mitt with which the fruits are quickly rubbed, and dropped into the proper one of six baskets, of which there is a set for every two graders. The grades are designated as No. 1, Fancy, Dills, Extras, and No. 2's, while the sixth grade is discarded. No. 1's and Fancys are perfect cukes, differing only in size. Extras are over size, and are not held to so rigid a standard of perfection. No. 2's or Choice are of the same size as No. 1's and Fancys, but are slightly off in form, or perhaps are slightly blemished. Dills are perfect, but smaller than Fancys. The discard receives all misshapen and otherwise blemished specimens.

As the baskets are filled, they are removed to piles, according to grade, and are covered and labeled. After all of a given grower's lot has been placed upon the tables, the grading is completed, parts of baskets are filled, and a tally is taken of the number of each grade. This is also made by means of a slip and punch. The full baskets are then removed to the shipping platform, and another lot begun. Parts of baskets over a half are tallied as one, while minor fractions are discarded.

Careful record is kept of each car shipped. These records are filed in the office of the Association, where they are typewritten on three duplicate sheets. The white one is kept at the office. The other two, pink and yellow in color, are forwarded to the consignee, with the request that he fill out both and return the pink, securing the signature of the freight agent. This sheet, with the white one, is filed for permanent record, and is invaluable in dealing with claims.

The bookkeeping in the office is necessarily rather complex. Yet the system of duplex tickets has done much to simplify it, and to insure accuracy. Baskets drawn are charged against the grower, while those returned are credited. Baskets shipped are finally charged at actual cost. The pooling is based on the third ticket mentioned, and is carried out each week. A special book is used for this purpose. It has at the left a space for the initial and number of the car, and this followed by a space for the number of baskets of each grade, the net price received for this grade, and the total. In this way, the actual net return is calculated, and is entered on the ledger account of each grower who shipped that week. Checks are then made out and handed to the grower. The actual cost of packing, usually from two to two and one-half cents per basket, is deducted together with a small commission. The salaries of the manager, bookkeeper, and foreman are not included in the cost of packing, and these, with other expenses, are paid from the commission. Each year's surplus of commission over expenses has been

used in improvements. The Association is organized as a stock company with $10 shares. As to results, this Association shipped last season nearly 150 cars. Good prices have been received much of the time, and fair prices all the time, including one or two periods of glut, when other shippers were moving none.

I have now to present a plan of marketing which is decidedly original, and which is being worked out by a Western New York grower. This producer was a city business man, who has given an increasing amount of his time to his gardens, until a year ago, when he left the city entirely. His home being in East Aurora, he chose the name "Sun-Rise Gardens," and with the help of a home-made manure green-house, he undertook the task of furnishing vegetables of quality to the housewife before that quality has departed from them. His leading crop is Golden Bantam sweet corn. It is gathered in the afternoon, and is brought to the packing house. If the day is hot, it is placed on tables, over which play the sprays of several sprinklers. After it is thoroughly cooled, it is closely graded, and the best is packed in dozens in neat cardboard cartons, bearing the following legend:

ABSOLUTELY RELIABLE
Away from Dust and Dirt
No Handling
Fresh from the Gardens
Sun-Rise Gardens
Golden Bantam Sweet Corn

It also shows the date of shipping and the signature of the proprietor. The packages are placed in crates, and shipped direct to grocers who handle the product regularly. The price received throughout the season is twenty cents per dozen. The seconds are consigned to commission merchants to be sold in the ordinary way, while thirds are fed to the hogs.

During the past season, Mr. Tyler marketed the produce of thirty acres of Golden Bantam corn. At the time of my visit to his place about the first of September, he had already marketed 12,000 dozen. In carrying out this work, Mr. Tyler has had some interesting experiences. When he was about to make his first shipment, he called a grocer by 'phone, and told him he meant to forward some corn which was to be sold at twenty-five cents per dozen. The ruling price at the time was nearer fifteen cents, and the grocer hooted at the idea. Mr. Tyler forwarded the corn in spite of objection, instructing the grocer not to sell any for less than twenty-five cents, and to keep none over until the second day. At the same time, he assumed the risk, agreeing that the dealer would owe him nothing for corn unsold. Only a few boxes were forwarded. The next day, the order came for fifteen, and the next for an increased quantity. Thus was the trade first established. Ever since the hardest struggle has been with the retail dealers, to convince them of the merit of the idea, and to induce them to give it a fair show. During the present season, a retailer said to Mr. Tyler, "The corn is fine, but the price is too high. You sell to me at fifteen cents,

and I will move double the quantity." Mr. Tyler agreed to try it for two weeks. Sales actually fell off, and back went the price to twenty cents.

We might have taken up many other questions, such as those that arise in connection with weights and measures, those pertaining to the planning and management of local markets, the use of advertising, commission sales, and the difficulties that are involved, and an indefinite number of others; but these we must pass by for the present. Leaving them behind, we must conclude that he who plants well, grades well, packs well, and who conducts his operations on a scale such that he may practice economy in detail and that he may command both labor and markets, will surely win. If he must labor on a small scale and cannot work with his neighbors to secure these advantages, he will certainly be crowded out by those who can. Indeed, we see pointers here and there that indicate that he is even now beginning his retreat.

THE GOOD SEED QUESTION.

C. E. Myers, *State College, Pa.*

(Note: This address was profusely illustrated with lantern slides).

Mr. Chairman, Ladies and Gentlemen:—There is probably no question confronting the farmer today that is more worthy of study than that of good seed. We may fertilize, cultivate, spray and irrigate, but if we do not plant good seeds we cannot secure a good crop. We are too much inclined to believe that seed is seed and disregard the fact that enclosed within the seed coat are the potentialities of the future plant. If the seed has not been produced by a good plant we cannot expect it to produce anything other than what has been bred into it. It is doubtless true that it is impossible to discriminate between good and poor seed by looking at it, but by growing the crop we can readily see important differences. During the past four years the Department of Horticulture of the Pennsylvania State College has been making a study of the importance of seed in the profitable production of cabbage and tomatoes. The work includes both variety and strain tests. In the strain tests the seeds of certain varieties are secured from a large number of seedsmen in various parts of the country. A germination test is made soon after the seed is received in order that we may regulate the thickness of sowing. In a lot of seeds of one variety secured in the spring of 1909, the germination ranged from 2 to 99 per cent. A high percentage of germination is not especially important, yet it should not fall below 65 for cabbage and in any event it is highly desirable that the percentage of germination be known because of the reason just stated.

After the germination test has been made the strains of the variety to be tested are sown in flats in the green-house. As germination proceeds, notable differences will be seen in the relative vigor of the various strains as will be seen by some of the slides which follow.

This slide shows a flat of well grown plants ready for the field planting. By careful control of temperature and watering vigorous stocky plants may be grown. These are much superior to the leggy, weak plants which develop where the temperature is too high and watering too frequent. While the plants are in cold frames they are gradually accustomed to cold temperature so that in case severe weather follows the field planting the plants will not be injured.

During the past three years we have been making a variety test of early varieties. These are of interest and value since sometimes new varieties of merit are produced. At the present time we have fifty so-called early varieties in the test but it is doubtful if there is sufficient difference between many of the varieties to identify them.

In a slide which follows the variety Early Race Horse is shown in comparison with a good strain of Jersey Wakefield. From the illustration it will be seen that Race Horse matures several days earlier than Jersey Wakefield. A test of other varieties shows that Race Horse, Extra Early and First Early are identical. The tests have shown that in several instances a well known variety has been sent out under a new name.

The next slide shows a field of Volga. This is a rather new variety which appears to be well suited to a limestone soil. It is mid-season in time of maturity. The heads are round, solid, and desirable, except that the head leaves do not fold across as much as might be desired.

As previously stated, the strain tests are perhaps the most important of the experiments we have been conducting during the past three years. In a strain test of Jersey Wakefield secured in 1908, which included twenty-five strains, notable differences were observed in the uniformity to type, and the time of maturing. Of the twenty-five strains in the test several matured more than 90 per cent. of the crop within thirteen weeks of the time it was planted in the field. The plants of these strains were quite uniform and desirable. On the other hand, four strains were very irregular, leafy and matured few if any marketable heads. The slide shows these poor strains as well as the strains that matured early.

The work of 1908 showed that the question of strains was worthy of investigation. The next year a new lot of seed was secured of the varieties Jersey Wakefield, Charleston Wakefield, Early Spring and Early Summer, as well as several late varieties.

Of the thirty-one strains secured at this time only one is as poor as the four previously mentioned of the test secured the year previous. The slide which follows shows a typical plant of this strain, while the next slide shows an excellent plant of the Jersey Wakefield variety.

This year at the time of making the first cutting the heads were piled at the end of the row of each strain and photographed. The series of slides which follow shows the variation in earliness of the respective strains. The slide showing this table of yields is interesting.

TABLE I.

Harvesting Record of Jersey Wakefield.

