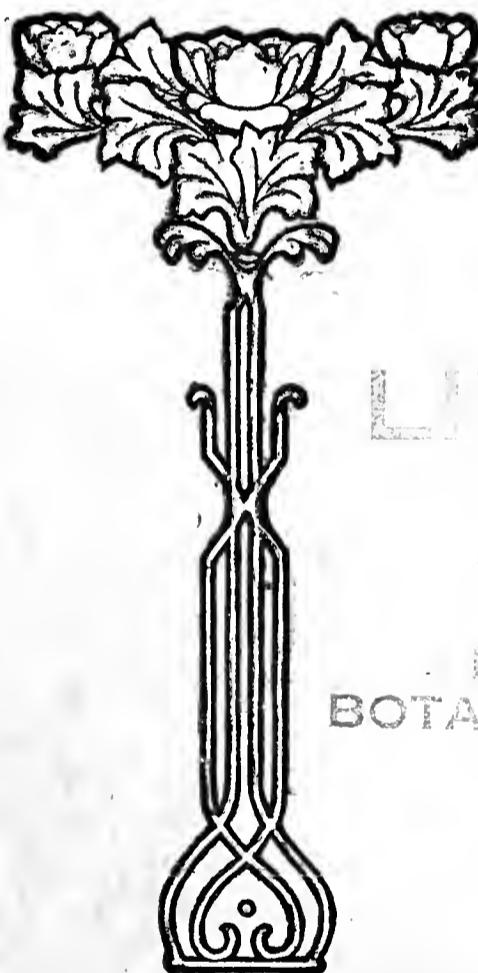


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PROCEEDINGS OF THE FLORIDA STATE HORTICULTURAL SOCIETY *for* 1922



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To the Members of the Florida State Horticultural Society

We are today mailing you your copy of the 1922 Proceedings of the Florida State Horticultural Society. Read it carefully. I believe you will agree with me and many others, that it is worth a great deal more than the dollar it has cost you.

As you will note in the editorial and in the resolutions passed at the Lakeland meeting, the annual membership fee has been increased from one dollar to two dollars, beginning January 1, 1923. This increase has been made necessary on account of the increased cost of printing and of current expenses. This increase is going to make it possible for the Executive Committee to put out a whole lot better publication than it has in the past. More pictures will be used; more articles will be included in the book and better paper can be used. Every cent is spent on the book, excepting a small amount that is used for postage, stenographic help and other expenses, incidental to the annual meeting.

You can save the Society much of this incidental expense by sending in your membership fee for 1923 at once. Fill out the following form and enclose it with your check for \$2.00 to Bayard F. Floyd, Sec., P. O. Box 719, Orlando, Florida.

Name of City and State _____

Date _____

Bayard F. Floyd, Secretary,
Florida State Horticultural Society,
P. O. Box 719, Orlando, Fla.

Dear Sir: I herewith enclose my check for two dollars (\$.200) in payment of my annual dues in the Florida State Horticultural Society for the year 1923. Please inform me what my membership number is.

Signed _____



H. HAROLD HUME, Glen St. Mary
President, Florida State Horticultural Society, 1910 to 1922



W. S. HART, Hawks Park
Treasurer, Florida State Horticultural Society, 1897 to 1922

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PROCEEDINGS
OF THE
THIRTY-FIFTH ANNUAL
MEETING
OF THE
FLORIDA STATE
HORTICULTURAL SOCIETY
HELD AT
LAKELAND, FLA., MAY 2, 3, 4, 5
1922



PUBLISHED QUARTERLY BY THE SOCIETY
OFFICE OF PUBLICATION, DELAND, FLORIDA

THE E.O. PAINTER PRINTING CO. DE LAND, FLA. NO 731

Florida State Horticultural Society

OFFICERS ELECT FOR 1923:

PRESIDENT:

L. B. SKINNER, Tampa.

VICE-PRESIDENTS:

W. J. KROME, Homestead.	S. F. POOLE, Lake Alfred.	A. H. BROWN, Manatee.
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SECRETARY:

BAYARD F. FLOYD, Orlando.

TREASURER:

L. D. NILES, Lucerne Park.

EXECUTIVE COMMITTEE:

FRANK STIRLING, Gainesville; B. L. HAMNER, Tampa;
H. HAROLD HUME, Glen St. Mary; President, Secretary and Treasurer, ex-officio.

Constitution

Article 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of Horticulture.

Article 2. Any person or firm may become an annual member of the Society by subscribing to the Constitution and paying two dollars. Any person or firm may become a perennial member of the Society by subscribing to the Constitution and paying the annual dues for five or more years in advance. Any person may become a life member of the Society by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a patron of the Society by subscribing to the Constitution and paying one hundred dollars.

Article 3. Its officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election their term of office shall begin on the first day of January following their election.

Article 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

Article 5. The duties of the President, Vice-President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

Article 6. The Executive Committee shall have authority to act for the Society between annual meetings.

Article 7. The Constitution may be amended by a vote of two-thirds of the members present.

By-Laws

1. The Society year shall be co-extensive with the calendar year, and the annual dues of members shall be two dollars.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O K'd by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

4. All patron and life membership dues and all donations, unless otherwise specified, shall be invested by the Treasurer in United States bonds. Only the interest on these bonds shall be available for payment of the current expenses of the Society. Perennial membership dues shall be placed on deposit at interest by the Treasurer. Only two dollars and the interest from each perennial membership fee shall be available for use in payment of the current expenses of the Society during any particular year.

List of Members

HONORARY MEMBERS

- Anderson, J. B., San Mateo, Fla.
Fairchild, Dr. David, Washington, D. C.
Gaitskill, S. H., McIntosh, Fla.
Hart, W. S., Hawks Park, Fla.
Hubbard, E. S., Federal Point, Fla.
Lipsey, L. W., Blanton, Fla.
- Rolfs, P. H., Vicoso, E. F. Leopoldina, Minas
Gaeres, Brazil.
Rolfs, Mrs. P. H., Vicoso, E. F. Leopoldina, Minas
Gaeres, Brazil.
Taber, Geo. L., Glen St. Mary, Fla.

PATRON MEMBERS

COMPANIES.

- American Agricultural Chemical Co., Jacksonville, Fla.
American Fruit Growers, Inc., Orlando, Fla.
Armour Fertilizer Works, Jacksonville, Fla.
Buckeye Nurseries, Tampa, Fla.
Chase & Co., Jacksonville, Fla.
Coral Reef Nurseries Co., Homestead, Fla.
Deerfield Groves Co., Wabasso, Fla.
Deering, Chas., Miami, Fla.
Exchange Supply Co., Tampa, Fla.
Exotic Gardens, Miami, Fla.
Florida Citrus Exchange, Tampa, Fla.
Florida East Coast Hotel Co., St. Augustine, Fla.
Florida Grower Publishing Co., Tampa, Fla.
The Fruitlands Co., Lake Alfred, Fla.
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Glen St. Mary Nurseries Co., Glen St. Mary, Fla.
Gulf Fertilizer Co., Tampa, Fla.
Hillsboro Hotel, Tampa, Fla.
Klemm, A. M. & Son, Winter Haven, Fla.
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Mills, The Florist, Jacksonville, Fla.
E. O. Painter Fertilizer Co., Jacksonville, Fla.
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Southern Crate Manufacturers Assn., Jacksonville, Fla.
Thomas Advertising Service, Jacksonville, Fla.
Van Fleet Co., Winter Haven, Fla.
Wilson & Toomer Fertilizer Co., Jacksonville, Fla.

INDIVIDUALS.

- Beach, John B., West Palm Beach, Fla.
Gardner, F. C., Lake Alfred, Fla.
Hart, W. S., Hawks Park, Fla.
Hume, H. Harold, Glen St. Mary, Fla.
Krome, W. J., Homestead, Fla.
- Rolfs, P. H., Vicoso, E. F. Leopoldina, Minas
Gaeres, Brazil.
Skinner, L. B., Dunedin, Fla.
Williams, S. F., Jacksonville, Fla.

PERENNIAL MEMBERS

- No. 1.—Adams, F. H., 1921-25, Sutherland, Fla.
No. 13.—Atkins, R. M., 1923-27, 2345 E. Hill Ave., Cincinnati, O.
No. 10.—Atwater, C. G., 1922-26, 40 Rector St., New York City, N. Y.
No. 4.—Carter, Thos., 1920-24, care of John Morley, Lake Alfred, Fla.
No. 3.—Carter, W. S., 1920-24, 901 Guardian Bldg., Cleveland, O.
No. 9.—Daspit, P. J., 1921-25, Verdale Nurseries, Houma, La.
- No. 8.—Doel, Geo. H., 1921-25, Bor 506, St Cloud, Fla.
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No. 11.—Pierce, Bessie B., 1922-26, Ft. Smith, Ark.
No. 12.—Rahn, Wm. J., 1922-26, care E. W. Berger, Gainesville, Fla.
No. 7.—Watson, Rupert J., 1920-24, "Perricoota," Maoma, N. S. W., Australia.

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 Berger, Mrs. E. W., Gainesville, Fla.
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 Washington, D. C.
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- Klein, John Allen, Box 264, Camden, N. J.
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 McCormick John, 663 Putnam Ave., New York City, N. Y.
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 Hoyt, R. D., Clearwater.
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 Hume, H. N., 2614 Riverside Ave., Jacksonville.
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 Hunt, D. A., Lake Wales.
 Hunt, J. E., R. F. D., Lake Wales.
 Hurlburt, G. B., Orlando.
 Hurlburt, T. H., Orlando.
 Hutchens, O. B., Lake Wales.
 Hutchinson, D. O., Winter Haven.
 Hutchinson, E. L., Winter Haven.
 Hutchinson, W. F., Winter Haven.
 Inks, F. M., Lake Alfred.
 Inman, S. C., Florence Villa.
 Irey, Julian, Route I, Orlando.
 Ittner, George, R. F. D. A, St. Petersburg.
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 Jackson, G. D., Eustis.
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 Jeal, George, Crescent City.
 Jefferies, John H., Lake Alfred.
 Jennings, G. B., Miami.
 Jensen, Carl M., Bounton.
 Jernkin, J. E., N. E. First St., Miami.
 Jernigan, W. P., Monticello.
 Johnson, A. B., Glen St. Mary.
 Johnson, B., Lake Alfred.
 Johnson, Chris., Marco.
 Johnson, O. F., Apopka.
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 Johnston, Jack A., Thonotassassa.
 Jones Bros., Sebring.
 Jones Edward R., Route 1, Miami.
 Jones, John C., Vero.
 Jones, Lyman E., Gardner.
 Jones, M. A., Lake Stearns.
 Jones, O. A., Lake Wales.
 Jones, T. W., Sanford.
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 Kay, A. O., Ft. Pierce.
 Keck, Irving, Bowling Green.
 Keen, Wm. LaBaro, Lakeland.
 Keil, Joseph, Lakeland Highlands.
 Keiser, F. J., Crooked Lake.
 Kelly, E. L., Homestead.
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 Kennedy, Llewellyn, Holly Hill.
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 Keyes, Mrs. W. T., Lucerne Park.
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 Kickliter, G. M., Ft. Green.
 Kilgore, B., Clearwater.
 Kilgore, Mrs. B., Clearwater.
 Kime, C. D., Orlando.
 King, Edwin F., Zellwood.
 King, Geo. J., Okahumpka.
 King, Wm., Avon Park.
 King, W. L., Lakeland.
 Kinsinger, J. A., Lakeland.
 Kirby, J. R., Winter Haven.
 Kirby, T. W., Ormond.
 Kirkpatrick, L. L., Winter Haven.
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 Klemm, Arthur R., Winter Haven.
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 Knight, Joe, Elfers.
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 Knox, Leonard B., Ormond.
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 Koplin, George E., Winter Haven.
 Kramer, L. H., Lake Wales.
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 Lake Nursery Co., Leesburg.
 Lamkin, Ward, Arcadia.
 Lamphear, O. C., Lakeland.
 Lance, M. W., Avon Park.
 Lane, Mrs. Jennie G., Winter Haven.