Record No. of Strain.	Yield per A. First Cutting—Tons.	Value per acre.	Per cent. of Crop Harvested. First Cutting.	Total Yield per Acre—Tons.
1	3.79	189.50	56.15	6.75
2	2.21	110.50	32.26	6.85
3	2.71	135.50	34.43	7.87
4	2.36	118.00	31.47	7.50
5	3.64	182.00	45.11	8.07
6	2.21	110.50	33.08	6.68
7	3.60	180.00	41.28	8.72
8	2.50	125.00	31.41	7.96
9	2.60	130.00	28.41	9.15
10	1.42	71.00	17.13	8.29
11	2.43	121.50	27.36	8.88
12	2.50	125.00	28.34	8.82
13	1.63	81.50	22.21	7.34
14	0.54	27.00	6.55	8.25
15	1.79	89.50	24.42	7.33
16	4.36	218.00	63.10	6.91
17	3.00	150.00	35.71	8.40
18	0.29	14.50	7.02	4.13
19	3.93	196.50	49.56	7.93
20	2.43	121.50	32.40	7.50
21	2.00	100.00	27.78	7.20
22	3.64	182.00	42.72	8.52
23	3.00	150.00	38.76	7.74
24	3.43	171.50	51.81	6.62
25	3.37	168.50	43.48	7.75
26	3.04	152.00	44.90	6.77
27	2.72	136.00	45.33	6.00
28	2.73	136.50	31.67	8.62
29	2.74	137.00	32.46	8.44
32	2.76	138.00	34.12	8.09
33	2.77	138.50	38.47	7.20

In this table we have compiled the yield per acre of each strain for the first as well as the total cutting. From it we see that the yield per acre at the first cutting varies from .29 tons to 4.36 tons. At the time this cutting was made the market price of cabbage was $50 a ton. Thus in the one case the money value was $14.50 and in the other case $218. This difference will readily be appreciated by all who grow this crop commercially. The total yield yield per acre ranged from 4.13 tons to 9.15 tons, or a difference of 5.02 tons. We have every reason to believe that this difference was solely due to the difference in seed.

From what has been said some may feel that we have been making an attack of the seedsmen. Nothing could be further from the truth. On the other hand, the work has been examined and

heartily approved by some of the best seedsmen of the country who are very glad to secure any information as to how they can better serve their customers.

During the past season while one of these seedsmen was visiting the experiments he remarked that as a whole few of the tests showed the uniformity that is desirable. He pointed to one strain which was very undesirable and commented on its inferiority. When I told him that it was his strain, he was very much surprised and said although it was a great disappointment to him, yet he wanted to know the facts. He said that he had paid an extra price for this seed with the request that the seed grower give him the best that could be produced. Naturally he would be chagrined when the seed produced the plants grown in this test. In justice to this seedsman I may say that strains of other varieties secured from him have been very good and his strain of Early Spring was next to the best in the test. I have every reason to believe that he used his best efforts to secure good seed in each case but in the one instance he was disappointed.

The test of Charleston Wakefield has been interesting in that in many instances there is little if any noticeable difference between it and the same strain of Jersey Wakefield. This is not especially important since the Charleston Wakefield is of the same general type, the chief difference being that of size (as it is a little later in maturing) a difference which apparently is not always present.

The test of the variety Early Spring shows several strains that are materially lacking in uniformity. This may be seen from the slide.

The next slide shows a plant typical of one of these poorly bred strains, while the next slide shows a well bred plant such as may be found in some of the best strains. Several of the strains are a mixture of one or more varieties. One is Jersey Wakefield, and two are Early Summer. It is possible that some of these are due to error, but in one case Early Summer is known to have been sold for Early Spring. Errors may be pardoned, but the seedsman who deliberately substitutes without informing his customer of the fact is deserving of but little sympathy.

The slides which follow show the relative earliness and yield of the various strains. We see that in some cases only a few of the fifty plants have yet matured heads, while in another case 49 of the fifty heads were cut at the first cutting. The yield per acre of the first cutting varied from 1.53 tons, as represented by the poorest strain to 14.58 tons as represented by the best. The total yield varied from 6 to 15 tons. The test of the late varieties has shown less variation than is found in the varieties just discussed. A fact of interest, however, is that there is considerable difference between strains and varieties as regards resistance to disease. Of the varieties we have tested, Houser seems to be the most resistant.

The work with tomatoes follows the same general plan as that with cabbage. When the plants are transplanted the last time, they are planted in three-inch paper pots. These pots are cheap, easily made and have given very satisfactory results. The slide shows the tools used in making them as well as a well grown plant. When

A TYPICAL PLANT FROM ONE OF THE POORLY BRED STRAINS.

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plants are grown by this method, they may be transplanted without suffering any severe shock because of broken roots, or unfavorable moisture condition in the soil. The pots are also desirable for use in starting melons and cucumbers.

In the next slide we have a comparison of the yield and general character of a test of 21 strains of Chalks Jewel tomato.

TABLE II.

Summary of Test of Chalk Jewel Tomato—1910-1911.

Record No. of strain.	Av. size of fruit.	Yield per acre.	General character.
1	.25 lb.	15.3 tons	Good
2	.25	14.7	Good
3	.21	14.0	Fair
4	.27	14.6	Fair
5	.29	14.5	Fair
6	.24	12.9	Good
7	.24	13.6	Good
8	.27	12.2	Are Matchless
9	.23	14.0	Fair
10	.28	15.4	Mixed with Matchless
11	.28	15.0	Fair
12	.25	17.8	Mixed with Beauty and Matchless
13	.26	14.2	Fair
14	.23	14.0	Good
15	.22	15.2	Fair
16	.23	15.4	Fair
17	.25	19.3	Good
18	.29	20.5	Are Matchless
19	.26	21.3	Mixed with Beauty
20	.26	19.6	Good
21	.25	20.6	Mixed with Matchless.

From the table we see that there is considerable irregularity as regards the general character of fruit and vine as well as the mixing with other varieties and substitution or errors. Of the twenty-one strains in the test it will be seen that two are of the variety other than what was desired, while four others are mixed.

Considering the yield of marketable fruit, we see that it varies from 12.9 to 19.6 tons per acre. Here again, we have a difference of 6.7 tons per acre due to seed.

As with the cabbage tests, the strains were grown under uniform conditions and the differences noted are apparently due to the heredity of the particular strain in question to produce well.

It is probable that some growers may find it desirable to grow their own seed. Where this is done, care should be used in making the selection of fruits. In making this selection, the character of the entire plant as well as the individual fruit should be considered. The selection should be made only of fruits that are desirable and which were grown on a plant which produced a large number of these fruits.

To summarize briefly, we may say that the farmer may do much to aid the movement for the production of better seeds. To do this we must abandon the practice of trying to get seeds at the lowest possible price. It requires considerable expense to produce high grade seeds, and furthermore, well bred seed plants frequently produce fewer seeds than less desirable ones, hence the cost of production is thereby increased. In the past the seedsmen have done much in placing the seed business on a basis where it serves the farmer well. If they are to maintain and improve this standard, they should receive the support of every farmer and gardener.

The experiments have shown the desirability of securing seed of a variety from more than one source. By securing from several sources a sufficient amount for the next year's planting and making a test a year in advance, we may do much toward overcoming disappointments which frequently accompany crop failures.

Convention adjourned until 2 o'clock.

AFTERNOON SESSION.

The convention was called to order at 2 o'clock, Friday afternoon, and the death of Mr. Gabriel Hiester, President of the Association, was announced.

The first number on the program was a talk on "Peaches," by Mr. J. H. Hale.

Mr. Hale.—Not having seen a program I don't know just what the subject is. I heard your worthy President say something about peaches, but I want to hit it right, or at least try to. Does anybody know what I am to talk about?

The Chairman.—Peaches.

Mr. Hale.—Oh, just peaches.

Question.—How did you get started at them?

Mr. Hale.—You don't really care to know how I got started. I don't know how much time you will want to devote to this subject, yet the question my brother on the left asks is an interesting one. How did any of us get started; what has kept up the faith in us; what has made it possible for us in Pennsylvania, New England or any other State, to develop a successful peach orchard.

I was born in comparative poverty, and my father died when I was only a year and a-half old, and left my mother with four children and a mortgaged farm. When I was fourteen years old I was at work, out by the month on a neighboring farm, at $12.50 a month and board. Guess it was more than I was worth. It was a small one-horse farm, and along in September I was sent more than a mile from home, back in a clearing in the woods to cut and stack up corn in an eighteen-acre field, which I own now, and have in a peach orchard. They were lonesome days, working out there alone. Eating my dinner one day on the sunny side of an old Virginia fence, there was a scrub peach tree, and on that tree there were ripening and had dropped on the ground among the bushes, a lot of peaches, bright red little fellows, an inch or so in diameter, and to a hungry boy, delicious in quality, and as I lay on the ground taking my noon hour under that tree, stomach full of those peaches, a dream or a picture came into my mind—If the God of nature and some careless man dropping a seed there, and it started and grew into that tree, if there were peaches in that ground, why wasn't it possible for me some time in the future to get money enough to buy a few trees of choice varieties and plant them in more congenial soil, and wasn't there an opportunity and promise there, and from the savings of that $12.50, I bought the first 200 peach trees I ever owned, planted them in a poor sandy side hill of mother's little farm and thus started my peach orchards that now hold, nearly one-fourth million trees. That is my start, and if that statement is any inspiration to any boy or girl that is seeking a chance. I can say while at that time it was believed that commercial peach growing was limited to a few favored regions in Delaware, New Jersey and Michigan, and outside of that there was no hope for any thing but occasional growth of trees—I can say since that time, from that inspiration that came to me, the inspiration that has come to hundreds of others and the scientific knowledge that has come to us, it has gone out so you may be almost in any corner of any State of this Union, and you can grow peaches and grow them successfully under certain conditions; not in every field on every farm, but somewhere almost in every county. This peach growing country is wonderfully broadened out, so there are no more "peach regions," no more peach "seasons." I remember when I first thought of increasing my plantings and going south, I thought we might get peaches on the market in June or July, I talked with dealers who thought they were wise, and they said people wouldn't buy peaches any time; that the time when people buy peaches is the last of August and early in September; that is the only time. They said, "You might sell a few, but to sell them in any quantity, it is nonsense," and when I asked them to take a little stock in the orchard to make it possible for me to develop it, they shook their heads and said it couldn't be done, and yet today the great commercial peach months are June and July. And yet we sell quantities of them in May; many in August, September and many in October. So the peach season of late August and early September of years ago is now extended from May to November, and it is is possible by growing peaches in different sections in the United States, by the change of varieties and change of methods of culture and methods of transportation, all those are factors that count. Perhaps the greatest factor in this enlarged peach culture in America has been the bringing to this country of the North China type of peaches, and of their seedlings that have been developed within the last twenty-five years, a type of peaches that are somewhat hardier, considerably hardier in fruit bud than the old Persian type we grew prior to that. I think perhaps that has been the greatest factor in broadening out.