- Langford, P. J., Frostproof.
 Langston, George D., Haines City.
 Larson, Jonas, Apopka.
 Larson, Nels, Vero.
 Larry, Dock A., Thonotosassa.
 Lathers, C. F., Winter Haven.
 Latzko, M., Clearwater.
 Law, W. L., Lakeland.
 Lawless, Pierce, Lake Alfred.
 Lawrence, C. W., Crooked Lake.
 Lawrence, Judge, Sebring.
 Layton, Harriette B., Tallahassee.
 Lazonby, J. L., Gainesville.
 Leach, Robert, Seminole.
 Lee, C. S., Oviedo.
 Lee, J. H., Oviedo.
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 Library, Fla. Agric. Exp. Station, Gainesville.
 Liles, A. G., Tampa.
 Lilly, Louis, West Palm Beach.
 Lilly, P. L., Winter Haven.
 Lincoln, J. W., Elfers.
 Lindermann, R. H., Lake Wales.
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 Lord, Chas., Orlando.
 Lord, Prof. E. L., Gainesville.
 Loveland, Clifton W., Palatka.
 Lukert, Wm., Avocado and Poultry Farm, Salerno.
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 Lunsford, A. C., Lakeland.
 Luther, James, Daytona.
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 Lyman, H. L., Winter Haven.
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 MacKay, George, Ocala.
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 Manatee Hammock Fruit Co., Manavista.
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 McKay, Dr. W. U., Winter Haven.
 McKissock, Mrs. J. L., Lake Worth.
 McLendon, H. S., F. E. C. Ry., St. Augustine.
 McMichael, J. C., Windermere.
 McMurry, Dr. R. J., Sebring.
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 Miller, C. H., Goulds.
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 Miller, Geo. A., Jr., South Lake Weir.
 Miller, J. E., Lakeland.
 Miller, J. T., Haines City.
 Miller, M. E., Leesburg.
 Miller, M. M., Sebastian.
 Miller, Phil H., Eagle Lake.
 Miller, W. F., Exchange Supply Co., Tampa.
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 Ohlinger, F. Edward, Frostproof.
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 Orlando Orange Groves Co., Orlando.
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 O'Steen, T. B., Lakeland.
 Ott, John, Vero.
 Ott, W. H., Lakeland.
 Overcash, W. C., Dunedin.
 Overstreet, Miss Gertrude, Lakeland.
- Padgett, Wm., Enterprise.
 Page, S. E., Winter Haven.
 Palmer, H. W., Fruitland.
 Palmer, J. C., Windermere.
 Parham, H. C., care State Plant Board, Gaines-
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- Park, Geo. W., Dunedin.
 Parker, C. H., Winter Haven.
 Parker, E. J., Winter Haven.
 Parker, J. E., Sebring.
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- Patten, Byron A., Loughman.
 Patterson, E. M., Fla. Citrus Exchange, Lakeland.
 Pattillo, C. T., Shiloh.
 Pattillo, Robert, Shiloh.
 Peacock, A. J., Plant City.
 Pearce, Eugene L., Clearwater.
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 Peterkin, Mrs. G. W., Lakeland.
 Peters, E. B., Leesburg.
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 Peterson, John A., Groveland.
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 Petteway, H. C., Lakeland.
 Peurifoy, C. A., Grande Island.
 Phelps, A. A., Oakland.
 Phifer State Bank, Gainesville.
 Phillips, C. E., Limona.
 Phillips, Geo. W., Orlando.
 Phillips, Dr. P., Orlando.
 Phillips, T. M., Lakeland.
 Piche, Thos. D., Homestead.
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 Price, C. E., Glen St. Mary.
 Price, A. F., Dade City.
 Provost, Chas. D., Georgiana.
 Pruden, Alfred J., Winter Haven.
 Pruitt, A. J., Lakeland.
 Putney, E. D., Avon Park.
 Quaintance, W. D., Lake Wales.
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 Reid, W. F., Lakeland.
 Reinsch, Bruno, R. F. D., Ft. Lauderdale.
 Reynolds, B. H., Lakeland.
 Reynolds, Curtis, Lakeland.
 Reynolds, M. L., Ocala.
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 Rippberger, P. J., Sebring.
 Roberts, A., Dade City.
 Robertson, A. H., Rt. No. B, Lakeland.
 Robertson, D. H., Rt. No. B., Lakeland.
 Robertson, Paul F., Rt. No. B, Lakeland.
 Robins, Mrs. Raymond, Brooksville.
 Robinson, E. E., Georgiana.
 Robinson, G. A., Lake Wales.
 Robinson, Thos. R., Gainesville.
 Robinson, T. Ralph, Terra Ceia.
 Robnett, N. D., Bartow.
 Rockdale Nursery Co., Shiloh.
 Rogan, G. C., Box 67, Lakeland.
 Rogers, C. W., Sebring.
 Rogers, D. E., Lisbon.
 Rogers, Frazier, Gainesville.
 Rohde, H., Sebring.
 Rollinson, J. W., Auburndale.
 Romph, George B., 1st Natl. Bank, Miami.
 Rose, Mrs. R. E., Tallahassee.
 Rose, R. E., Tallahassee.
 Rosenstreter, R. B., Winter Haven.
 Ross, J. B., Route A., Miami.
 Ross, J. H., Winter Haven.
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 Ross, W. G., Fruitland Park.
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- Rogells, J. D., Palmetto.
 Rudesill, Dick, Orsino.
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- Saxton, E. E., Lakeland.
 Sadler, O. W., Mt. Dora.
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 Schneider, Mrs. A., Bartow.
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 Schneider, Arthur E., Eau Gallie.
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 Scott, George A., Tampa.
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 Schultz, F., Hobe Sound.
 Schultz, W. H., Winter Park.
 Schultz, W. H., Winter Haven.
 Schumacher, E., Lotus.
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 Schuman, Albert, Sebastian.
 Schumard, R. C., Sebring.
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 Sias, D. P., Orlando.
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 Skinner, Robt. E., Hillsboro Hotel, Tampa.
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 Smith, Gould, Naples, Lee Co.
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 Smith, Henry W., Sebring.
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 Stevens, Minor, Lakeland.
 Stewart, C. E. Jr., Tampa.
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 Stuart, E. C., Bartow.
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 Taylor, Jas. A., Shiloh.
 Taylor, Mrs. Jas. A., Shiloh.
 Taylor, J. B., Care Elks Hotel, Lakeland.
 Taylor, J. H., Ocala.
 Taylor, J. J., Ocala.
 Taylor, John S., Largo.
 Taylor, T. A., Emporia.
 Taylor Nurseries, The, Shiloh.
 Taylor, W. D., Ocala.
 Taylor, W. S., 3905 Ashley St., Tampa.
 Temple, Mrs. W. C., Winter Park.
 Terry, F. L., Box 891, Miami.
 Terwilligar, A. C., Titusville.
 Thacher, R. R., Tampa.
 Thirsk, John, Winter Haven.
 Thomas Tent and Awning Co., Box 733, Miami.
 Thomas, C. E., 404½ Zach St., Tampa.
 Thomas, G. P., Exchange Supply Co., Tampa.
 Thomas, Irving J., Coconut Grove.
 Thomas, Mrs. Julian, Hotel Franklin, Lakeland.
 Thomas, Paris, Winter Park.
 Thomas, Paul, Box 1713, Jacksonville.
 Thompson, C. H., Box 818, Winter Haven.
 Thompson, Mrs. C. H., Box 818, Winter Haven.
 Thompson, F. C., Frostproof.
 Thompson, Dr. J. L., Frostproof.
 Thompson, N. H., R. A. 215, Homestead.
 Thompson, Ralph P., Box 818, Winter Haven.
 Thompson, Robert K., Sarasota.
 Thornton, W. R., Redland.
 Thullbery, C. C., Lake Wales.
 Thullbery, H. A., Lake Wales.
 Tilden, A. M., Winter Haven.
 Tilden, W. L., Orlando.
 Tilghman, W. G., Palatka.
 Tillinghast, B. F., Crescent City.
 Tillinghast, Mrs. B. F., Crescent City.
 Tillinghast, Miss Helen, Crescent City.
 Tillman, J. M., Lake Wales.
 Tippin, Geo. T., Vero.
 Titus, H. S., Dunedin.
 Toadvin, Edw. S., Hypoluxo.
 Tobian, J. J., Box 517, Winter Haven.
 Told, C. E., Lakeland.
 Todd Lumber Co., R. H., Ocala.
 Todtenhousen, A., Lake Worth.
 Tomlinson, F. E., Zephyrhills.
 Toms, Chas. Stanley., P. O. Box 167, Miami.
 Tontellotte, L. E., Limona.
 Touchton, John., Winter Haven.
 Townsend, H. W., Lake Stearns.
 Townsend, J. L., Wauchula.
 Trask, B., Lake Wales.
 Traxler, L. W., McIntosh.
 Traxler, T. W., Ocala.
 Tucker, E., Lake Wales.
 Tucker, M., Gainesville.
 Turner, Mrs. B. G., 1718 N. E. 1st Ave., Miami.
 Turner, H. A., Glen St. Mary.
 Tyazzali, Cha's. P., Corner Palmetto & Ingraham
Ave., Lakeland.
 Tyler, A., Glen St. Mary.
 Ulmer, H. L., Box 557, Largo.
 Ulmer, J. E., Sutherland.
 Umlauf, Gustav, Gainesville.
 Valentine, Geo. C., Palmetto.
 VanAckooy, A., 509 N. St., West Palm Beach.
 Vaughn, Horace A., Riverview.
 Vaniman, O. S., Ft. Lauderdale.
 Van Roy, Frederick, Crystal River.
 Van Sickler, J. E., Rt. A., Box 140, Lakeland.
 Varena, A., Sebring.
 Varn, M. L., Eagle Lake.
 Varn, W. A., Lake Wales.
 Varney, H. B., Box 571, Lakeland.
 Vidal, J. W., Gainesville.
 Viele, H. M. & Son, Davie.
 Vlag, Piet, Oldsmar.
 Voyles, I. A., Auburndale.
 Waddell, E. A., 224 N. E. 3rd Ave., Miami.
 Wadsworth, Edwin S., 38 Standish Place, JACK-
sonville.
 Waite, J. W., Palmetto.
 Wakelin, G. M., Tavares.
 Wakelin, Maud M., Tavares.

- Walbank, Fred, Auburndale.
 Waldo, M. A., Bartow.
 Waldron, Max, Crooked Lake.
 Walker, C. D., Care Trueman Fert. Co., Jacksonville.
 Walker, Seth, care Exchange Supply Co., Tampa.
 Walker, C. H., Bartow.
 Walker, E. C., Vero.
 Wall, A. H., Dundee.
 Walsh, C. A., Ft. Lauderdale.
 Walters, W. W., Box 147, Haines City.
 Wandrey, Ernest, Eustis.
 Ward, C. H., Winter Park.
 Ward, H. A., Winter Park.
 Ward, H. B., 814 S. Sapodilla St., West Palm Beach.
 Wardell, T. E., Mt. Dora.
 Warfield, W. C., Winter Haven.
 Waring, M. G., Lakeland.
 Warner, Arlando D., Daytona Beach.
 Warner, L. R., Box 484, Key West.
 Warner, S. C., East Palatka.
 Warren, Alex., Haines City.
 Warren, Alfred, Ft. Pierce.
 Warren, Geo., Care Marion Hotel, Lakeland.
 Warren, Geo., 144 East Flagler, Miami.
 Wart, H. A., Lake Alfred.
 Wartmann, E. L., Citra.
 Wartmann, H. A., Ocala.
 Washburn, H. D., Elks Hotel, Lakeland.
 Watkins, P. C., Sharps.
 Watkins, Jos. C., Lake Wales.
 Watson, J. R., Agric. Exp. Sta., Gainesville.
 Watts, W. M., Lakeland.
 Watts, B. F., Leesburg.
 Way, Edgar B., Eagle Lake.
 Way, C. H., 807 So. Florida Ave., Lakeland.
 Webb, W. S., Dundee.
 Webb, W. H., Winter Haven.
 Webster, Agnes, Tallahassee.
 Wedge, Mrs. Clarence, Ft. Lauderdale.
 Weiland, Chas., Estero.
 Weiss, Fred, 916 Graham Bldg., Jacksonville.
 Weissinger, J. F., 518 Citizens Bank Bldg., Tampa.
 Welsh, G. W., Gainesville.
 Wells, W. G., City Point.
 Wells, B. B., City Point.
 Welling, Mrs. F. D., Crooked Lake.
 Wendel, Henry, 408 Anderson St., Orlando.
 West, C. J., Lake Stearns.
 West, Dr. J. A., Winter Haven.
 Wetherbee, J. E., Fort Pierce.
 Wetmore, T. L., Lake Wales.
 Wetmore, G. E., Lake Wales.
 Wever, E. C., Homestead.
 Wheeler, C. O., Lakeland.
 Wheeler, G. A., West Palm Beach.
 Whidden, G. D., Gen. Del., Lakeland.
 Whidden, W. J. J., Bartow.
 Whittaker, Mrs. W. R., Manatee.
 Whittaker, W. R., Manatee.
- Whipp, C. Leslie, care Mills, the Florist, Jacksonville.
 Whipp, Mrs. C. Leslie, care Mills, the Florist, Jacksonville.
 White, Geo. E., Gainesville.
 Wichtendahl, Karl, Gotha.
 Wigfield, Virginia, Quay.
 Wightman, L., Box 576, Tampa.
 Wilkinson, Col., care Epping & Co., San Juan Hotel, Orlando.
 Williams, G. W., Lake Stearns.
 Williams, G. R., Winter Haven.
 Williams, I. T., Bradenton.
 Williams, Simon F., 600 Professional Bldg., Jacksonville.
 Williamson & Dennis, Jacksonville.
 Williamson, Frank W., Clearwater.
 Williamson, Frank, Box 618, Clearwater.
 Willson, J. F., 113 W. Florida Ave., Tampa.
 Wilmhurst, H. J., DeLand.
 Winn, N. A., Haskell.
 Winston, J. R., Orlando.
 Wilson Co., The, Gainesville.
 Wilson, D. Earl, Box 324, Miami.
 Wilson, J. P., Lakeland.
 Wilson, Leo H., Kissimmee.
 Wilson, Sylvester E., 18 Orange Ave., Orlando.
 Woelfle, E. H., Ritta.
 Wolf, J. S., Auburndale.
 Wolcott, A. D., Auburndale.
 Wolcott, Mrs. A. D., Auburndale.
 Wood, Claude O., Dunedin.
 Woodrow, Davis S., care Brown Realty & Investment Co., Miami.
 Woodruff, Hamilton, Box 1154, Jacksonville.
 Woolfolk, R. B., care A. F. G. Inc., Orlando.
 Worch, F. H., Box 95, Winter Park.
 Worthen, S. T., 349 Fifth St., North, St. Petersburg.
 Wright, A. C., Lakeland.
 Wright, Edgar, care Fla. Grower, Tampa.
 Wright, George M., Box 95, Lakeland.
 Wug, H. E., 1061 W. University Ave, Gainesville.
 Wycoff, John, Citra.
 Yale, Mrs. J. R., Haines City.
 Yocom, W. F., 332 E. Broadway, Ocala.
 Yonge, P. K., Southern States Lumber Co., Pensacola.
 Young, J. W., Crooked Lake.
 Youngesman, Geo. H., 209 Grove St., Bradenton.
 Younghusband, Mrs. F. S., Ankona.
 Younghusband, F. S., Ankona.
 Yount, Mrs. E. C., Fort Lauderdale.
 Yowell, N. P., Orlando.
- Zaborowski, Joseph, Route 1, Box 248, Tampa.
 Zeluff, U. C., Box 283, Tampa.
 Zietlow, J. L. W., Lakeland.
 Zimmerman, E. L., Oldsmar.
 Zimmerman, F. J., Oldsmar.

FLORIDA STATE
HORTICULTURAL SOCIETY
QUARTERLY



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Proceedings of the Thirty-Fifth Annual Meeting of the Florida State Horticultural Society

It was quite fitting that the Thirty-fifth Annual Meeting of the Florida State Horticultural Society should be held in Lakeland because the society has long been primarily interested in the production of citrus fruits, and that beautiful little city—one of Polk county's gems—is the center of a thriving citrus region. In addition to the large number of small and large sized groves in this community, it is also the home of the Lakeland Highlands Co-operative Association, a co-operative association of near three hundred grove owners, who have property in the Lakeland Highlands. The total acreage in this association is near four thousand acres.

The spirit of co-operation pervades the community. Every person and every organization joined in welcoming the members of the society and gave every help possible to make the meeting a pleasant and profitable one. Secretary Appleyard of the Chamber of Commerce, was everywhere during the meeting, lending a helping hand. Wm. Gomme, the Agricultural Agent of Polk county, was much in evidence and did more than his bit to make every one happy. The society is much indebted to Mrs. Geo. W. Peterkin for the

very active co-operation that she gave. She was present early and late, helping to secure new members and giving service to see that everyone was made comfortable.

Motorcade

Among the entertainments provided by the people of Lakeland and Polk county, was a motorcade to points on the "Ridge." At Lake Wales a luncheon was provided at the Club House on the lake by the Lake Wales Chamber of Commerce, which was a happy culmination to a long morning drive through Auburndale, Lake Alfred, Haines City, Winter Haven, Dundee and Mountain Lake. After seeing the miles and miles of rolling hills covered with beautiful groves laden with fruit, it is thought that the "sour orange" members went home with more respect in their hearts for the "rough lemon" country than their papers and discussions might indicate.

Reunion

One of the features of the Lakeland meeting was the reunion of the former workers of the State Plant Board, who took part in the fight

against citrus canker. To show its appreciation of the good work they had done, the Horticultural Society invited them to attend the meeting as its guests. Fifty-four of the men were present. On Wednesday a banquet was given them by the Horticultural Society and the Lakeland Chamber of Commerce.

During the meeting, the workers perfected an organization known as the Canker Veterans' Association. M. G. Campbell, of Lake Wales, was elected president, and Frank Stirling, of Gainesville, secretary-treasurer. The purpose of the organization is to hold together the men who know citrus canker from a field point of view and have had experience in the eradication work. The meetings will be social and will be held annually at the time and place of meeting of the Horticultural Society. That the citrus industry and the State at large owe these men a debt of gratitude goes without saying. The industry enjoys its present prosperity to the efficient work that these men of the State Plant Board and their leader, Dr. Wilmon Newell, did and are doing.

Exhibits

Another feature of the meeting was three exhibits. One was of diseases and pests of citrus trees that was prepared by the State Plant Board; and another was an exhibit of citrus fruits. These exhibits were housed in the lobby of the Thelma Hotel. Both attracted much attention and particularly the exhibit of fruits. Some very fancy fruit and packs were shown by the American Fruit Growers Inc. and the Florida Citrus Exchange.

The third exhibit was a floral exhibit prepared by members of the Florida State Florists' Association. It was housed in the parlors of the Elks Hotel and consisted of foliage plants and cut flowers. Much credit is due to Messrs. Knull, Reasoner and Giddings for this beautiful display that attracted the attention not only of the members of the society, but also of the people of Lakeland, many of whom visited it.

State Florists' Association

Meeting with the Horticultural Society, but holding separate sessions, was the Florida State Florists' Association. This infant organization is really a child of the Horticultural Society. Organized in Jacksonville on November 17, 1921, and holding its First Annual Meeting in Lakeland during the Horticultural meeting, it has quickly acquired a membership of more than one hundred. It promises to grow into an organization of much strength and influence. The officers for 1923 are C. Leslie Whipp, of Jacksonville, president, and N. A. Reasoner, of Oneco, secretary-treasurer.

State Flower Show

During the last several meetings of the society, floral exhibits have been a feature. These have been prepared largely by the florists. There has been a decided interest in the society in flower gardens and landscape beautification. Many have thought that the time was ripe for holding a State Flower Show. Pursuant to a resolution introduced and adopted by the society calling for a committee from the society to meet

with similar committees from the Florida State Florists' Association and the State Federation of Women's Clubs, to discuss and decide concerning a State Flower Show, a meeting of the combined committees was held in Orlando. It was unanimously decided to hold the show in Orlando in April, 1923, during the week the Horticultural Society and State Florists are in session there. An organization was perfected to have charge of the details of the show, of which N. A. Reasoner, of Oneco, was elected chairman and director-in-charge, with Mr. F. W. Fletcher, of Orlando, as superintendent of exhibits. A number of other organizations will be asked to co-operate and the show will doubtless attract State-wide interest.

Annual Membership Fee Increased to \$2.00

For several years the Horticultural Society has had difficulty in meeting the expense of the publication of its proceedings and meeting its other current expenses with its income from the annual membership fee of one dollar. During 1920, owing to the great increase in cost of printing, the cost of printing a copy of the Proceedings was in excess of one dollar, leaving the society a considerable deficit to meet. Thanks to the generosity of several members of the society, this deficit has been made up. In fairness to those who have always contributed liberally to meet deficits in the past, and because lack of funds was curtailing some of the activities of the society, it was decided best to increase the annual membership fee. A resolution was introduced and adopted to increase this fee to two

dollars, beginning January 1, 1923. No increase was made in the life membership fee, which remains at twenty-five dollars.

1922 Membership

The total membership at time of going to press is 1,763, made up as follows:

Honorary members	-----	9
Patron members	-----	36
Perennial members	-----	13
Life members	-----	133
Annual members	-----	1,572

Total	-----	1,763

This is more than two hundred less than the total of last year, which was even 2,000. The society is indebted to Mrs. Geo. W. Peterkin and to Mr. S. L. McCleahan and his associates for their efforts in maintaining the membership of the society. The work is arduous and deserves much credit.

Honorary Members

Four honorary members were elected at this meeting. These were Dr. David Fairchild, of Coconut Grove, Florida and Washington, D. C., who is agricultural explorer in charge of Foreign Seed and Plant Introduction of the United States Department of Agriculture, and who, with his co-workers, is doing much to develop the avocado and sub-tropical fruit industry in Florida; E. S. Hubbard, of Federal Point, who, while not a charter member of the society, joined soon afterward and was a member of the Executive Committee from 1894 to 1921, and a wheel horse in the society for

these many years; J. B. Anderson, of San Mateo, and L. W. Lipsey, of Blanton, who with G. L. Taber, of Glen St. Mary, are the only living charter members of the society. Mr. Anderson was the first treasurer of the society and held office until 1896, when he was succeeded by Mr. W. S. Hart, who in turn has held office until this year.

President and
Treasurer Retire

It is with much regret that it is necessary to announce the retirement of two of the older officers of the society—H. Harold Hume, president of the society since 1910, and W. S. Hart, treasurer of the society since 1896. The least we can say is that we will miss them.

OPENING

Pres. H. Harold Hume: The Thirty-fifth Annual Meeting of the Florida State Horticultural Society will now come to order and we will have the invocation by Rev. J. M. Gross, D. D.

Prayer.

H. H. Hume: On the occasion of the opening meeting it is usual for us to have an address of welcome, which is to be given this evening by Major H. C. Pette-way, of Lakeland.

Address of Welcome

H. C. Petteway, Lakeland

Ladies and Gentlemen:

We will eliminate the address part of it but we do not want to eliminate the welcome part. I want to assure you that you are welcome. Lakeland lies in the heart of the citrus belt and is heartily interested in the work which you are gathered here to discuss and which your society is developing. Therefore, Lakeland is interested in those men who are giving their time to this wonderful industry.

Lakeland is glad to have you meet here. First, she is glad to have you as individuals; and second, she is glad to have you become acquainted with her people and let

them learn to know you, in order that we may all come in closer fellowship and secure better co-operation and better fruit in the work, of which Lakeland is a factor. I wish to expressly welcome you to the city of Lakeland and I hope you will have a very pleasant time while with us. I assure you that if any of the citizens or any of the city officials can do anything to make your stay successful or more pleasant you have only to name it and we will do our best to see that it is done.

Again, in the name of Lakeland, I welcome you to our city.

Response

Dr. J. H. Ross, Winter Haven

Mr. President, Ladies and Gentlemen:

It is certainly very gratifying to come to so good a town as Lakeland and to be assured of the welcome that the Mayor has so gratifyingly expressed to us. Lakeland is the great city in Polk county and Polk county is the banner citrus county of Florida, and therefore it is quite fitting that this society should be welcomed

to this city. This society may be called the pioneer influence which has had more to do with the establishing of the citrus industry in Florida and in its growth and expansion than any one influence which has been expressed in this State. This society is respectable enough to be welcomed to any city—respectable because of its agents, respectable because its purpose has

been very good, respectable also because it adheres to its purpose. No matter about the cross currents of opinions in the State, this society fixes and corrects. This society can be termed a clearing house of citrus opinions in Florida. In fact, I think if we were speaking chemically we might say that this society is the melting pot of the citrus opinions in Florida, the pot in which your opinions are tested. This society has done everything possible in a collective way to increase the quantity of crops. It has done much to improve the quality of fruit products. It is a lamentable fact that with all we have done it appears true that of all fruit that we produce and send out of Florida, 60% will class as second and third grade and only 40% as first. I don't know if it is possible to overcome that. It might be possible. It may be a climatic condition. We look back, some of us possibly over a long time, and we see that the years we put in makes comparatively short time. It takes a longer time than we have been at this job to make horticulture complete. Just how to improve the quality of citrus

fruit is a question that should seriously engage this society in the future. We have a great deal of help from our own schools and also from the Federal agents, but after all, we need not deceive ourselves into the fact that we do not have second and third grade fruit.

Now, referring to the cordial welcome to which I am supposed to respond, I think we are honored to be invited to meet in Lakeland. We are here, we are going to behave ourselves, we want to leave as good an impression when we leave as we come, and if we obey the Federal laws we shall probably be able to leave a good impression. We feel that we are as welcome as when Emerson entertained his guest. When his guest was to arrive, he told his daughter, "Now, of course, we will have fresh linen and a little more to eat." He said, "We will endeavor to make our guest feel that he is welcome, not by the linen, but by the spirit of cordiality that we may extend." That is what we shall do, we will conduct ourselves so that Lakeland will feel proud of us.