The next factor has been the consolidation of great railway lines of transportation. We talk about the monopoly of consolida-

tion, but if it hadn't been for that, it wouldn't have been possible to feed the great American nation today. And then the building of the refrigerator car. Some of you here present probably remember the time when there wasn't a refrigerator car line in America; when there wasn't a refrigerator car that you could have loaded your perishable products into if you had wanted to. Mr. Parker Earl, the strawberry grower of Cobden, Illinois, was the first man to grow strawberries by fifty, seventy-five or one hundred cars, and to reach out into markets further than Chicago, he developed the first refrigerator car for transporting his strawberries. The first refrigerator car was from Cobden, Illinois, to Detroit, Michigan. So that has added very much to the possibilities of a wider distribution.

I don't know what you want me to say about peaches. I could talk for a week and tell you some things, and not tell many others, but there are so many phases of the question, I hardly know what to touch upon, and I think perhaps after I ramble on a little while, questions that may come from you will be of more value than anything I might say. I have made some notes here, but I don't know whether I will use them or not.

Like all other products manufactured and cultivated and grown and developed, there has grown up with the greater production of peaches, and the greater consumption also, the demand for better peaches, for those of finer appearance, those of large size and those of better carrying quality. But there is still a demand, and a growing one, for fruits of higher quality. I grow, as I say, on a large scale; perhaps larger than anybody in America. I can tell the character almost of a community as to its culture and refinement and its appreciation of high grade things if you will tell me whether they buy white or yellow peaches. The demand for yellow peaches comes from a low grade desire, and that for the more beautiful, delicate, and more delicious peaches from a greater appreciation of the refinements of life. If you are ever going to send any peaches to your best girl, never send her yellow peaches. Send her white ones. There is quality and character there that is worth considering.

To bring about high grade fruit means the selection of the right varieties; means the selection of as good a soil as you can get. The question of early culture in the spring, and thorough culture, and no other crops growing between, are essential; and getting the trees started at the word go. The question of the tree is an important one. I don't know but I spoke yesterday a little slightingly of the nurseryman. I didn't mean to, because they are essential in our business. The idea that we can grow our trees as well as the nurseryman can, is a mistake. In depending on the nurseryman for our trees, we have gone to the extent of looking for cheap trees, and one of the foundations of failure in many an orchard planting is attempting to buy cheap trees, regardless of who grew them, where they were grown, or how they were grown, so the question of the cost of the tree shouldn't enter into it at all, if we get the right kind of a tree. The nurseryman, to meet the cheap trees we have demanded, have had to grow trees as cheaply as they could. The honest nursery-man has been distributing a great many mixed trees, without

knowing it himself, and because you and I have wanted cheap trees. The time is coming, it is here now, when some of the nurserymen are selecting their buds from the best bearing trees, and there is a great difference in the value of the trees. I am having it tested now in some of my orchards, taking a block of some of the best Carmen trees, counting the blossoms, the buds, the fruit, measuring them by weight. If you could see those figures and see the productive value of one Carmen tree over another, or all the different varieties we have, it is simply astonishing. Some of the nurserymen are doing it in a small way, and others who will do it in the future will simply want the buds from the best bearing trees they can find. There will be a greater loss in propagation, but it will be a better tree, and the man that is willing to pay for that tree will get his money's worth, and the man who thinks he can get off by buying lower priced trees, will make a mistake. You cannot get too good a tree for the foundation of a peach orchard. I used to be in the nursery business, and I am onto their curves. I am an orchardist now. A lot of us are careless in handling our trees. I have shipped out in years gone by a thousand good trees, five hundred to John Smith, five hundred to Jones, all grown in the same plot, and in a few months time I have a glorious letter from John Smith, praising me for the quality of the tree, vigor of growth, and so forth, and a fault-finding letter from the other fellow; he never was so stuck in his life, yet he filled the holes full of good rich manure when he planted them, but they had failed. Get the best trees you can get; pay what it costs to grow them and a profit on top, but don't expect the nurseryman to replace them, because you have been careless and they don't live. If he can prove they were properly packed and handled, it is up to you to make them grow if you can. The culture of peach trees, the thorough culture, the frequent culture of all the land in the orchard, is more important to the peach than any trees that grow. There is no tree that responds so quickly to a thorough cultivation or feeding, or none that goes back so quickly for lack of it, as the peach; therefore, the early months of the season are the months to cultivate the peach orchard. And the growth of any other crops, everything after the second season, is dangerous. I know there are men who are good gardeners; who are able to grow clover liberally and plow under, and by intensive cultivation can grow garden crops for a series of years, but as a general peach orchard cultivation, give the harrow, cultivator and plow and horse and mule an opportunity to keep the ground stirred, and you will make the best orchard without any question whatever. The question of feeding the orchards well, we have had various notions about. At one time we thought nothing but bone and potash would make a solid, substantial tree, and high grade fruit, and no stable manure whatsoever. We have learned in later years that some varieties need a liberal amount of nitrogenous food. Take, for instance, the Waddell, Hills Chili and Crosby, inclined to overbear, at all times hardy in bud, setting an enormous amount of fruit, thin them as much as you may, and the chance is, they won't be thin enough. Those trees are rather weak in tree growth, and a liberal amount of nitrogen or stable manure will benefit them, but a vigorous growing variety, the Belle of Georgia,

the Carmen and Champion, would be ruined under the same conditions, on the same soil, by a liberal use of stable manure, but as a broad, general proposition, heavy applications of potash and phosphate fertilizer in one form or the other, give the best results. For many years, I depended on fine ground bone as a source of phosphorous. The last few years we are getting some wonderful results from the use of basic slag, but I am not prepared to tell you today to use basic slag on your orchard. I am not sure but what it is the lime in the slag from which we are getting better development of buds, better foliage through the growing season, where we have used basic slag frequently, than where we have used any other form of phosphorus, and I am satisfied phosphorus, potash and a moderate amount of nitrogen are essential elements of building up good, strong tree growth.

Again, the pruning is an important matter. Very close pruning at time of planting; in fact, down to a single stalk, a well headed tree with three or more branches to it, no forks, growing it to its full limit the first year; after one year's growth a cutting of two-thirds or three-fourths, thinning out of crowding branches first, and then shortening in the others, two-thirds or three-fourths the first year, and then away she goes. Next year proper thinning out to make broad, spreading head, a much less shortening process, one-third to one-half. The third summer, if you have got the healthy tree you should have, and feed and culture you should have, you will get an enormous growth, and if you will go in there in your latitude, which is similar to ours in Connecticut, about the middle of July or towards the first of August, just as vigorous growth has about ceased, but before growth has ceased entirely, and cut out all your crowding branches, shorten in the stronger branches—this is done just before the fruit buds begin to form,—you will cause the formation of an enormous amount of fruit buds on those trees. That summer pruning is a shocking process, but it is a splendid process to bring a peach orchard into bearing when it is able to bear. Some of my scientific friends tell me that summer pruning is all wrong, but we take the risk of winning out on it, and I have always won out, since I began to practice the summer pruning of peaches. I don't know whether I want you to go and say, Hale tells you to prune the third summer, but I have done it and made it very profitable.

The question of varieties perhaps you will touch by asking some questions. The growing of fruit, as touched upon by the professor this morning, applies perhaps better to the peach than anything else. We all have some things we pat ourselves on the back for, and I am weak like the rest of you. I have done some things in the way of marketing, I think I have done better than anybody else, so far as I know, and I am not telling this because I am any more honest than any of the rest of you, but when my first orchards came up to bearing, with borrowed money I went to New Jersey and Delaware and Maryland as the peach centres and the commercial centres, and studied their methods of picking, packing and marketing of peaches. I went home with the lesson, and I don't wonder that their peaches didn't pay some of them; they sold

too low in price. Whatever attempt at grading there was, was simply to bring a few of the largest and best to the top always, and generally one grade of fruit as it came from the orchard, except a few of the inferior ones thrown out, and if there were any big ones, those were on the top. I went home convinced—I was hard up then; there was a big mortgage on the place at that time, more than the thing was worth—but desperate to get money, mean skinning Yankee as I was, desperate to get money; it seemed to me the only way to get money was to take those peaches and carefully grade them into size, and then I thought if they were to be graded, how wicked and crooked men are, and the only way to get it done was to hire some girls. Women are more honest than men. So we hired some of the best girls we could get in the neighborhood to grade those peaches into proper sizes, so that every package should be honestly graded from top to bottom, and put up rounding full. Then to print a label and put it on the basket. So far as I know, I was the first man in America to properly, honestly grade peaches all the way through and put a label on them, but here was the result,—I have bought labels which cost me 42 cents a thousand, and as soon as I stuck them on a peach basket, I got 50 cents a piece for them. So if Hale ever made any money in the peach business, he made more of it at the start selling labels rather than peaches.