President's Annual Address

H. Harold Hume

Mr. Chairman, Members of the Florida State Horticultural Society, Ladies and Gentlemen:

Florida! A State of vast woodlands and open savannahs, a State of mirrored lakes and smoothly flowing rivers, all walled in by the restless sea! A State of ample rainfall and genial climate! A State of oak and bay, of palm and pine! A State where nature from her bountiful hand scattered far and wide trees and shrubs and lowly flowering things, striking in their beauty, wondrous in their variety, a fair and goodly land. Such was this State where the Indian lived and roamed its vast expanse of park-like forests, hunted beside its rivers, fished its limpid lakes. Then the white man came and named it, because he saw it was a pleasant place—Florida.

And the Florida that you and I know is much the same Florida. The lakes and rivers are the same, and the same sea still washes our vast extent of sea coast. Here and there the palm adorns our landscape as of old, beauteous flowers still grow in the waste places. The climate is still genial and the rains have not entirely forsaken us.

But change is over all!

Gone are the Indians from our trackless forests, gone their gleaming paddles from

our inland waters, gone are their village fires from which the smoke curled through the giant oaks that o'ershadowed them, gone are the virgin forests through whose vastness they wandered, gone is the majesty of those vast timberlands whose somber greatness made sober the lives of their aboriginal inhabitants, gone are all these and with them much of Florida's immeasurable natural wealth and primeval beauty.

In their place? The white man's cities, towns and villages. In their place? The white man's groves, farms and gardens. In their place endless miles of roads of steel and rock. In their place man destroyed and fire consumed open acres where once the Indians held sway beneath shadowing branches. He has done much, has the white man; built much, made great material gain, destroyed much and in many places left this Florida of ours a less lovely place, a less worth-while place, in some ways, than in the ancient days.

Now the first point to which I desire to lead up is, that one of these days the reforestation of Florida must be undertaken in earnest. That the replanting of forest areas will add greatly to the beauty of our State goes without saying, but out and beyond that is the fact staring us in the face that our supplies of lumber are all

but exhausted. There is no other way out; why should it be longer delayed? Reforestation must be undertaken, not in a half-hearted way, but on a large scale, a scale commensurate with our former condition and in line with our direct and pressing needs. This work will have to be undertaken by the State both on its own initiative and in co-operation in many ways with individuals. There is no greater problem before us than this. When it comes up for solution, as it must come before many days, let me urge upon the membership of this society that they lend every possible assistance in carrying through a constructive program even as they have given assistance along other lines in the past. It is in line with our duty, our privilege and our avowed course of action.

To restore Florida to its former beauty and the glory which it had when the white man named it Florida, is another work to which the members of this society should lend their every help. A broad state-wide movement should be inaugurated for a "more beautiful Florida." To such an undertaking there are so many angles that to cover them all in a brief address is quite impossible. It is a work in which every inhabitant of the State, yea, every sojourner therein, may have a part.

To clean the trash and refuse and unsightly things from the surface of Florida would be an enormous undertaking. Could it be done? Yes, if every citizen did his part. This alone would make our State a more pleasant place in which to live.

Old signs should be removed from our roadways. Some of them are poor testimony of the value of things that are long since out of use or out of fashion. New ones should be prohibited along our roadways. Why decorate our landscape and road side views with the merits of somebody's ketchup or the particular value of certain brands of cigarettes?

Roadways should be planted both to add to their beauty and to the comfort of travel. Trees and flowering shrubs placed there would replace those which in our haste to clear land have been destroyed.

The planting along the Memorial Road leading from Tampa toward Pinellas county is a commendable piece of work. We should have more of it. Would it not be worth while for instance, if the road from Lakeland to Bartow were planted throughout its entire length on both sides with Oleanders, or the road leading from Lakeland to Tampa with Bauhinia Purpurea? Why should not the roads of North Florida be lined with Magnolias, or Live Oaks, or Crape Myrtle? We can so plant our roadways as to make them never-to-be-forgotten stretches of beauty to him who travels over them. In our cities, towns and villages we need the same sort of planting, the carrying out of one predominating line of planting, whether in yard or street. Gainesville will be famous within a few seasons for her palm-lined avenues. The Poinsettias of Bartow in their season of bloom are worth going far to see. They need more of them. Why shouldn't Lakeland be famous for its Hibiscus and other towns for other lines of planting? If it is advertising that our

towns want, and many of them do want it, there is no way in which the right sort of publicity can be secured so well as by doing these things in the right way.

And do not forget that every home owner by roadside or on city street has his large opportunity in helping to build a more beautiful state. What is it that makes a beautiful street? Is it not houses of fitting design and well planted, well cared for lawns and yards? Certainly these are the things that make beautiful our home surroundings, which make them better places in which to live, these are the

things that make beautiful pictures to linger longer in the memories of those so fortunate as to see them.

With you as members of this society, let me leave this thought, that to make more beautiful the State in which we live, is at once a high privilege and a duty. Let us make up for many plants and trees that have been destroyed by planting others in the places where we live and work, and along the roads we travel and so bring a more surpassing beauty to this Land of Flowers—our Florida.

Address of Welcome to Former Workers of Florida State Plant Board

B. L. Hamner, Tampa

H. H. Hume: A good many years ago Florida found herself in a very peculiar and very dangerous position, I am referring to the time when citrus canker first began to interest us, about ten years ago. Very many men took an active part in crowding out that very dangerous disease and at this meeting we deem it fit and proper to try to have a reunion of those who first worked in that battle. They are veterans of one of the most unique wars that has ever been waged. I am going to ask B. L. Hamner, of Tampa, to say a word of welcome to these men.

B. L. Hamner: Ladies and Gentlemen—In behalf of the workers in citrus products, to you men who worked against the citrus canker, I offer my most sincere welcome. I will say that we welcome you with gratification in our hearts. Our president has well said that you waged a war and it is not alone in war that we have heroes in our daily life. There are many who are living the lives of heroes and I know that all those growers of citrus fruit in this State who took part in the fight against the danger that was at hand are real heroes. Your victory as warriors was a remarkable one. I think it is true that it is the first time in the history where

a disease has started that it has been so nearly eradicated. Therefore, as warriors you have won a great victory. Think what damage the cotton grower in this country had with the boll weevil. We had to go to Washington to secure funds to carry on some of our battles. We had men of purpose and men of determination and real warriors and real heroes. You men fought on and on and fought through discouragement and I will say that you were careful warriors. You fought everything that looked serious on the tree and you gave the benefit of the doubt to the citrus fruit and you decided it and by your careful work there, you became, in the eyes who know, real heroes. I will say that we owe to you a debt of gratitude. Practically, we owe our industry to your efforts. If citrus canker should have been allowed to go on and damaged, there would have been no citrus industry. Those who come now to raise oranges and grapefruit owe you a debt of gratitude whether or not they know it. We realize that your pay was small, that your labor was great. I have never yet heard a man who carried on that work or helped to carry it on, make a claim for compensation for the job that he did. What he had accom-

plished was a satisfaction to him and a compensation.

Now I want to say one word to those who carried on that fight. You are the men who know citrus canker and are the ones who can detect it should it break out again. You are our Home Guards, you are our National Guards, you are our Reserve Corps. I know that through the service you have rendered the State that you love Florida and that should the occasion arise, you will come to the rescue

and therefore we can sleep well at night and live on in peace because we have confidence in our Reserve Corps. By your actions you have proven yourselves to be dependable and I express in the name of the Horticultural Society our love for you and that love is a sincere one. We have confidence in you because you have proven yourselves worthy of our love and our gratification and in the name of the society and all the citrus growers of Florida, I welcome you.

Response

Hon. Frank Jennings, Jacksonville

Mr. Hume, Members of the Society, Ladies and Gentlemen:

I assure you that I received a few days ago the invitation to make this address with both surprise and pleasure, but that I accepted it with some considerable trepidation. I recognize full well the fact that this is one of the largest organizations of its kind in the world, overwhelmingly outranking any similar society in this section of the country, and I know that among your members are men whose learning, abilities and achievements have received merited note and recognition, not alone throughout this great State, but throughout every clime wherein horticulture is of considerable importance.

Had you met merely for the purpose of discussing and re-living your problems and your achievements of the past, your convention would be a happy and a profit-

able one. For while your trials and tribulations of the past have been varied and, in some instances, extremely serious, they have in the main been met and overcome with such clear vision, supreme courage and dependable co-operation that your society today can look back over a most inspiring record of growth, progress and achievement, a result, be it said, in which not your members alone are interested, but one which has redounded to the betterment, the growth, the wealth and the up-building of the entire commonwealth.

As it is impossible for an individual to grow physically strong without exercise, or to grow in character without meeting and overcoming the problems of daily life, just as truly is it impossible for any organization of this character to live and grow and continuously increase in strength and influence without grappling

with and battling with the conditions and circumstances which retard or endanger the growth or the existence of your industry. Men will not, at no small expense of both time and money, attend these meetings year after year merely for the purpose of tossing bouquets at each other.

You have seen the resources from the industries with which you are directly identified grow from an unclassified and almost negligible amount to a systematized, stabilized, wealth-producer of the first magnitude in this State, and you know that you have hardly more than scratched the surface of your possibilities. Think for a moment of the condition of this wonderful country immediately surrounding where we now stand, a third of a century ago and as it is today, and the growth of the past, being, as it is, but an index of the possibilities and probabilities of the future, is little less than staggering. One reads that our citrus output increased almost two hundred per cent from 1910-11 to 1920-21, and doubts. One sees Florida today, and believes. I am told that last year alone there were planted in the State over a million, six hundred thousand citrus trees. I do not know the number of pecan trees planted last year, but I do know that that industry is throughout favored sections in the State growing by leaps and bounds. Our orange packing houses represent an investment of well over six million dollars, and our citrus crop alone is now sufficient to load a solid train of freight cars reaching from St. Petersburg to Jacksonville.

But this enterprising and aggressive membership does not live in the past.

Your shadows still fall far to the west and your past will be used, not as a place in which to *live*, but as a place in which to *learn*. Wise men make mistakes. Fools make the same mistake *twice*. And so I take it you have met again in this your thirty-fifth gathering, not only to learn how best to meet and solve your various ever-present problems, but to take calm counsel among yourselves concerning the problems that must be met in the future.

And let it not be forgotten that to a very considerable degree the problems of the horticulturist have become the problems of the entire State, not alone because of the immense revenues in the form of taxes upon your properties, in which the entire State participates, but also because your improved properties are situated throughout the entire State. In your successes the entire State benefits. In your reverses, the entire State suffers. It is, therefore, the just province and duty of the State as a part of its governmental functions to reasonably aid and assist you in the continued upbuilding of the resources in which you are as citizens and individuals so vitally interested and in which you are so heavily involved. I think you will agree with me when I say that within the last eight or ten years there has been a wonderful awakening on the part of the State in this regard, and that while, no doubt, much remains yet to be done, the "breeze comes from the proper quarter," and that you are justified in believing that it will continue so to do.

The careful consideration of your intimate problems of successful cultivation, fertilization and care of your diversified

fruits, plants and shrubs in this great State of unparalleled diversities of soil and climate, make these meetings of your experts and leaders imperative. But there are also many problems and conditions with which you are, in the large, vitally interested.

You are, of course, directly interested in your extensive nurseries, and in their inspection and certification. Nothing can be of more concern to the grower than to have every assurance, which reasonable care and foresight can assure, that when he pays his good money for bread, he shall not receive a stone; that his labor and efforts upon a tree shall cause it to produce that variety which he was told he bought. And it is axiomatic that a square deal for the grower is a square deal for the nurseryman. It is the province and it must ever be the purpose of your inspecting officials to do as nearly as possible exact justice to both nurseryman and grower. But a few years ago, you had practically no such department in the State. For lack of it, as is well known, the State and the citrus industry paid most dearly. To help this department efficiently perform its functions, whether such help be the suggestion of new or different plans or practices, or whether it be of friendly criticism of some plan, or any other just suggestion, is a subject in which you are directly interested, and I am sure this department of our State activity does and will welcome and value your judgment and your advice.

What I have said concerning the nursery inspection department of our State applies with equal force to the importance

of upbuilding, maintaining and assisting our port quarantine inspections. No man has less sympathy with the creation of useless public positions than do I. But such is not this case. No State of the Union has such diversified actualities and possibilities as has this State, and it is nothing less than common sense to safeguard and protect them against disease or depredation coming from without. This department, inadequate though it is, has many times paid for itself. Every grove property in this State is worth much more money, as an investment, because of this safeguard. And the same statement is as applicable, and as true, to every farm.

Another direct problem, which is under our present law more of a private, as distinguished from a public, nature, is one of advertising your products. Personally I know very little about it, but as I ride over this State and see the thousands upon thousands of acres of groves, both citrus and pecans, soon to come into bearing, I am impressed with the fact that greater effort to bring before the consuming world the actual merits of our citrus products must necessarily follow. The old slogan, "If the world but knew," is directly applicable. In this, however, your effort will be a happy and gratifying and easy one, for I care not whom you may select nor how fertile his imagination may be, nor how adept a painter with printer's ink he may be, you can retire to your slumbers at night with the calm assurance that he cannot over-describe the excellencies of the Florida orange.

And then, your problems come in contact with those affecting persons not di-

rectly or primarily engaged in horticulture. Our lumber and naval stores industries cannot forever last. From the mathematics of the situation we know this to be true. He is not an alarmist who tells us that at the present rapid rate of lumber depletion, both by cutting and by fire, and the present slow rate of lumber propagation, the time is rapidly approaching when not only will our export lumber trade be no more, but when we will not have sufficient to provide for our housing problems and our crate materials. It is most sobering to contemplate the fact that our new plantings of fruit, and our extensive and growing truck industry, will increase the demand for crates several hundred-fold in the near future, and that the supply is decreasing with equal rapidity. And thus we have a vital problem, affecting directly our horticulturist, and also our mill man, our farmer and our cattle-man. Personally, there is nothing that appeals to me of more vital interest to the future welfare of all the people of this State than the formulation and positive promulgation of some plan of timber conservation and re-forestration. I believe, too, that this can be brought about not without some inconvenience to the industries directly or indirectly affected, and not without some modifications of the old-time ways, but most certainly without destruction to these industries and, in the end, for their permanent good, and for the ultimate welfare of the people as a whole.

Nature has not endowed us with deposits of gold, silver, copper, iron or coal, and the great factories depending on any of them will in the main continue to be found

near the source of raw supply. Proud though we are of all our varied resources, zealous as we must always be of their protection, yet, my friends, as we see much of our natural wealth being rapidly depleted; as we see our immigration continuing, as in the past, second to no Eastern or Southern state; as we contemplate that in the year of 1920-21 our people did more than 25% of the entire building done in the entire United States; as we thus see our State becoming one of permanent happy homes we are, my friends, impressed with the fact that the great handmaiden of horticulture, linked with her by indissoluble bonds of mutual needs, mutual ambitions and mutual opportunities, will be agriculture. Over 70% of our farmers own their own homes, and over 85% of our white farmers operate their own farms. But in no state in the Union is scientific and expert knowledge more necessary for success. And hence every agency of our government, both state and national, whose business it is to accurately acquire and intelligently distribute such knowledge, must be encouraged, supported and enlarged.

But I must not continue longer. No one need endeavor to discuss all the problems which confront an ambitious people in a State of such positive possibilities as ours. They are a ringing challenge for closer co-operation, renewed energy, and aggressive action, but in meeting them the achievements of this society in the past are, I predict, but a dim prophesy of what they will be in the future.

On a bright October forenoon in 1918 a young American lieutenant had with his

company reached the objective which in the scheme of battle he was directed to reach, and await further orders. He deployed his command beneath the trees and bushes of the hillside and waited. No runner came, and no signal was given him. Everyone knows how soldiers dread the ordeal of standing still, especially under fire, as they then were. Finally he left his command, went to the rear to obtain further orders, and as he was returning a fragment of a bursting shell tore its jagged path through his brave young heart. Rising to his feet he rushed for-

ward to his men and cried out: "Sergeant, the command is 'Forward,'" and sank lifeless. There is no spoken word which insures better morale, inspires more bravery, or generates more heroism than that command. Thus it is in war. Equally true it is in peace. Under this command, guided as you are by the best of trained minds, actuated as you are by noble and unselfish purposes, you will continue to be in the future, as you have been in the past, a moulder of public sentiment, a stronghold of mutual helpfulness, and a positive upbuilder of this great State.

Tractors for Grove Cultivation

Frazier Rogers, Gainesville

Since the standard by which American farming is measured is production per man and not yields per acre, the value of improved farm machinery per farm can be taken as an indication of not only the efficiency of the farmer but also his actual labor income. Numerous farm surveys have brought this fact to our attention. Don't misunderstand me, for I do not mean to convey the idea that the way to make a success with citrus is to purchase every new-fangled machine that comes on the market, but I do say that your chance for making a profit on citrus is dependent to a great extent on the use of machinery. The wheat farmer of today using modern methods and machinery can grow as much wheat in three months as the old Roman farmer could grow using his methods and working 10 hours per day six days a week for all of his three score and ten years.

In 1850 it took four-fifths of the population of the United States to feed themselves and the other fifth. Now thirty per cent of our population are feeding themselves and the other seventy per cent. The yield per acre has increased only a very little during this period, and we are far behind the Japanese in this respect. Their average wheat yield was 21 bushels in 1920, while our yield was 13.8 bushels for the same year. Does that mean that we should turn from our meth-

ods of agriculture and go to those of Japan? Far from it, for in Japan the bushel is what counts while in America the man is the important factor. The farm tractor is one of the many improved farm machines that has enabled a man to handle more acres. It is rapidly becoming one of the essential machines of our farms. Already the value of the tractors produced yearly has exceeded that of all other farm machinery. In 1920 the value of all machinery produced, including the tractor, was 535 millions of dollars; of this sum 270 millions of dollars represents the tractors produced.

The subject as given me by the chairman of our committee was the utilization of the farm tractor in the cultivation of citrus groves. While I can never think that the horse can be entirely replaced on the general farms of the country by mechanical power, I am confident that it can replace the horse to a great extent on the citrus groves in this State. There are a number of reasons why the tractor could be very profitably used by our citrus growers; the first of which is the rate at which the tractor works. The average number of acres cultivated by a tractor in a 10-hour day was shown to be 20 acres. This data comes from men who are actually operating tractors in groves. The advantage then in being able to cultivate at

the proper time in order to conserve the moisture in the soil can be readily seen. Even though your tractor is not in use all of the time it is better to have it idle part of the time than for the trees to suffer on account of the lack of water or injury by weeds.

The second reason is a very important one in Florida, viz., the inability of horses to do their maximum work during the hot summer days. Doubtless most of you are familiar with this condition. If a careless driver is handling the team you have to keep constant watch on him to see that he does not over-heat your team. I do not mean to infer that we are exempt from careless drivers of tractors, for they furnish us a source of constant worry. However, if you see that your machine has plenty of oil and water in the morning and at noon, there is little else to fear from a careless driver. This, too, is the period of the year when we want most out of our teams. In the hot days of March, April, May and June, the evaporation is enormous unless we cultivate often, and these are the months in which our teams are not capable of doing the most work. The tractor does not take exception to the hot days. In fact it operates better. Your fuel evaporates more readily in June than in December.

LIFE

One question in which all tractor users or prospective tractor owners are interested is in the life of their machines under grove conditions. How many years will it last? This will depend upon a number of things. We can increase or decrease the number of years of service by the way

in which the machine is handled. The figures that I shall give you represent only average conditions and not maximum possibilities. Circular 12 of the Extension Division shows the average life of a tractor under grove conditions to be approximately four years. This doubtless seems to be a very short period when compared with the life of a tractor in other sections of the United States, but we must not lose sight of the fact that these tractors were in use on an average of 123 days per year, more than twice the number of days used in the corn belt. Doubtless it would be better to give the number of days of work to be expected from a tractor rather than lasting so many years.

Virtually all of our grove cultivation is done with harrows, either the cut-away disc or the acme. When the cut-away penetrates to too great a depth, wooden spools have been used between disc to prevent this. Using either the disc or acme the average number of acres harrowed was shown by data received from tractor users to be 20 acres in a 10-hour day. This was for an eight-sixteen h. p. tractor, the size of machine most commonly used for grove work. Quite a few of the grove owners reported having done away with all horses on their farms and using tractors exclusively and have gotten splendid results. The fuel consumption as well as the amount of lubricating oil used per acre in cultivating would of course be considerably less than that required to plow an acre. According to the data obtained from growers this would amount to about $\frac{1}{4}$ of the fuel and oil required to plow an acre, which would be from $\frac{1}{2}$ to $\frac{3}{4}$

of a gallon gasoline and from $\frac{1}{2}$ to 1 pint of cylinder oil.

COST OF PLOWING 1 ACRE

	YEAR	ACRE
Depreciation -----	\$125.00	\$.20
Interest on investment---		.06
Repairs -----		.08
Fuel -----		.67
Oil and grease -----		.20
Man labor -----		.70

Total -----		\$1.91

Initial cost of tractor, \$500.

Life, 4 years.

Interest at 7%.

Fuel, 2.67 gallons gasoline.

Four-fifths quart cylinder oil.

Man labor at \$3.50 per day.

REPAIRS

The yearly repair charges are very difficult to obtain but according to Circular 12 of the Extension Division they would be approximately one-twentieth of the initial cost of the tractor the first year, one-twelfth of the initial cost the second year and one-eighth of the initial cost the third year.

SELECTION

The conditions under which farm machinery must operate in Florida are undoubtedly the most adverse of any state in the Union. Downpours of dust and sand always accompany their operation in the citrus grove, due to the sandy nature of our soils. Therefore in order to reduce the wear to a minimum, all of the working parts of a tractor must be encased or the life of your tractor is very short. The entire transmission system must be protected, steering joints, etc., should be sup-

plied with large grease cups that feed freely. As long as grease works out of the bearings sand does not get into them. A tractor must be provided with an efficient air filter. If you allow air filled with grit to be drawn into the cylinders of your motor, it forms with cylinder oil a splendid grinding compound that soon cuts away the cylinder walls and you begin to have trouble. The moist air filters seem to be somewhat more efficient than other types in removing the dust and sand from the air. However, these should be looked after very carefully and cleaned real often, especially if it is very dry.

The slippage of the wheels of a tractor that is bound to occur in our sandy soils is much more destructive than are heavy loads, and especially is this true of the bolted and riveted framed tractors. The unit frame tractor seems to have a decided advantage in this respect for the gears and other parts are in a fixed relationship to each other. The wide wheels are a necessity in order to give traction. A protected radiator is something that should receive attention from the manufacturers, for the circulation of air is very easily interrupted by leaves, etc., especially if you happen to be working in rank vegetation. This can be done by the operator by using a heavy $\frac{1}{4}$ -inch mesh wire, mounted about 5 inches in front of the radiator, which will catch the leaves and the currents of air to the radiator are not cut off.

There is much more to be said on the question of tractor selection for grove culture, but in a paper of this kind I have made an attempt to give only a few of the most important.

Types of Implements Used in Cultivation of Groves, Frequency of Cultiva- tion and Cost

L. H. Kramer, Lake Wales

A. The types of implements commonly used in cultivating citrus groves may be listed as follows:

1. Plows—

Walking: Turning.

Tractor: Disc.

2. Harrows and Cultivators—

Disc (Tractor): Eight-foot tandem, 10-foot doubles and singles; 12-foot single.

Acmes: Three-foot single (tree row work), 4-foot single (tree row work), 6 and 8-foot 2-horse (tree row work), 12-foot tractor (middles), 16-foot tractor (middles).

Planet Jr.: Five and 7-tooth using three sweeps (optional) (tree row work and grass patches).

Spring Tooth: Ten-foot tractor harrow, use in grassy middles in young grove where plowing would not be done during certain seasons; careful operator required to keep from injuring roots.

B. The frequency of cultivation is as follows:

1. Plowing—Once yearly, probably in fall or early winter.

2. Discing — Immediately following plowing or before if extremely heavy cover crop stands on ground. Ordinary cover crop in middles can be cut up and fairly well mixed with soil by using disc two ways; an exceptionally heavy cover crop, three ways. Use of acme after disc in fall work depends on condition of land. In case of heavy winter growth a light discing may be necessary in spring before acme will do work satisfactorily. Where trees are larger, requiring fertilizer to be spread some distance from them, the disc is probably best implement for working in. This applies especially to spring application where grass and weeds may be heavy.

3. Harrowing—As a leveling operation the frequency and amount of work depends on condition of ground.

As a part of the active cultivating program, it depends and varies:

- (a) Upon moisture content of soil.
- (b) Presence of grass and weeds.

Where moisture is present in generous amount, no set time can be given for going over grove; but where maintenance of a dust mulch to preserve moisture is practiced, we find that trees in their first and second years should be gone over on an average of once every ten days or two weeks under ordinary conditions; but in case of prolonged drought, they should be harrowed every five to seven days. This applies to older and bearing trees as well.