We have had our troubles in peach growing. The borers are always with us, and probably ever will be, and perhaps the brown rot and the yellows, and the only way to get rid of that is to pull the tree out and burn it, and the borers, to dig them out and smash their heads. Fungus troubles until a few years ago we couldn't control, and the brown rot finally became so serious that Prof. Scott spent years in its study, and in the different seasons when he was studying in our orchards and propagating those cultures in my house in Georgia, it seemed almost a useless task he had undertaken, but year after year he patiently plodded on, and finally discovered how to prepare the self boiled lime and sulphur which we now use so successfully, makes it possible to grow some of the commercial peaches in a large way, in sections of the United States where they were driven out of business by the rot, and since his discovery there has been a wonderful forward march in producing firm, better keeping and better colored fruit. Some late varieties are better in color. That rot is now gone, and in going has taken with it a lot of other troubles and brought us profit. The marketing of fruits, the marketing of peaches—in the olden days they were shipped to a few large central markets, and from there distributed within a reasonable distance to other markets, the smaller towns and villages being almost without peaches. There are towns, I suppose, in Pennsylvania, of three and five and eight thousand inhabitants, that haven't a peach orchard in driving distance of it. But there is a great opening there for the sale of fruit, direct to the consumer, in a small way. There is a wonderful opening all over the country. I live in a farming community, a town of less than 5,000 inhabitants, but they are tobacco farmers, and buy our peaches and we don't have any cost for transportation, and they take the over-ripes, and when we come to figure up at the end of the year, there has been three

or four thousand dollars worth of fruit sold at the packing shed. So in every community there are people who will come and take your fruit away. And no expenses of marketing.

Then as I said in regard to this small hamper business, when we get the parcels post, we are going to be able to send small packages direct to families and get one package into the house today and another tomorrow, and double the consumption by that method. After we get beyond reaching the consumer direct from our small orchard, the next thing is to reach a little further and sell to the retail dealer, so far as we can, and make a reputation for our goods, so his customers will come day after day and call for our particular brand, and while you may never get the extreme high prices as in some big markets, you will never get the extreme low ones, and there will be a high level of profitable prices which you can draw upon from that retail grocer. I have one orchard in Connecticut off to one side, where they are not used to paying high prices; they will stand about so much. So when I am getting 50 per cent. more in a far away market, I give the fruit to them at their price, then when the drop came in the big markets we held the home. We supplied them from it last year. I think we started selling at same old price to the grocers at 75 cents per one-half bushel basket. We are going to make them this year 80 cents a basket, while in the big outside markets we have to take 35 cents to $1. So you can make most money in the home market, the moderate-sized grower, who will take care of the market that is nearest, and always remember your neighbors and friends are the best people to deal with. When you have to go to a distant market, ship by rail a long distance away, besides paying the freight, you must use the commission man and pay well for his services. I have often been tired and hurt in horticultural meetings to hear the wholesale condemnation of the commission men. There are a lot of crooks, not high-class commission men, who go out about the country with pretty stories, soliciting, promising you that they will do so much better for you, and the man who is a little green sends a few to Jones and some to Smith, and so on; a mistake always. Never ship to a commission man until you have investigated him. Make up your mind certain markets you intend to utilize, go there and look up the commission man. You will have no trouble finding honorable men. Mean men show it in their faces. So from a business standpoint, go and get into direct contact with the commission man you want to deal with. Find out what you want to about him; tell him who you are. Say to him, "Mr. Commission Man, come out with me and see the orchard." He is too busy to go or it costs too much. No matter what it costs, tell him you will stick by him if he sticks by you, and if he won't go this 200 or 500 miles, more or less, to your orchard, ask him to please recommend you to some other fellow down the street who has more courage. Ten chances to one, he won't recommend anybody else. He will go himself. Take him to your orchard, let him see how you cultivate your trees; how fine the fruit is; and show him the nice new white packages you have, all regardles of the cost. When you can buy one grade of package for ten cents a piece, or something of cleaner, better and whiter wood for twelve cents,

don't hesitate for the two cents. Show him those packages under cover in the fall. Show him the details of your business, how you grade and pack, etc., and say, "Do you think you can sell those goods if I get them to you in good order?" He goes home feeling he has a personal interest in that orchard, and thus when the fruit comes to market, and some one says that another dealer has some as good, he says, "I don't know, I have seen that orchard, I have seen how that fruit grows and is packed, and I am going to get a quarter more;" and finally he gets the quarter more. Get in close touch with the man you do business with. The meanest man you ever knew, if you get close to him and treat him right, will grow to be a better man all the time, and will also help you to be a better man. And the whole business is a mutual uplift. You cannot do business any other way profitably and for a long time. Don't discourage the buyer who comes out to buy in the orchard. Encourage F. O. B. sales as far as possible. Now, I am speaking of the larger growers; those who ship by the carload or quantity. If you are shipping to market and getting 50 cents a package, and some man wants to buy them at the orchard and offers you 45 cents, encourage him to come there with his money. That will encourage others to come. Encourage the F. O. B. buyer as much as possible. You know where you stand, and when you go to bed at night, you will sleep like a Christian.

Question.—Do you think it better to deal through a commission man direct than through a fruit growers' association?

Mr. Hale.—No, if there are enough of you in the neighborhood and you will get together and pull together, an organization is the thing in every community, an organization that will send its fruit, if possible, to one packing house, and is ready to load solid cars, will attract buyers; it will bring buyers there. Use the association wherever you can, but the trouble with the farmers and fruit growers, our business is so good we can live in spite of the other fellow, other people have to band together or fail, but any old blunderbuss can live on a farm. The Creator of all good has made it so man can live out of the soil. You cannot starve on a farm. You can live out of it, and because we can live out of it, we are too pesky independent, and won't work with our fellow growers as we should. We ought to combine, in the purchase of our farm implements, fertilizers and nursery stock; all combine in one township or one county, if necessary, and buy a carload of trees and have them come in bulk to save the expense of boxing. Buy your fertilizer that way, instead of buying two or three hundred pounds here and five tons from the other man, go buy it by five hundred tons for the community. A few fruit growers in Connecticut the other day placed an order for seven hundred tons. I believe in pulling together if you can.

I have rambled along in this way, and I believe I can be more helpful by answering some direct questions. I do want to say one other thing, however.

In speaking about the dynamiting of land for trees, and a little

merry laugh at our friends, the Duponts—I believe they are doing a great work; I believe they are spending money liberally, directly or indirectly, to benefit their own business, but I believe it is calling our attention to conditions that pertain, that are worth consideration, and I believe where there is any hard underlying soil, in the planting of peach trees especially, if we will use dynamite in planting the trees, the small cost of it will repay itself many times over. I strongly advocate it and believe in it, and if anything I said yesterday might lead you to think otherwise, I wish to correct it.

Question.—Have you had any experience in dynamiting older trees?

Mr. Hale.—Yes, but not enough results yet. Two years ago in Georgia, I went into an eight-year-old orchard, and put in a half-pound charge of dynamite across two or three rows. This was done rather late in the season. That year was extremely dry, and I don't think it gave the chance for any new roots to make and go into the ground. Last year we suffered from extreme drought in an old apple orchard at home, trees some seven years old, I put down a few charges last year, but haven't had any time to see the effect, but I am inclined to think many an old apple orchard can be waked up and helped to new roots by breaking up the hard sub-soils.

Question.—Have you tried any under the tree direct?

Mr. Hale.—Only when I wanted to get it out. I should think that would be dangerous.

Question.—How deep in the ground do you put that dynamite?

Mr. Hale.—Two and a-half to three feet.

Question.—Will you talk about varieties?

Mr. Hale.—Yes, I would like to take every nurseryman's list and cut it in two, and then slit it the other way. They are all offering far too many varieties.

Starting with the early ones, Greensboro; it is hardy in bud; not very hardy tree; rather tender, rather a weak growing tree; it is extremely early, and until we had Scott spraying, it was off color, just brightened on one side, but soak it with lime and sulphur and plenty of arsenate of lead in it, and you will bring it out in color.

Waddell right after that. Waddell is a North China type of peach, extremely hardy in tree, extremely hardy in bud; inclined to overbear. All those same early peaches are clings; no freestones. This Waddell, as I say, is extremely hardy in fruit bud; it will stand four and five, sometimes ten degrees more than the Elberta will. It is inclined to overbear.

Immediately following that is the Carmen, one of the most charming peaches we have, and one of the most fickle and uncertain.

It is a vigorous growing tree. The tree isn't as hardy as the other two, but the buds are extremely hardy and it fruits when a great many others fail.

Following that is the Hiley, which is a seedling of the Belle of Georgia; splendid bright red color, acid taste. Some like it very much. It is beautiful in appearance, and brings the highest price in its season. The Hiley is a good freestone peach, I think commercial for all parts of the country. I am speaking of the broad range of this particular continent. A singular thing in itself, these peaches I am speaking of, while they will do well in an extreme southern latitude, they will also do well at the very northern.

Then come to the Champion, which perhaps next to the old Morris White is the best in quality of any peach grown, where it is perfectly grown.

Following that, you get the Belle of Georgia, most reliable white flesh peach now known, and then you lap into the Elberta, which is quite inferior to eat when you can get anything better, but a money maker and the great big standard market peach of all. Everybody has it; the markets are full; it's the Ben Davis, Kieffer of peaches.

Question.—The best canner of the lot, isn't it?

Mr. Hale.—No, if you want the best, get Crosby or old Hills Chili. They will can and be delicious. While the big Pumpkin Elberta the people will buy it and it can be canned, but it doesn't improve it any to can it. Fruit that isn't good outside the can never grows better by going into glass. The finest eating peach you can get, the most delicate, don't buy anything inferior for canning, the best table peach you can get is the best one to can, can a Belle of Georgia, bring it out and blindfold your guests at your table, and serve a dish of Elberta and a dish of Belle of Georgia at the same time, and note the answer. Champion is all right, only it clings until it is very ripe.

Question.—Isn't it a little bit astringent?