We believe many growers and caretakers fail to acme bearing groves as often as they should, apparently believing that the size of trees with their larger and more penetrating root system make them practically immune to drought; but if they would stop to consider the immense amount of water required to support old bearing trees, they would readily appreciate the dependency of such trees upon the protection of a dust mulch. Where the Planet Jr. or similar cultivating harrows are used, the frequency of their use will ordinarily depend upon growth of grass and weeds, but where they are used in place of acme harrows, the frequency of operation should be approximately the same.

C. The cost of cultivation based upon our own experience is as follows:

1. Plowing.—We find that plowing can be done as cheaply by mules as by tractors (where the tractor does not pull over three or four bottoms), but the speed of operation gained by using tractors make their use very desirable and necessary in large acreages. This is especially true where only enough stock is kept to work the tree rows, and tractors are de-

pended upon to do all other work. Plowing or breaking rough land with tractors will cost approximately \$1.85 per acre, and the plowing of cultivated groves only about \$1.38 per acre.

Cost of plowing grove is arrived at by using 4-bottom plow cutting 40 inches, making three rounds to the middle in 25-foot middle, cutting a total of 240 inches out of 300 inches, which is width of middle from tree to tree. This leaves 5 feet of unplowed ground, or a strip of $2\frac{1}{2}$ feet on either side of tree, at a cost of \$1.18 per acre and figuring depreciation at 20 cents, and an average of 9 acres per day makes a total cost of \$1.38 per acre. Cost will decrease with increase in size of trees and will cut down cost in proportion to number of rounds per middle. This estimate is made on a year-old grove. At the rate of \$1.38 per acre for 3 rounds, or 6 trips of a 40-inch plow, the cost per round would be 46 cents per acre, and the cost per trip 23 cents per acre. Taking these figures you can arrive at cost on any age of grove, depending on width of middle you have to plow. A grove of 8 years old, having a space of 10 feet in the middles to be plowed, could be plowed one way at 69 cents per acre. The probable minimum cost per acre, plowing one time around tree row, using \$5.00 per day operator on tractor, is 27 cents per acre; two times around tree row, 54 cents; solid middles 81 cents. Using mules the cost for solid plowing rough land runs approximately \$2.25 per acre.

2. Discing.—The cost per acre of double discing with tractors, in young groves, using 8-inch discs, should run

about 38 cents per acre, running three times in 30-foot middles, based on a period of five weeks or more of steady work and using a \$5.00 per day tractor operator. Running two times in 25-foot middles should be 32 to 34 cents per acre, allowing 5 cents per acre per day for depreciation. The cost for discing diagonally with 10-foot singles should run approximately 26 cents per acre, while the cost per acre using 12-foot singles is approximately 28 cents per acre, running two times in 30-foot middle.

The acreage of grove covered will vary with direction of operation, i. e., east, west, north and south, or on one or two of the diagonal directions; and naturally the cost will vary accordingly. A very important factor in cost of discing, or in fact, any tractor work, is the length of rows which cause much time in turning, which will increase the cost from one to several cents per acre, depending on length of same.

3. Harrowing.—The cost per acre using 4-foot walking acme doing tree row work depends on whether you run straight down both sides of row or zig-zag. The cost of straight harrowing should be around 9 cents per acre, while the cost of zig-zag should be about 12 cents per acre. The cost of using 6-foot two-horse harrows zig-zag should be about 18 cents per acre, while straight work will be a few cents less. Tractors pulling 12-foot acme harrows (which actually stir 13½ feet of dirt) should turn out work at the average cost of 26 cents per acre, running straight and harrowing the entire surface of the ground; while

running diagonally down rows the cost should not exceed 20 cents per acre. Pulling the 16-foot acme (which stirs 17½ feet) one time per middle, in 25-foot middles, tractors should turn out work at 23 cents per acre.

The method of cost accounting used at Mammoth Grove to arrive at the above, given on work of 16-foot acme is as follows: (See Reports 1 to 8.)

Reports 1 to 6.—Sheets for one week on tractor pulling 17-foot acme—Driver \$5.00 per day.

Report 7.—Minimum cost per acre on 85-acre day.

Report 8.—Maximum probable cost during week showing one-half day lay-up, break-down and parts used.

REPORT I

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 20, 1922; gas consumed, 16 gallons; oil consumed, 4 quarts; amount acreage, 45; kind of work, acme harrow, middles, 16-foot implement; amount operating time, 8 hours; location of work, Section 30—hilly.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 16 gals. at 26c	3.16
Oil, 4 qts. at 20c	.80
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Total cost	\$8.96
Total cost per acre	\$.20

Remarks.—Price of gas 23½c; shrinkage 2½c; purchase price of heavy tractor oil, 56c per gallon.

Kind of Work.—Acme.

FLORIDA STATE HORTICULTURAL SOCIETY

REPORT 2

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 21, 1922; gas consumed, 14 gallons; oil consumed, 2 quarts; amount acreage, 65; kind of work, acme harrow, middles; amount operating time, 8 hours; location of work, Section 30.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 14 gals. at 26c	3.64
Oil, 2 qts. at 20c	.40

Total cost	\$9.04
Total cost per acre	\$.14

Kind of Work.—Acme.

REPORT 3

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 22, 1922; gas consumed, 15 gallons; oil consumed, 3 quarts; amount acreage, 55; kind of work, acme harrow, middles; amount operating time, 8 hours; location of work, Section 30—hilly.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 15 gals. at 26c	3.90
Oil, 3 qts. at 20c	.60

Total cost	\$9.50
Total cost per acre	\$.17

Kind of Work.—Acme.

REPORT 4

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 23, 1922; gas consumed, 16 gallons; oil consumed 3

quarts; amount acreage, 75; kind of work, acme harrow, middles; amount operating time, 8 hours; location of work, Section 30.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 16 gals. at 26c	4.16
Oil, 3 qts. at 20c	.60

Total cost	\$9.76
Total cost per acre	\$.13

Kind of Work.—Acme.

REPORT 5

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 24, 1922; gas consumed, 15 gallons; oil consumed 2 quarts; amount acreage, 70; kind of work, acme harrow, middles; amount operating time, 8 hours; location of work, Section 29.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 15 gals. at 26c	\$3.90
Oil, 2 quarts at 20c	.40

Total cost	\$9.30
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Total cost per acre	\$.13½
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Kind of Work.—Acme.

REPORT 6

Tractor No. 6 Report.—Operator, Jones, Otto; date, March 25, 1922; gas consumed, 9 gallons; oil consumed, 12 quarts; amount acreage, 40; kind of work, acme harrow, middles; amount operating time, 4 hours; time repairing tractor, 4 hours; trouble, cleaning and washing mo-

tor, tightening bearings, etc.; new parts used, none; location of work, Section 29.

Total operating expense per day:

Lost time, salary 4 hrs. at 62½c	\$2.50
Operating, salary 4 hrs. at 62½c	2.50
Gas, 9 gals. at 26c	2.34
Oil, 12 qts. at 20c	2.40
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Total cost	\$9.74
Operating cost per acre	.18
Lost time cost per acre	.06
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Total cost per acre	\$.24
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Remarks.—Put in fresh oil.

Kind of Work.—Acme.

RESUME

Week ending March 25, 1922:

Date	Cost	Grove Acreage
March 20th	\$.20	45
March 21st	.14	65
March 22d	.17	55
March 23d	.13	75
March 24th	.13½	70
March 25th	.24	40
<hr/>		
Total	\$1.01½	350 Acres

Average per day, 17c; 58½ acres average.

Depreciation on tractor, \$9.00 per week; per acre per week, 02 6-10c.; average operating cost, 17c. Total cost, 19 6-10c per acre.

Lost time cost for week, \$2.50; 350 acres, 7-10c per acre.

Depreciation per year on tractor, \$300.00.

Eight months operation; 25 working days per month; 200 total working days per year; \$1.50 depreciation per day.

REPORT 7 (MINIMUM POSSIBILITY)

Tractor No. 6 Report.—Operator, Jones, Otto; date, April 2, 1922; gas consumed, 16 gallons; oil consumed, 3 quarts; amount acreage, 85; kind of work, acme, 16-foot implement; amount operating time, 8 hours; location of work, Section 29.

Total operating expense per day:

Operating, salary 8 hrs. at 62½c	\$5.00
Gas, 16 gals. at 26c	4.16
Oil, 3 qts. at 20c	.60
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Total cost	\$9.76
Total cost per acre	\$.11½

Remarks.—Operating cost, 11½c; implement depreciation, ¼c; tractor depreciation, 1¾c. Total per acre, 13½c.

Kind of Work.—Acme.

REPORT 8 (MAXIMUM, SHOWING ALL COST)

Tractor No. 6 Report.—Operator, Jones, Otto; date, April 3, 1922; gas consumed, 10 gallons; oil consumed, 4 quarts; amount acreage, 35; kind of work, acme harrow, middles; amount operating time, 4 hours; time repairing tractor, 4 hours; trouble, putting in connecting rod bearings, fan belt, spark plug; new parts used, connecting rod bearing \$2.45, fan belt \$2.40 and spark plug \$1.00; location of work, Section 29; damage to trees, none.

Total operating expense per day:	
Lost time, salary 4 hours at 62½c--	\$2.50
Operating, salary 4 hrs. at 62½c--	2.50
Gas, 10 gals. at 26c -----	2.60
Oil, 4 qts. at 20c -----	.80
 Parts:	
Upper Con. rod bearing-\$2.45	
Fan belt -----	2.40
Spark plug -----	1.00
Ad. labor, 4 hrs. at \$1.00 -----	4.00
 Total cost -----\$18.25	
Parts cost per acre, ----\$5.85	\$.16½
Operating cost per acre-- 5.90	.17
Lost time cost per acre-- 6.50	.18½
 Total cost per acre -----\$.52	

Remarks.—Cost, 52c; implement depreciation 20c per day, ½c; tractor depreciation \$1.50 per day, 4c. Total, 56½c.

Kind of Work.—Acme.

Hume: As this finishes this section of the program, I think we better take a few minutes for any questions in regard to Mr. Kramer's paper or the one presented by Mr. Rogers.

Sadler: Can the ground be satisfactorily cultivated in old groves with a tractor?

Kramer: Yes, there are extension acme and disc harrows which may be used for cultivating not only in the middles but out under the branches and right up to the trunks. The harrows should be arranged or built so as not to interfere with the branches.

Grove Factors Influencing Citrus Fruit Quality

George V. Leonard, Hastings

Upon receiving notice from Secretary Floyd that I had been appointed to serve on a committee representing citrus fruit quality at this meeting, I was at first at a loss to know what was expected of me, and, having an opportunity to talk this over with Mr. Floyd, I learned that we were expected to come before you, this body of citrus fruit growers from all parts of the State, many of whom have had a great deal more experience in growing fruit than I have had, and tell you how to go about to raise fruit of the best quality. Quite an undertaking, is it not?

Let us first consider just what are the requisites of fruit of the best quality. Good quality fruit should be smooth, thin skinned, it should be uniform in appearance and highly colored when fully ripe, as well as juicy and sweet. Fruit of this description will not only be attractive and pleasing to the eye, but also to the taste.

There are a great many different factors that must be considered in attempting to produce fruit of the best quality. First, we might say we should consider locality, then stock or root, variety and strains of varieties, cultivation, fertilizing, spraying and pruning. These are only a few of the important factors to be considered, but I

do not wish my paper to be too lengthy, so will not take up but these few important factors.

LOCALITY

Climatic and soil conditions should have our consideration here. For the past few years my work has carried me through different sections of the State a great deal and the experience thus gained has led me to believe that citrus fruit can be raised more or less successfully on almost any type of soil in the State; some, of course giving better results than others. I have seen citrus growing on the low flat woods, the high pine land, the low hammock and the high hammock, the high sandy ridges of the lower East Coast, as well as the low muck lands of the same section, the oak ridges of Polk county, and many other types of soil. And as I have stated, I believe that oranges are grown successfully in all of these sections, but in growing them for the best quality I should favor a rather heavy strong soil, one that would not require as much fertilizing as the lighter soils might.

ROOT STOCK

Just a word in regard to the stock. I should say that under average conditions

that sour orange root is preferable for growing fruit of the best quality, but there are some sections of the State, such as the Polk county ridge land and the red sand ridges of the lower East Coast where it would seem as though rough lemon root gave good results. However, it would be well in setting out young trees to investigate this point very carefully, for I have seen in some localities where Valencias had been budded to lemon root that the fruit had a tendency to dry out at the stem end, as well as show green around the upper portions of the orange. In some cases, this being noticed as early as the first of March, and of course, such tendencies would greatly lower the quality of such fruit.

VARIETIES

It is always well for one to acquaint himself with the varieties best suited for his special locality as far as may be possible, and in speaking of this, I would call your attention to the fact that there are undoubtedly two or more strains of some of our best known varieties of citrus fruits, some of which do not bring forth fruit of the best quality. Take for instance, the Parson Brown orange; this orange, as we all know, has not the flavor when at its best that we expect in some of our mid-season varieties. Yet it has its place in our industry, in that it ripens earlier, giving us an orange for marketing during the latter part of October and November. Therefore, to produce a Parson Brown of the best quality, one must be sure that it is of a strain that matures among the earliest. Another well known

variety, the pineapple orange, has at least two distinct strains, one the truly high-colored type, another strain exactly the same in every description with the exception that it has not the high color. I have seen these two strains growing in the same grove and of the two, the high colored one is always the more preferable.

Having selected a suitable locality and planted thereon trees of the best varieties and root adaptable to our location, we have complied with the first section of our problem and come now to the second section, that of cultivating, fertilizing, spraying and pruning for quality in fruit.

CULTIVATION

Cultivation should be done with the idea in view, not only of producing fruit of the best quality, but also that we might keep our fruit trees in a healthy growing condition and so expect quantities of quality fruit. This subject of cultivation has been discussed at many of our meetings, from all of its different angles, and I do not think it necessary for me to enlarge upon it, only to say that I have for two or three years and am still carrying on experiments in non-cultivation in one or two small plots in several of the groves under my supervision. It is my opinion that from a fruit quality standpoint that a practice of cultivating lightly from early spring until the summer rains commence is preferable. In the heavier soils the disc and spring tooth harrow may be used if spools or sleds are used to govern the depth. In the lighter soils the disc harrow on spools, followed by the acme harrow is recommended.

FERTILIZING

Like cultivation, fertilizer should be applied not only to produce fruit of good quality, but to keep the tree vigorous and healthy. The subject of fertilizing for quality is one that we can not take too seriously, one that deserves a great deal of our attention and one that I am sure is getting a great deal of study from all of us. There is of course, no standard fertilizer formula that may be employed in every grove. A certain treatment that might bring forth good results in one grove possibly would not do as well in another grove of a different locality. In fertilizing, we must ever keep quality of fruit before us. It is easy to give the right kind of fertilizer in amounts as to make a tree grow off vigorously, but it is also easy to fertilize a tree so heavily as to lower the quality of the fruit. Too much fertilizer lowers the quality, too little, in most cases, improves the quality of the fruit, but as is often the case, at the expense of the tree, for it reduces the vitality of the tree, and if followed up, will naturally interfere with the crops to come. It is, therefore, necessary for our pocket-book's sake, in fertilizing to endeavor to strike a happy medium. In fertilizing for quality there is another condition that I think that it might be well to mention and that is that we sometimes have drouths during the late summer and fall, such as we had last year, to the extent that the trees are unable to take up the fertilizer that was applied in early summer, so that when it comes time to put down the fall

application, we would do well to consider this fact and put on a lighter application than otherwise. An over-dose at this time will show up later in the fruit on the trees, having a tendency to make the skin pebbly and rough, as well as retarding the maturity. Much has been said about fertilizers at our meetings, what fertilizers best to use, how and when to apply them and I do not think it necessary to enlarge upon this factor in fruit quality.

SPRAYING

Spraying is by no means a minor factor in the producing of good quality fruit. There is nothing that can lower the quality of fruit more successfully than a heavy infestation of either white fly, purple scale, rust mite or thrips, to say nothing of melanose, scab and other fungus diseases, all of which may be controlled by proper spraying. By proper spraying, I refer to the spraying being done in a very thorough manner at the opportune time. An orange or grapefruit affected with thrip marks, rust, melanose or citrus scab is an unsightly thing, even if the eating qualities are really good; while on the other hand, fruit infested with white fly and purple scale not only lose greatly in appearance, but are also totally lacking in flavor. It is not my purpose to tell how or when to spray, nor what materials to use. I can only say to produce first quality fruit these pests must be controlled and this can be done by spraying. By a careful study of Bulletin 30 of the Agricultural Extension Division of the University of Florida, we may select a spray schedule to fit our own peculiar needs,

that when carried out faithfully, will practically eliminate our grove pests.

PRUNING

There is not a great deal to be said about pruning as related to fruit quality.

However, by keeping our trees in a good healthy condition, and by pruning out so far as is practicable all of the dead branches and twigs, we reduce greatly our source of infection and consequently will have less melanose.

Citrus Fruit Quality

A. H. Brown, Manatee

Your president has asked me to give you something bearing on production of quality in citrus fruit. This is a subject that I think falls more in line with scientific research and not for the layman. However, it might seem best not to depend entirely on the scientist and we can at least give the society the benefit of our observations along these lines.

There are at least four features of the business that must have more or less bearing on the subject in question.

SOIL

The soil feature is one of the most important.

We think, in our section of the State, that we can raise a heavier and thinner skinned fruit on our low to medium low hammocks than can be raised on the higher sandy soils of other sections of the State. We cannot, however, raise the fine appearing fruit that is raised in the Indian river section on a soil that is more or less of a shell formation. Even in our own section of the State we raise, on a very light sandy soil, a fruit that has much the appearance of the Indian river fruit, but this same fruit is thicker skinned and is lacking in the quality, which we might designate "character," that is found in this hammock land fruit.

In past seasons we have covered, in our shipments to the markets of the country, the larger cities from Boston to Denver. This, of course, has included New York. Our experience has been, in the case of New York, that if we have not something that is very attractive in appearance you would better stay away from that market. While it is a discriminating market, it discriminates in favor of appearance rather than quality. Boston, on the other hand, has paid us good money for quality at a time when most of the growers of the State were holding back shipments because they could not see their way clear to pick and pack their fruit and be at all sure of getting their fixed charges out of their shipments.

FERTILIZER

Fertilizer used has a very important bearing on the quality of the fruit. During the war, and for some time afterward, potash was very high and the grower hesitated to pay the price of a grade of goods containing 7%, or more, of potash, and I think the quality of the fruit declined and it is now only getting back to where it was before the war. Personally, in the fertilizers used in the groves in which I have been interested for more than 20 years, we kept up our content of potash

and I think it not only added to the quality of our fruit but increased our production. We think our crop of last season, with an average of 700 boxes to the acre for our entire planting of 170 acres, would be rated as very high.

STOCK

The stock on which your trees are budded also has a great influence on the quality. It goes without saying that on our low hammocks, we would not think of planting anything but that which was budded on the sour stock. Our friends in this vicinity, Lakeland, and all through Polk county, I believe, figure that the rough lemon is the proper thing. Undoubtedly, a larger tree can be produced in the shortest possible time by the use of the rough lemon for a budding stock. However, when it comes to thinness of peel and the character of the pulp, we think the sour stock is in the lead.

VARIETY

Variety has an important bearing on quality.

Our own grove is budded largely to the Walters variety and we consider it one of the very best quality grapefruit grown.

We have, however, some 40 acres of the Marsh Seedless, and while it has features that are desirable, i. e., late ripening and holding on the tree until the latest and the tree is very prolific, yet in quality it is not to be compared with the Walters or Pernambuco. It simply lacks the character found in the above mentioned varieties, which goes to make a fruit that is pleasing to the taste.

CULTIVATION

Another feature that has much to do with quality is cultivation or, we might say, lack of cultivation. We find that the very few inaccessible portions of our grove, that have grown up in Bermuda sod, really gives us some of the finest texture fruit that we raise. However, these neglected corners always suffer during a drought and never develop trees with the bearing capacity that the other trees have. If we could give them all the fertilizer and water that they needed, they might have the combination of both quality and quantity.

The writer well remembers, and I presume many of the older members of this society remember, that the late Dudley Adams, for many years president of this society, was an advocate of non-cultivation and in his day there was no finer brand of fruit on the market than his "Mocking-bird Brand." You never heard him bewailing the fact that his grove was infested with Bermuda grass.

A subject so important to the future of the citrus industry as *quality* should be given more time than will be consumed in the reading of these short papers, and your committee figures that these papers are but the introduction of the subject. More in the future than in the past, will this feature have a most important bearing on the biggest industry of this State. Buyers and consumers are going to be more critical and they will demand more in the way of quality than they have in the past. They will demand a fruit with less rag and more quality juice.

Only recently I saw in one of our State

papers an instance of where a consumer of oranges was deplored the fact that he had been stung in buying California oranges as he said that he could get a full tumbler of juice from *two* Florida oranges where it took *seven* Californias to produce the same amount, and the *quality* of the Florida juice was much superior to the California. Well, we trust he has learned a lesson and in the future purchase none but the best, viz., *Floridas*.

Hume: In continuing this portion of our program I am going to ask Mr. Skinner to speak along this line at this time.

Skinner: Mr. President, Ladies and Gentlemen—I was asked a few minutes ago to speak a little on the importance of quality in the marketing of citrus fruits. When I bring to my mind the word quality in fruit, my mind immediately resorts to the names of Sampson, Wartmann, Green Label, Blue Goose and certain others. These names stand for quality in fruit. Back of these men was the soil. The soil is of the greatest importance. If you look at the grove of Mr. Sampson you will see quality of soil to start with. Look at Wartmann's beautiful groves. That brings back the remark of Mr. Sampson made years and years ago in 1890. He made the remark that it was the extra 50 cents he was after that no one could take from him. The railroad company could not take it from him. That extra 50 cents is alone. He says that it is that extra 50 cents I am after, and he is here and he may remember that conversation.

We cannot plant pineapple oranges on high pine lands. If you plant on high pine lands, plant stuff that is adapted to it.

Don't put pineapple oranges there. My experience is that when you put them on high pine lands they are not at home. If you have the soil for pineapple oranges plant pineapple oranges on it and nothing else. We want to be awfully careful about this quality of fruit. I have not mentioned the government men, Shamel and Scott, who are devoting their energies to producing quality of fruit. Mr. Yothers is trying to help us and Mr. Winston is devoting his energies that we may have quality in fruit.

There are a few ways and means to protect yourself from pests and other things and if we will not be bull-headed, can get that extra 50 cents.

Hume: Mr. Burton, will you please continue this discussion for us.

R. P. Burton: Mr. Chairman, Ladies and Gentlemen—I had not intended to make a talk when I came here, but came to listen. In fact, the longer I am in the citrus fruit business the more I have to listen and the less I know. I happen to belong to the old school who began in the citrus business when the men considered themselves unfit if they did not get into hammock land on which they could plant sour stock.

I think one of the most important things today is to advertise. In years gone by, outside of the State of Florida the only orange known was the Indian river orange. There was a gentleman by the name of Lee, at Rockledge, and he owned the hotel on the Indian river and the tourists were permitted to go out and eat these oranges, and they were the finest in the world. Florida was advertised

through this hotel. Rockledge was only shipping 100,000 boxes of oranges and Florida was shipping over a million of boxes. They got the price and they got that extra 50 cents which Mr. Skinner spoke about. I have a man in mind at Leesburg who I don't believe has ever been out of the county and was never on a railroad train until some friends put him on, and he produced the finest fruit in that section. When anyone else would produce 5,000 he got 1,200 and 1,500 boxes. Now is the question whether we want that 1,500 boxes at \$1.50 per box or 5,000 boxes at 90 cents and sometimes 50 cents. We used to have a tremendous number of varieties in this State. I got the Cunningham orange from a budding at Orange Bend, and New York used to pay more for this orange than any, because it had the quality. Today you cannot find a Cunningham orange. It was the soil it was grown on. You cannot take a piece of pine land and produce on it the pineapple orange that they can produce at Citra, and you cannot produce an orange with the quality; you can probably produce a commercial orange, but not the quality. They do produce some quite fine Valencias in Polk county.

I ship from 2,000 to 5,000 boxes of Parson Brown oranges and I ship the most of them from the 15th of December to the 15th of March. I originally got the Parson Brown oranges in Webster county. I planted the seeds. There is sufficient acid in it that you can eat it in November and December and you can eat it the last of October if you want to ship a green orange. I would rather ship a car-

load of pineapple oranges in January and take 40% less money for them than to ship that same car in September when every car would give the market a black eye. Now the question of quality is what interests the man on the other end of the line, the man who buys this fruit.

You will pardon me for referring to California, but they have taught us a great many things. They used to ship into Boston their first, second and third grades in the same car and they could not understand why Boston would not pay the same for the second grade as for the first. It would give 50 cents more for the first than for the second grade. Boston would not pay for pale fruit, but New York would take pale fruit, but would not take granulated fruit. When you get west of the Mississippi river you never see a russet orange. They do put some out from the San Diego section. There is not anything that pleases so well as a good rich-looking orange.

About twelve years ago there was hardly a decent packing house in the State. Those people recognize the fact that they must not only have the quality of fruit, but they must have the quality of pack, and it must be placed on the other end of the line in the most satisfactory manner possible. I don't know of anything else to be said on this subject.