Mr. Hale.—It isn't with us. There is no pucker there except to pucker your mouth and wish you had more. Then your Elberta. We have got Elbertas galore. The markets are full of them, the one great market peach; poor quality; coarse grained; large and beautiful; a money maker always. Now comes the business proposition, what is the next good yellow peach to follow Elberta? The only way to help that is this co-operative plan, or large orchard plan, is to have cold storage. You cannot hurt the pesky things by keeping them in cold storage for two or three weeks. The Elberta in cold storage won't seriously harm it. If you can put the peaches in cold storage as fast as harvested, you can carry Elbertas two or three weeks or a month and so make it the best peach to follow itself and keep running them out in the market. That is the best way to get a peach to follow the Elberta.

Question.—Isn't the Niagara good?

Mr. Hale.—The Niagara belongs to the Persian type, none of which are very reliable. Then following that (I am talking about money makers now) Fox seedling is perhaps next. Then the Iron Mountain. Those are the other late money makers. You all have others in mind.

Question.—What about the Stephens?

Mr. Hale.—Stephens is a delicious peach, but it is pretty tender in bud. I have some twenty acres of Stephens, and when we get a crop, we get big money for them, but they are not sure bearers, and I was trying to keep you on the good safe side of reliable fruiting varieties.

Question.—What do you think about the Salway?

Mr. Hale.—I suppose it succeeds well here in the Ohio Valley and in New Jersey, the Salway belongs to the Persian strain and is very uncertain in most sections of the country.

Question.—How about the Ray?

Mr. Hale.—I don't know enough about it to speak intelligently. One of my neighbors had quite an orchard of it; came about the season of the Belle of Georgia this year, and was not as large and attractive as the Belle of Georgia.

Question.—What about the Gold Drop?

Mr. Hale.—Pale yellow, hasn't enough style or size.

Question.—Smock?

Mr. Hale.—Is a pretty good commercial late peach.

Question.—Wonderful?

Mr. Hale.—Wonderful is a rather poor type of Smock.

Question.—How about Willett?

Mr. Hale.—Oh, that is a big, elegant peach when you get them, but they are few and far between, shy bearing.

Question.—How about Mathews?

Mr. Hale.—It is a shy bearer. Another poor Smock.

Question.—The Geary?

Mr. Hale.—That is one of the kinds that was abandoned with Mountain Rose and that type of peaches.

Question.—The Fox Seedling and Iron Mountain?

Mr. Hale.—They are both very vigorous growing trees. The Fox Seedling is not as vigorous as Iron Mountain, but a strong, vigorous tree, hardy in bud, fine white peach, with a little tinge on it when it is on inferior soil, but on congenial soil, it is a good rosy red on one side and a peach of excellent quality, sometimes a little mellow, some places not mellow at all. The Iron Mountain is probably a week or ten days later, a week later anyhow, a much more vigorous tree, fruit of large size. With us in Central Connecticut latitude not quite up to 42, elevation of 600 or 800 feet, it ripens about the 5th of October; last week of September in the vicinity of Philadelphia. I suppose in the western part of the State it would be the 5th or 10th of October.

Question.—Where a man has no cold storage and local trade, is there anything better to follow Elberta than Crosby?

Mr. Hale.—Probably not. Crosby is probably the best in quality of any yellow peach that grows, and if you will feed it liberally and then add an excess of nitrogen, and thin it, thin it tremendously, and then thin it again, and then do it again, you will get some size to it. I have seen perhaps as inferior a crop of Crosbys as I ever saw in my life of peaches. And again the largest peaches I ever saw were Crosbys. One night in an orchard of mine, they came in with great peaches, 18 and 19 ounces, and said they came from Crosby trees. With the exception of the peach that bears my name the biggest peaches I ever saw in my life were Crosbys, and yet it is generally a small peach. It is a money-making peach, because hardy in bud and delicious in quality, but before we had the summer spray it needed shearing. The summer spray has taken the wool off some of those peaches. Scott is to blame for that too.

Question.—Isn't it pretty tender for market?

Mr. Hale.—When it gets fully ripe, it is quite tender, rather thin skinned.

Question.—Why do you not recommend Hill's Chili?

Mr. Hale.—It is so blooming homely. You catch the pocketbook with the eye. It is an inferior looking thing and this peach has to be planted only in locations where its hardness makes it possible to produce fruit where others would fail. You can plant it in the low spots, where you cannot go with anything else. It is one of the extremely hardy peaches, yet not to be recommended to any extent.

Question.—Do you plant large blocks of the same variety?

Mr. Hale.—Why, reasonably large blocks. I think upon the whole, that all fruits do better where they are more or less intermingled one with the other and get the benefits of cross pollenization.

Question.—What is wrong with Reeve's Favorite?

Mr. Hale.—You don't get them. Beautiful peach when you get it. The dealer will say, why don't you plant a whole orchard; this looks good to me, but bless you, you can send him in a hundred baskets of Elberta where you can get ten of Reeve's Favorite, the country over. I am speaking now in a broad, general way. I am not tying you down to any locality, but I am speaking in a broad general way of the varieties that are safe to tie to over a wide range of country.

Question.—How about Crawford's Late?

Mr. Hale.—You don't get the peaches.

Question.—Is there any way to get rid of the borer, but to dig them out?

Mr. Hale.—No, when you dig him out and smash him, you have control of him.

Prof. Stewart spoke on "Varieties and Care of Peaches in Pennsylvania."

PEACHES FOR PENNSYLVANIA.

By John P. Stewart, Ph.D., *Experimental Pomologist, State College, Pa.*

In commercial importance the peach is next to the apple at the present time in this State. Its relative quickness of returns makes it an especially desirable fruit crop. The industry is now best developed in the southern part of the State, where exist especially the conditions of climate, elevation and soil that makes this fruit unusually regular and profitable in bearing. As a result, in certain sections it has shown some remarkable values, $2,000 per acre in gross returns having been obtained from considerable acreages within ten years from planting. Some attention to peach production is also given in the more northern sections of the State, though the crop there is, of course, less certain and only the hardier varities are likely to succeed.

Soil, Purchase of Trees, Planting and Other Care.

The soil for peaches in general should be somewhat lighter (sandier) than that for apples, though with proper moisture conditions, air-drainage and care, satisfactory results may be obtained with certain varieties even on the heavier soils. The soil should be

thoroughly prepared before planting, at least as well as for corn.

In the purchase of trees, it is well to guard especially against yellows, since it is apparently often transmitted in nursery stock. This is probably best done by dealing only with nurserymen who are thoroughly acquainted with the disease and who take proper care to exclude it. This precaution is necessary, since the presence of the disease on the young trees can often not be detected until one or two years after planting. The trees on receipt should also be carefully examined for borers. One-year-old trees, of about five-eighths-inch "caliper," are best to buy,—better than "June buds,"—and the height is of relatively little importance.

The other precautions in the purchase and handling of stock on receipt are essentially as described for apples, pages 6 and 7 of my Bulletin 106, though the root-pruning may be more severe with peaches.

Peaches are planted 16 to 20 feet apart. Deep dead furrows and a wire marked with the desired distances and long enough to reach throughout the row are most convenient and satisfactory. Three men, one to drop the trees and the others to plant, will thus set from 50 to 75 trees per hour in good soil. The soil should be well firmed about the roots, and the trees set slightly deeper than they grew in the nursery. If soil "cups" develop about the trees, they should not be permitted to remain, as they are conducive to winter injury, especially on exposed western slopes. Peach trees should be headed at about 18 to 24 inches, and from three to five limbs may be used in forming the framework for the tops. In later pruning, the main objects are to keep the annual growth well headed back, thus avoiding undue increase in height, and to keep the tops fairly open in order to secure light and ventilation for the fruit.

Culture, Thinning and Picking.

As to cultural methods, peaches are generally considered to require more thorough and continuous tillage than apples. The tillage and cropping methods described for the latter in Bulletin 106, however, if thoroughly carried out, will generally prove satisfactory.

The proper use of fertilizers on peaches is a matter of some debate. Judging from analyses, peaches are more exhaustive on the land than any other fruit crop. But in spite of this, the value of fertilization is questioned by some growers, especially if they are making good use of cover crops. It is an interesting fact, however, that in Niagara county, N. Y., on nearly 3,000 acres of peaches it was found that over 87 per cent. of the acreage was receiving fertilizer of some kind.[1] Also the average return for five years from those orchards receiving manure was $26 per acre higher than that from the unfertilized orchards, and the return from those receiving both manure and commercial fertilizer was $46 per acre higher than

[1]Data from an orchard survey of Niagara County, made by Cornell University. Data furnished by M. B. Cummings, now of University of Vermont, Nov. 1908.

from the unfertilized. This would indicate that a judicious use of fertilization should prove profitable in many cases. Care should be taken, however, not to stimulate growth unduly and especially not to prolong the seasonal growth so much as to prevent the entrance upon winter with well-seasoned wood.

Thinning is essential whenever the trees are unduly loaded. It is regularly practiced by all commercial growers. It enables the fruit to attain proper size, aids in the control of rot and avoids unnecessary exhaustion of the tree. Over-production and starvation are among the leading causes of failure and early decline in the average peach orchard. The thinning is done usually in the latter part of June, after the "June drop," leaving no peaches less than 4 to 6 inches apart, and removing especially those that are defective.

The proper time for picking depends largely upon the time required in reaching market. It also naturally depends much upon the carrying qualities of the variety and the cooling and shipping facilities available. The best color, quality and size are undoubtedly attained by permitting the fruit to ripen on the tree. When considerable time must elapse before reaching market, however, this is impracticable. In such cases, the fruit should be picked enough in advance to enable it to ripen in transit and approximately reach its prime when it arrives at the market. The softening of occasional specimens will aid in determining the right time for picking, but more detailed directions can hardly be given.

Important Difficulties.

Important obstacles to success with peaches are yellows, brown rot, and borers.[1] Regular mounding and cutting-out is probably the surest method of control for the latter and is most generally practiced, though a safe and efficient covering would be most welcome and may be found in the sediment or sludge formed in making lime-sulphur. It should be renewed whenever any important breaks occur in the coating, however.

The mound or cover should be in place during the egg-laying period, which extends from about the middle of June to the middle of September in this State. The "mound" is formed by dragging up the earth all around the base of the tree to a height of 8 or 10 inches. Any protective covering should extend from about two or three inches below the general surface of the ground to a height of 15 or 20 inches. It is also well to remember that most of those that have been recommended are decidedly worthless.

In hunting the borers, which may be done either before or after the egg-laying period, it is well to have cheap labor go ahead and remove the soil, with hoes or other appropriate tools, and reliable men to follow and remove the "worms" after the bark has dried and their discolorations become more evident.

[1]The San Jose scale is, of course, also an important enemy of the peach, but it is more easily controlled than on the apple, and in the same manner.

Yellows.

Peach yellows is an apparently contagious disease of unknown cause, for true cases of which there is now no remedy. It is important that one be able to recognize its symptoms, however, in order to remove the affected trees at the earliest opportunity and thus prevent its spread to those adjacent, with the resulting rapid destruction of the orchard. The most prominent marks of the disease are *premature ripening of red-spotted fruit,*[1] *and tufts of vertical, willowy shoots,* which appear on the branches or main limbs. Earlier and less evident symptoms are as follows: In a well-cultivated orchard, part of an apparently healthy tree stops growing, the leaves at the bases of its twigs *droop,* roll at the edges,[2] and turn yellow or reddish-green. Also leaf buds and blossoms may be prematured, —the acceleration amounting in some cases to a few days only, while in others it may even cause them to start in the fall.

The disease is reported as likely to appear first in wet and poorly-drained areas; and most of the symptoms are apparently likely to be aggravated by winter-injury or other checks, especially checks to the transfer of food or starch. The recognition and treatment of the disease would be relatively easy if it were not for the fact that the same influences which aggravate the symptoms of yellows seem able to produce a good imitation of the disease.

These imitations are usually curable by good orchard practice, especially by heavy pruning and judicious nitrogen application. But the true cases are apparently only covered up temporarily by such treatment and in the meantime are menacing the general health of the orchard. The best procedure, therefore, is to eliminate so far as possible, the influences that tend to develop the "imitation yellows" by maintaining the best possible orchard practice and then destroying on sight all cases that do appear, on the assumption that they are true cases of yellows.

Brown Rot, Scab, and Curculio Treatment.

The control of brown rot also involves that of the curculio and incidentally secures the control of peach scab or black spot which usually mars or destroys so much unsprayed fruit. A very satisfactory plan for this purpose is the one advised by Scott, of the Bureau of Plant Industry. It is rapidly becoming the regular practice of commercial peach growers. With slight modifications, the plan is as follows:[3]

(1) About the time the calyces (or shucks) are shedding, spray with arsenate of lead at the rate of two pounds to 50 gallons of water. In order to reduce the caustic properties of the poison, add milk of lime made from slaking two pounds of stone lime.

[1]The red spots are in the flesh.

[2]The rolling at the edges under these conditions is said to distinguish the disease from "Little Peach."

[3]For full discussion of the preparation and use of self-boiled lime-sulphur, see Farmers' Bulletin 440, pp. 33-40, obtainable from the Department of Agriculture, Washington, D. C.

(2) About three or four weeks after the calyces drop, spray with 8-8-50 self-boiled lime-sulphur and two pounds of arsenate of lead.

(3) About one month before the fruit ripens, spray with 8-8-50 self-boiled lime-sulphur or with 1.003 lime-sulphur solution, omitting the poison.

The use of the clear solution in the third spray is handier, cheaper and avoids any important staining of the fruit, which may be quite serious with the self-boiled lime-sulphur in the last spray. The self-boiled is the only safe material to use in combination with commercial lead arsenate in the second spray, however. Our present experiments indicate that a strictly neutral ortho-arsenate of lead, $Ph_3 (AsO_4)_2$, is safest with lime-sulphur solutions, but even this combination cannot be recommended unconditionally on peaches as yet.

Varieties.

The following list gives the principal varieties now in cultivation in the State, so far as the writer has been able to learn. It also includes some varieties that, judging by their behavior elsewhere, are of probable value here, and some that are widely known but are rather undesirable, as indicated by the accompanying descriptions. Further selection should, of course, be made on the basis of local experience and market. Six or eight varieties well distributed through the season are usually ample for the commercial orchard. These may well be selected from the following group of varieties, with the aid of our descriptions given later, supplemented by local inquiry: Greensboro, St. John, Waddell, Carman, Hiley, Champion, Belle, Ede, Elberta, Stump, Crosby, Fox, Smock, Iron Mountain, Stevens and Salway. This group gives a succession from early July to October, and the varieties are named approximately in order of ripening.

The relative commercial value of the varieties is indicated by stars. Two stars (**) indicate those considered fully commercial; one star, those considered limited commercial. The others may be valuable commercially in some places when they are better known or they may be useful in home orchards.

The indications are intended especially for the location in which peaches are known to thrive. But even for them, local experience and especially the season of ripening with reference to market conditions may often require some modifications. Thus a variety may do well in a certain locality, but not be profitable because the market, at its season of ripening, is supplied with better fruit of another variety, possibly from another locality. This accounts for the fact that in some localities only those peaches ripening with Elberta or later are reported profitable, while in others many of the earlier sorts are very satisfactory. Study your market and fill in the gaps is a good general rule.

In the list, the hardier varieties,—those apparently adapted to the more rigorous sections,—are marked with a dagger. All varieties **are named approximately in order of ripening,** with the exceptions that the varieties in each of the following groups seem from available data to be of practically the same seasons. St. John and Bishop; Waddell, Lewis and Connet; Mountain Rose, Champion and Oldmixon Free; Niagara and Reeves; Ede, Bokhara and Engle; Crosby and Chairs; Geary, McCollister and Smock; Stevens and Salway. There is also more or less overlapping in season with many of the other adjacent varieties.

Sneed.[1] Early July. White,[2] cling. Tree has broad leaves; usually a heavy bearer and small unless thinned, low quality and not valuable commercially.

Victor. White, semi-cling. Rather resistant to rot.[3] Much better than Sneed in quality; entirely red when ripe.

Triumph.† Yellowish-red, free. One of the extra early peaches, of medium size and quality, probably suitable for home use or local market, but usually not desirable commercially because of great susceptibility to rot.

Greensboro.†* White, semi-cling. Tree very hardy and prolific; probably the earliest peach of any material commercial value. Fruit large, reported resistant to rot,[3] but rather delicate textured for distant shipment and only medium quality. Pick when apex begins to soften.

St. John.* Yellow, free. One of the standards in Ontario and also reported very satisfactory in Delaware. Quality good. Often quite subject to rot, but this can be controlled by proper spraying.

Bishop. White, free. Reported one of the most satisfactory early peaches in the mountain orchards of West Virginia. Fruit large and very good. Worthy of trial in southern Pennsylvania.

Waddell.† White, free. Rather poor grower, but very prolific. Long blooming period and hence said to be less susceptible to frost injury. Medium in size and quality. Ripens too near Carman for best success.

Lewis.† Yellowish-white, free. One of the hardiest peaches and much valued generally for commercial use. Fruit medium to large and very good. Of Michigan origin.

Connet.*† White, semi-cling. Another hardy variety which is reported unusually satisfactory in the mountain orchards of West Virginia. It ripens with Lewis and is said to be fully as productive, finer looking, and much freer from rot. Fruit large and very good. Apparently worthy of extensive trial in this state. A seedling of Chinese cling.

Carman.**† White, semi-cling. Probably best of its season for market. Fruit large and of good quality. Ripens early in August. Tree very hardy and productive, one of the latest in blossoming.

Hiley*† (*Early Belle*). White, free. Regular, but not prolific. Good shipper, uneven ripener. Much grown in Georgia.

[1]For the meaning of stars, daggers, etc., see page 162.

[2]Refers to color of flesh.

[3]"Resistent" is not used in the sense of "immune," but means less susceptible than most others.

Mt. Rose. White, free. High quality, often irregular in size and subject to rot; good for home use and local market, if picked while firm.

Champion*† (*Illinois*). Creamy white, free or often semi-cling. Among the highest in quality, excellent for canning, moderate bearer, medium shipper. Somewhat susceptible to rot, but preventable by proper spraying.

Oldmixon Free.* White, free. One of the old favorites, but apparently losing in favor in some parts of this state. High quality and prolific, but reported as often dropping before attaining full color.

Early Crawford. Yellow, free. A standard peach in many regions, but apparently losing favor in this state on account of shy bearing.

Niagara.* Yellow, free. Supposed to be a seedling or possibly a bud-sport of Early Crawford[1] and reported a heavier bearer. Fruit equal to it in quality and of larger size. Considered promising, though not sufficiently tried to warrant unqualified recommendation.

Reeves (*Favorite*). Yellow, free. Excellent quality, and one of the old favorites, but often shy bearer; especially so on heavy soils.

Thurber.* White, free. Prolific, good shipper; valuable where a white peach is acceptable.

Belle†** (*of Georgia*). White, free. Early and heavy bearer; reported best of its season. Hardy in bud and very high quality. Ripens in late August or early September and must be watched as picking time approaches, as it ripens quickly.

Engle (*Mammoth*). Yellow, free. One of the best commercial peaches in Michigan, being reported preferable to Elberta for profit. Not sufficiently tried for recommendation.

Ede†** (*Captain Ede*). Yellow, free. Very productive and uniform in fruit. Early in bearing. Excellent for canning; quality very good.

Bokhara.† Yellow, free. Said to be the hardiest desirable peach in Iowa. Quality fair. Value in Pennsylvania unknown, though apparently worthy of limited trial in the more rigorous sections.

Elberta.** Yellow, free. The standard commercial peach and the variety most widely planted throughout the country, though distinctly less valuable than some others in certain localities of this state. Fruit very large and excellent carrier, but quality is only medium. Quality, as well as appearance, is much improved by proper maturing on the tree.

Chairs* (*Choice*). Yellow, free. Another strong grower and often tardy in bearing, but very satisfactory with increasing age in certain orchards of southern Pennsylvania. Fruit large and good, tapering to apex.

Crosby.† Yellow, free or occasionally semi-cling. One of the hardiest in bud, and of high quality. Fruit tends to run a trifle

[1]See Cornell Bulletin **262 : 282** for account of the origin of this peach.

small for market, unless heavily thinned. Very heavy and regular bearer.

Late Crawford.** Yellow, free. An old favorite, grown across the continent. Reported among the most profitable varieties in certain orchards of the state, while considered rather shy in others. The successes are in dry, airy locations, with rather light soil and thorough cultivation and other care. Said to be less satisfactory than Early Crawford in New Jersey.

Ray. White, free. A relatively new peach of Mississippi origin, that is doing very well in Eastern Pennsylvania, especially with H. S. Snavely near Lebanon. Tree stocky, good grower and very productive. Fruit larger than Belle and about equal to Oldmixon. Flesh white to the pit, good quality, though not quite as good as Oldmixon. Apt to ripen up quickly like Belle.

Stump.* White, free. Very widely planted, and reported fine in some places in the state, while in others it seems to be less successful.

Fox* (*Seedling*). White, free. Apparently one of the most desirable for its season. Growth vigorous and somewhat tardy in bearing. Fruit of medium size and quality.

Mathews (*Beauty*). Yellow, free. A strong grower, rather tardy in bearing. Fruit very large and good seller, but reported shy and generally unprofitable in the mountain orchards of West Virginia. Has done well with Dr. Funk in eastern Pennsylvania. Said to be difficult to get true to name and is reported by some to ripen after Smock.

Geary* (*Hold on*). Yellow, free. Among the most profitable in the orchards of D. M. Wertz, Franklin county. The soil there is light,[1] well elevated and has a good moisture supply. Fruit is firm and of good quality. Closely resembles Smock in tree and fruit.

McCollister.* Yellow, free. Another of the leaders in Wertz's orchard; closely resembles the next variety in character of fruit and season.

Smock.** Yellow, free. This variety and Salway have done best in the orchards named above, and both are very highly recommended by other growers in our leading peach sections. They apparently do best in the conditions described for Geary.

Iron Mountain.† White, semi-cling. Considered desirable in some of the more rigorous sections, on account of hardiness. Quality medium.

Stevens* (*Rareripe*). Creamy white, free. Tree vigorous and upright grower, and rather tardy but good bearer. Fruit large, good quality, and profitable because of lateness.

Salway.** Yellow, free. One of the very best under proper conditions, but not good on low or heavy soil. See discussion under Smock. A very sure cropper and excellent market peach. Season about same as Stevens, early to mid-October.

At the conclusion of Prof. Stewart's address, the Resolution Committee presented its report.

Your Committee on Resolutions begs to report as follows:

[1]Classified by Bureau of Soils as Mont Alto fine sandy loam.

REPORT OF RESOLUTION COMMITTEE.

ROBERT J. WALTON, *Hummelstown, Chairman.*

WHEREAS, We, the members of the State Horticultural Association assembled, believing that this has been one of the best meetings in the history of the organization, desire to express our appreciation to all who have in any way contributed to its success; therefore be it

Resolved, That we do hereby tender special thanks to our Secretary, C. J. Tyson, to the Committee of Arrangements and to W. J. Wright, the Chairman, and members of the Exhibit Committee for their untiring efforts; to the visiting speakers from a distance, who have rendered so much valuable service in the line of instruction, and especially to C. E. Bassett, J. H. Hale, Horace Roberts and Fred Johnson.

WHEREAS, Believing that a parcels post would serve a large public interest through the development of its possibilities along the line of bringing the producers and consumers into closer and more profitable relations, this Association declares itself as favoring the speedy enactment of such a law; therefore be it

Resolved, That the Association urge its members to continue in their efforts to secure its enactment.

Resolved, That we heartily endorse the Good Roads movement, and do all in our power toward improving road conditions in Pennsylvania.

WHEREAS, We appreciate the work done by the Pennsylvania State College, and recognizing the unusual ability of our Dean, Dr. Thomas F. Hunt, and being convinced that proper development of the work calls for a more liberal appropriation by the Legislature.

Resolved, That we begin right now to persuade our friends who will be members of the next Legislature, that farmers of Pennsylvania need liberal support for their State College, and that we authorize our officers to convey this resolution to the absent members.

WHEREAS, The Department of Zoology, under the management of Prof. H. A. Surface, has rendered so much valuable assistance to the fruit industry of Pennsylvania; therefore be it

Resolved, That we thank Prof. Surface and his assistants for their untiring work.

Resolved, That the Pennsylvania Horticultural Association approve the bill now pending before Congress, to appropriate the sum of $80,000 for the further study and investigation of the chestnut tree blight by the National Department of Agriculture, and it should receive the support of every senator and congressman in the National Legislature, believing, as we do, that the subject matter is of such importance that no person knowing the situation should refrain from according this measure the fullest support.

WHEREAS, We have lost, by death, our worthy President, Gabriel Hiester, a man who was an ardent admirer and champion of the horticultural interests of Pennsylvania, and who was always very liberal with his advice and experience to his brother horticulturists.

WHEREAS, He was a member of this Association for many

years, a Life Member for the past fifteen years, and served as President since 1906.

WHEREAS, He served the horticultural interests of the State as a member of the Board of Trustees of State College, and was a most efficient servant in all of these several ways; therefore be it

Resolved, That this Association expresses its deep sense of loss and extends to the bereaved family its sympathies.

WHEREAS, Death has removed from among us William H. Moon, of Morrisville, Bucks county, one of our former presidents and working members; therefore be it

Resolved, That this Association express its sense of loss and extend to the bereaved family its sympathy.

Moved and carried that the report of the Resolution Committee be accepted.

Chairman Blaine.—We have with us Mr. Taylor, Secretary of the New Jersey Society, in the capacity of official delegate, and we shall be very glad to hear from him.

Mr. Taylor.—*Mr. President and Members of the Pennsylvania Association:*—I don't know that I have very much to say to you this afternoon, except to bring to you the good wishes and friendship of your neighboring society, and tell you how much I have enjoyed being with you, and what a privilege I feel it to be, to be a representative of our society.

I think you ought to be congratulated on your exhibit and the general interest of your program. I fear that you have members in Pennsylvania like we have in New Jersey, that are just a little slow in appreciating the benefits of these societies. Last winter I was at a gathering of our public school committee. We draw together once a year, to hear a few words of advice, telling what we ought to do and ought to leave undone. They generally give us some pretty good speakers. Last year, I think, we had a man from Brother Bassett's state. One of the things he said was, "Failure is lack of knowledge; success is knowing how," and I think in coming together as we do and meeting with these men that do know how, perhaps some of us little fellows can learn how too. And I think it is of very great benefit to us all. Then I can't help but feel that we have just a right to be a little bit proud of our calling. I like to hear a man, whatever business he is in, or a woman, whatever they are interested in, stand up for that business.

And there is one other thing that man gave us that day that applies especially to our calling, I think, and that was to choose no profession in which you cannot better the community. I think that is one thing about our work. What we do is for the benefit of the community, and whatever way you are to take it, it is for the benefit of the community, and it is always a pleasure to me to meet with fruit growers. They are always men who are willing to extend you a hearty greeting and to welcome you to their meetings, and I hope more of you will find your way across the river. We have conditions somewhat different from yours, but still we are all working

for the same end, better fruit rather than more fruit. I thank you for your kindness.

It was moved by Mr. Walton, seconded and carried, that the Society adjourn.

THE FRUIT SHOW.

The annual fruit show of this Association was held jointly with the exhibitions of the State Dairy Union and the State Live Stock Breeders' Association, in Duquesne Garden, Pittsburgh, during the whole week of January 15-20, 1912.

In quantity it was many times larger than any previous show of the Association and as a whole the quality was probably better than ever before. The judges feel that there is still some need to remind a few members that one of the chief purposes of a fruit show is to teach the growing of fine fruit and that none but perfect specimens should be shown.

Nearly a thousand boxes, over two hundred barrels and about two thousand plates were shown. Space will not permit of a full list of exhibitors. The photograph shows one end of the arena. About one-half of the fruit exhibit is in sight.

The fruit show arrangements entailing an immense amount of work were in the hands of Prof. W. J. Wright, of State College. To his work and to that of his active assistants, the success of the fruit show is largely due.

Three competent judges from outside the State were secured and we have heard nothing but satisfaction with their decisions. The judges were Mr. C. W. Waid, of New Carlisle, O., former Professor of Horticulture in Ohio Agricultural College, and now a large commercial grower; Prof. W. H. Alderman, Professor of Horticulture at West Virginia State College, and Mr. D. Gold Miller, a well known commercial grower of Berkeley county, W. Va. Following are the awards:

Premium Awards.

CLASS I.—*Single Barrel—Any Variety.*

(1) (Ben Davis) A. C. Richards & Son, Schellsburg, Pa.; (2) (Stayman) Tyson Brothers, Flora Dale, Pa.

CLASS II.—*Three Barrels—Three Varieties.*

(1) (York, Stayman, Grimes) Tyson Brothers, Flora Dale, Pa.; (2) (Jonathan, Grimes, Baldwin) R. M. Eldon, Aspers, Pa.

CLASS III.—*Five Barrels—One Variety.*

(1) (York) H. M. Keller, Gettysburg, R. 5, Pa.; (2) (Smokehouse) Daniel Rice, New Bloomfield, Pa.

CLASS IV.—*Twenty-five Boxes—One Variety.*

(1) (Stayman) Tyson Brothers; (2) (Smokehouse) Daniel Rice, New Bloomfield, Pa.

CLASS V.—*Single Box—Following List:*

Baldwin.—(1) A. C. Richards & Son, Schellsburg, Pa.; (2) S. R. Huey, Newcastle, Pa.

Ben Davis.—(1) A. C. Richards & Son; (2) William Stewart, Landisburg, Pa.

Gano.—(1) A. C. Richards & Son.

Grimes Golden.—(1) Tyson Brothers; (2) S. R. Huey, Newcastle, Pa.

Hubbardston.—(1) A. A. Hyde, Manns Choice, Pa.

Jonathan.—(1) A. A. Hyde, Manns Choice, Pa.; (2) A. C. Richards & Son.

Northern Spy.—(1) A. C. Richards & Son.

Rambo.—(1) Daniel Rice, New Bloomfield, Pa.

Smokehouse.—(1) Daniel Rice.

Stayman.—(1) Tyson Brothers; (2) E. P. Garrettson, Biglerville, Pa.

Summer Rambo.—(1) William Stewart; (2) Tyson Brothers.

T. King.—(1) A. C. Richards & Son; (2) Daniel Rice.

Wagener.—(2) S. R. Huey, Newcastle, Pa.

Winter Banana.—(1) William Stewart, Landisburg, Pa.

York Imperial.—(1) Tyson Brothers; (2) A. C. Richards & Son.

York Stripe.—(1) Daniel Rice; (2) B. F. Wilson, Aspers, Pa.

CLASS VI.—*One Box—Any Variety Not in Class V.*

(1) (American Blush) Wm. Stewart; (2) (Wolf River) Wm. Stewart.

CLASS VII.—*Five Boxes—List of Varieties.*

(1) (Grimes) Tyson Brothers; (2) (Stayman) Tyson Brothers.

CLASS VIII.—*Five Boxes—List of Varieties.*

(1) (York Imperial) Tyson Brothers; (2) (Ben Davis) A. C. Richards & Son.

CLASS IX.—*Pratt Cup Special—Three Boxes.*

(1) (York, Stayman, Grimes) Tyson Brothers.

CLASS X.—*Single Plate—Following List:*

Arkansas.—(1) D. M. Wertz, Waynesboro, Pa.; (2) McClelland Brothers, Canonsburg, Pa.

Baldwin.—(1) R. M. Eldon, Aspers, Pa.; (2) McClelland Brothers, Canonsburg, Pa.

Ben Davis.—(1) R. M. Eldon; (2) A. C. Richards & Son.

Gano.—(1) Miss F. K. Morgan, Orrtanna, Pa.; (2) A. C. Richards & Son.

Grimes Golden.—(1) Tyson Brothers; (2) R. M. Eldon.

Hubbardston.—(1) McClelland Brothers; (2) R. M. Eldon.

Jonathan.—(1) R. M. Eldon; (2) Miss F. K. Morgan, Orrtanna, Pa.

Northern Spy.—(1) Geo. F. Taylor, Edinboro, Pa.; (2) A. C. Richards & Son.

Rambo.—(1) Tyson Brothers; (2) R. P. Heilman, Emporium, Pa.

R. I. Greening.—(1) A. C. Richards & Son; (2) L. Winship, Moscow, Pa.

Smokehouse.—(1) Daniel Rice, New Bloomfield, Pa.; (2) Tyson Brothers.

Stayman.—(1) Tyson Brothers; (2) R. M. Eldon.

Summer Rambo.—(1) A. C. Richards & Son; (2) R. M. Eldon.

Tompkins King.—(1) A. C. Richards & Son; (2) L. Winship.

Twenty Ounce.—(1) A. C. Richards & Son.

Wagener.—(1) McClelland Brothers; (2) Tyson Brothers.
Wealthy.—(2) Miss Katharine Large, Orrtanna, Pa.
Yellow Bellflower.—(2) A. C. Richards & Son.
York Imperial.—(1) E. F. Strausbaugh, Orrtanna, Pa.; (2) Tyson Brothers.
York Stripe.—(1) W. S. Adams, Aspers, Pa.; (2) Daniel Rice.

CLASS XI.—*Five Plates—List of Varieties:*

(1) (Stayman) Tyson Brothers; (2) (Grimes) Tyson Brothers.

CLASS XII.—*Five Plates—List of Varieties:*

(1) (Ben) A. C. Richards & Son; (2) (York) Tyson Brothers.

CLASS XIII.—*Five Plates—Any Variety.*

(1) (Wolf River) A. C. Richards & Son; (2) (Pound) Chas. M. Aurand, Lewistown, Pa.

CLASS XIV.—*Collection of Pears.*

(1) Wm. Stewart, Landisburg, Pa.

CLASS XV.—*Single Plate of Pears.*

(1) (Clairgeau) Miss Katharine Large, Orrtanna, Pa.; (2) (Duchess) H. A. Surface, Harrisburg, Pa.

CLASS XVI.—*Largest Apple.*

(1) Wm. Stewart; (2) A. C. Richards.

CLASS XVII.—*Largest and Best Individual Exhibit.*

(1) Tyson Brothers; (2) William Stewart.

CLASS XVIII.—*Nuts.*

English Walnuts.—(1) L. C. Hall, Avonia, Pa.; (2) Chas. M. Aurand, Lewistown, Pa.
Black Walnut.—(1) William Stewart; (2) E. F. Kauffman, York, Pa.
Native Chestnuts.—(1) Miss Annie E. Stain, Allentown, Pa.

CLASS XIX.—*County Exhibit.*

(1) Adams County; (2) Wyoming County.

TREASURER'S REPORT FOR 1911.

The following report was duly presented to the Executive Board, audited by the Business Committee, accepted and ordered printed in the Annual Report.

Receipts.

Cash balance, first month, 25th, 1911,	$564 62	
Annual dues for 1911, collected at Harrisburg,	69 00	
From Chester J. Tyson for cold storage,	6 86	
From Chester J. Tyson, gift from A. D. Strode,	5 00	
From Chester J. Tyson, sales of apples,	13 00	
From Chester J. Tyson, annual dues, 1911	214 00	
Wm. Stewart for storage charges,	5 25	
Contributions for premiums,	114 50	
Chester J. Tyson, annual dues,	105 00	
State appropriation,	1,000 00	
Apples sold Kreidler,	7 50	
Sold Spramator Premium,	3 50	
Donated by B. E. Ogden,	8 85	
Chester J. Tyson, annual dues,	235 00	
Interest on deposit in bank,	2 80	
Interest on deposit in bank,	6 31	
Total receipts,		$2,361 19

Expenditures.

To Gabriel Hiester,	$5 50	
To John D. Herr,	41 00	
To The Times and News Publishing Co.,	26 38	
To Publishing House of the United Evangelical Church,	50 25	
To Whitehead & Hoag Co.,	13 00	
To Steelton Store Co.,	18 21	
To G. B. Brackett,	7 52	
To C. W. Waid,	36 69	
To J. W. Kerr,	18 27	
To Chester J. Tyson, expenses for annual meeting,	101 17	
To Chester J. Tyson, salary of secretary,	50 00	
To Chester J. Tyson, expenses of fruit show,	38 96	
To Edwin W. Thomas,	11 10	
To Chester J. Tyson, sundry exhibit expenses,	39 13	
To Chester J. Tyson, sundry expenses,	18 30	
To John W. Roberts,	12 20	
To premium awards,	17 00	
To J. Horace McFarland Co.,	21 00	
To Publishing House of the United Evangelical Church,	16 50	
To W. W. Farnsworth,	35 70	
To Wayne Title & Trust Co., treasurer's bond,	5 00	
To saving funds account of Life Members,	70 00	
To Gabriel Hiester,	2 75	
To Publishing House United Evangelical Church,	18 90	
To Chester J. Tyson, postage and sundries,	57 16	
To The Times and News Publishing Co.,	12 55	
To Gatchel & Manning,	55 00	
To Publishing House United Evangelical Church,	13 35	
To The Times and News Publishing Co.,	30 25	
To Chester J. Tyson, postage and sundries,	71 24	
To E. W. Catchpole,	21 41	
To Wm. T. Creasy,	4 00	
To A. C. Richards,	11 42	
To Geo. W. Blaine,	22 70	
To A. B. Kilmer,	7 14	
To Wm. Stewart,	2 06	
To Robert M. Eldon,	2 55	
To Abram Hostetler,	7 43	
To Keystone State Fair Association,	500 00	
To Publishing House of the United Evangelical Church,	241 98	
To Publishing House of the United Evangelical Church,	62 16	
To Keystone State Fair Association,	250 00	
To The Times and News Publishing Co.,	26 00	
To Chester J. Tyson, postage, etc.,	57 29	
To balance, cash on hand,	230 97	
Total expenditures,		$2,361 19

Pittsburgh, Pa., January 19, 1912.

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

ROBT. M. ELDON.
WILLIAM STEWART.

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END OF YEAR