Coming back to the Indian river proposition. The production of oranges and placing them on the market to sell are different things. I have hammock soil and I have the sour stock, and I can produce good fruit if I will do it. We cannot all produce the best, but we can if the oppor-

tunity will permit. Ten years ago California was marketing Buffalo east, but she went to the Pacific. You can go to the Mississippi Valley. You have California handicapped as she cannot produce juicy fruit. Their orange has only one-third as much juice as the Florida orange, but people have the habit of California oranges because of the beauty of the orange and they are not going to change that habit until we have an orange that appeals to the eye.

Hume: Any further discussion of this?

Mr. Sadler: I have a question I have been trying to get answered for several years. I would like to find out what is the best root for tangerines?

Mr. Sampson. I have my tangerines all on sour stock.

_____: Mine are on lemon stock, and sour stock and those on sour stock hang on until April. They are always good, and you get that extra 50 cents and sometimes \$1.00, \$2.00 and \$3.00. I think that is a very important feature; I think the sour stock is the stock. I think the quality of the soil and the moisture from that soil is what makes your tangerines.

McCabe: I think the soil has more to do with the color and size than the stock.

Skinner: If anybody here has budded grapefruit on bitter-sweet orange I would like to know it.

Sadler: I have some grapefruit on both bitter-sweet and sour stock and so far as I am able to observe, I cannot distinguish any difference in the quality of the fruit

and comparatively little in the quantity. However, there is a difference in the character of the trees as to work and fertilizer, particularly on the same soil. The oil cells are not quite as well distinguished on bitter-sweet as on lemon and the quantity of production is very closely allied.

Hart: I have tangerines on both rough lemon and sour orange stock in the same grove and I have to pack the tangerines on the rough lemon as soon as they color, otherwise they get puffy and very soon get dry. Those on sour orange stock in the same grove will remain and hold shape. I also find a marked difference in the quality of fruit in that same grove. I made the mistake of budding a Washington navel on lemon stock, and a friend of mine has a story of bringing a friend of hers to Jacksonville whom she wanted to give a real treat. She bought a 15-cent orange which was a fine big Washington navel. It happened to be one of my oranges, and it was very sour. I certainly think the stock has a very marked influence on the quality of the fruit, especially in soil like mine, which is high clay hammock and there is no coquina rock under it until you get down about 12 feet. I don't think that affects the fruit.

_____: I am glad I am not the only one that feels that way. I don't think lemon is the thing for tangerines.

Hume: I wonder why Polk county people are so quiet.

Krome: There is considerable reason for this difference in the matter of tangerines. It is due to looking at the wrong end of the trees. I have tangerines bud-

ded on rough lemon stock which can be marketed in October. They took prize at the fair. I never ship any of my tangerines until November. The color is about the same. I have another planting I regularly ship in February, budded on rough lemon. I have another budded on rough lemon and up until two weeks ago they were perfectly juicy. There are many kinds of Dancy tangerines in the State. I believe the difference is due more to difference in strains rather than difference in root stock.

Carson: When they talk about tangerines I know a little myself. I have three varieties, viz., Dancy, Willow and India. They are each one distinct. The Willow and India are very much alike. We have some on sour stock and also have them on sweet seedling stock. They keep very well but the Dancy keeps best. They all get puffy. As far as we are able to see, those on rough lemon are practically alike. We have not been able to observe much difference. That does not answer the question, but that is only from my experience. The older the trees get the better they get. I have some trees budded on lemon stock that have made a very splendid development for the age, and the fruit ripens in standard time. I think that tangerines in our country would be profitable budded on rough lemon stock. I don't think them profitable budded on bitter sweet stock.

Mr. O'Byrne: I understand the tangerine is being used on a stock. I think

I am correct in my statement, although I am unable to confirm it.

Krome: I do not know of any nurseries that are budding on tangerine stock, but I do know that there are experiments of that kind being carried on by the Bureau of Plant Industry. They have been growing the Cleopatra seedling for stock for this purpose for the tangerine. Have seen one or two instances where the tangerine was budded on that stock and they looked to have very promising results. If Mr. Robinson is here he could give some information on that.

Robinson: We have made tests along that line but not of any actual value. To the best of my knowledge there is just one grove in the State in which there is a large number of trees budded on that stock, and we cannot reach any final conclusion from that, but in that one grove the results are very satisfactory. But of course we cannot recommend the stock until more experiments have been made. I certainly hope that no enthusiast will make a general recommendation on the opinion of one grove.

Hume: Along with the quality of the fruit there is another phase that can be vastly improved upon, and that is the outside appearance. This afternoon we will get at that subject. California sells on looks and gets away with it, and Florida could do a great deal more in the improvement of appearance.

Avocado Explorations in Tropical America

Wilson Popenoe, Agricultural Explorer, United States Department of Agriculture, Washington, D. C.

The manifold problems which are faced by Florida avocado growers can only be solved by concerted effort on the part of all those interested in the development of this new industry. The United States Department of Agriculture, desirous of doing its share of this work, has, during the past five or six years, conducted a rather exhaustive survey of the principal avocado-growing regions in tropical America, where the avocado is native and has been cultivated since prehistoric times. The objects of this survey have been several: First, it was desired to bring to light and introduce into the United States, the most promising varieties which could be found; secondly, it was thought that a study of the avocado in its native home might yield knowledge concerning the requirements of the tree which would be useful in connection with its proper cultivation in the United States; and thirdly, it was desired to find, if possible, the wild prototypes of the cultivated avocados, and to study the wild relatives of the avocado, with a view to utilizing such of them as seemed valuable in the work of breeding new forms, or perhaps as stock-plants on which to graft the avocado itself.

Not knowing exactly how far we would

be able to carry this work, we thought it best to commence with the most promising field, rather than to pursue a geographical sequence. Thus it was that in the late summer of 1916 I sailed for Guatemala, where I spent sixteen months, and whence I sent twenty-three selected varieties of avocados to the United States for trial. Some of these have already borne fruit in California and Florida; several are now offered by the nurserymen in both states. In addition to the introduction of these varieties, several wild relatives of the avocado were obtained and introduced for trial—notably the coyo, *Persea schiediana*, and the anay, *Hufelandia anay*; nearly a thousand photographs and many observations on avocado culture were secured; twenty-five thousand avocado seeds were packed and shipped to Washington, for use in growing stock-plants on which to bud the superior varieties; and seeds or roots of a number of promising economic plants, likely to be of value in the southern-most United States, were secured.

The results of this first expedition have been made known through several publications, notably Bulletin 743 of the Department of Agriculture, entitled "The

Avocado in Guatemala," and a lengthy paper published in the Annual Report of the California Avocado Association for 1917. Our next undertaking was a detailed survey of the more important avocado-growing regions of Mexico, most of which had already received attention at the hands of Californians in search of desirable varieties for culture in that State. Mexico and Guatemala have, in fact, supplied practically all of the avocados which have been planted in California up to the present time.

In November of 1919 I sailed from the United States upon the third voyage of avocado exploration, this time with the intention of covering all the important territory which had not yet been touched, and thus completing the survey. I should mention, at this point, that the exploration of eastern Brazil carried out in 1913 and 1914 by Messrs. A. D. Shamel, P. H. Dorsett and myself, while primarily undertaken for the purpose of studying the navel orange in its native home, served also to give us a sufficient knowledge of the avocados of that part of South America, and to show us that there was nothing of great interest there, so far as desirable varieties were concerned. Later, in 1914 and 1915, I was able to visit Cuba and Porto Rico, and to study the avocados of these two islands. We therefore had left before us, when I started upon this last voyage, the Central American countries south of Guatemala, and the western part of South America; certain portions of the latter region, in particular, were *terra incognita* so far as avocados were con-

cerned, and I looked forward to an interesting, though somewhat long journey.

My first stop was in Guatemala, which could scarcely be passed by, since we were in need of a further stock of seedling plants, and there was no better place to secure the necessary seeds. I had completed my work, and was about to proceed southward when I was overtaken by an accident and laid up in the hospital for a month, during which time a revolution broke out. Things finally quieted down so that I was able to pick up my baggage, which I had stored in Guatemala City when I was sent to the hospital, and go through Salvador, which seemed to have nothing to offer in the way of valuable avocados, to Costa Rica, where I thought I might find something of interest. I was not disappointed, for on the slopes of the volcano Irazu, Oton Jibenez and I discovered a wild avocado which we believe may be the prototype of our cultivated West Indian and Guatemalan varieties.

This question of the wild avocado has always interested me greatly. I have seen the wild Mexican avocado growing on the slopes of the volcano Orizaba in Mexico, and I have occasionally run across it in the mountainis of Guatemala, where it may not, however, be indigenous; but I have never felt that the West Indian and Guatemalan varieties could have been derived from this small, thin-skinned, Mexican species. When we found the wild avocado of Irazu, therefore, I was altogether delighted, for this species may be not only the wild prototype of the cultivated sorts, but also—and this of more practical im-

portance—a vigorous stock-plant on which to graft some of the more delicate avocados, and a wild species for use in breeding. In recent years, plant-breeders have come to place much emphasis on the value of the wild relatives of our cultivated plants, some of which have been utilized in breeding with excellent results. The wild avocado may, therefore, prove extremely useful, even though its fruit is not worth eating.

This wild avocado of Costa Rica—*aguacate de anis*, or anise-scented avocado, it is locally called—grows in small ravines and on moist slopes at elevations between 4,000 and 6,000 feet. The tree much resembles that of some of the Guatemalan varieties, except that the leaves are thicker and stiffer, and strongly anise-scented when crushed. In this latter respect they resemble the Mexican race of avocados, and it may appear at first glance that the Guatemalan and West Indian varieties, which do not possess any of the anise-like odor, can not have been derived from this wild species. But all studies of cultivated avocados have shown that this odor is not a definite character; it varies in amount, and it is altogether possible that long cultivation has entirely eliminated it from the cultivated forms. The fruits are about the size of a baseball, quite round in form, dark green on the surface, and extremely hard-shelled. The seed is large, and is surrounded by a small quantity of yellow, rather gritty pulp, which is oily, rather dry, and has, in addition to the typical avocado flavor, a large amount of anise, so that it is scarcely eatable.

Seeds of this wild species were sent to the United States, as also budwood, but the latter failed to reach Washington alive. Further supplies of both will be obtained through Sr. Jimenez, a young botanist of San Jose de Costa Rica, who has collaborated with us very generously.

Aside from the wild avocado, two or three of the best cultivated varieties were obtained from the region about San Jose, and have been established in this country. These seem to be of the West Indian race, and are worthy of trial in southern Florida, since they may prove to ripen at a different season than the sorts now cultivated in this State. In quality I do not believe they are quite as good as several of our present commercial sorts.

From Costa Rica I went down to the Canal Zone, and then shipped for Santa Marta, Colombia. Before leaving the States on this last trip, I had talked with Mr. Krome of Homestead, and he had emphasized the importance of securing an early-ripening variety of the West Indian race, for cultivation in southern Florida. He had mentioned the fact that avocados reach New York from Santa Marta, Colombia, in the month of June, and he suggested that I might there find unusually early-ripening sorts. I had also heard that avocados grew wild in the mountains back of Santa Marta, forming small forests. I was therefore, keen to see this region.

It proved something of a disappointment. The cultivated trees are of the West Indian race, and shipments to New York during the month of June are pos-

sible because, firstly, the climate of Santa Marta is extremely hot and the fruits mature more quickly than in Florida, and secondly, the natives gather them before they are fully mature. I found, however, that there were some very choice seedlings in this region, and I selected one of the best and sent budwood to Washington. This variety we have named Fernandez, in honor of Sr. Fernandez, who was local manager of the United Fruit Company at the time of my visit, and who has since died of one of those malarial fevers which desolate the tropical American sea-coast.

As to the wild avocados of Santa Marta, I found that they are escapes, and of the West Indian race. Such a lot of inferior West Indian seedlings I had never seen! In some places the mountain-side was covered with the trees, which formed veritable forests, and the fruits lay upon the ground in thousands. The quality of these fruits is scarcely good enough, save in exceptional instances, to warrant shipping them to New York.

From Santa Marta I went up the Magdalena river, and across the Andes to Bogota, the capital of Colombia, where I headquartered for several months. The avocados of this region proved to be inferior West Indians, and there was nothing of value to be had; so I finally left Bogota, after collecting some very interesting and remarkable blackberries, and a number of other things, and rode across the Andes to the Pacific coast, where I shipped for Guayaquil, Ecuador, and went thence by rail to Quito, a fascinating old Spanish city which lies high up in the

Andes, only twelve miles from the equator. Here I headquartered for eight months, during which time I covered the Andean region of Ecuador from one end to the other.

While in the northern part of the country, I spent a few days in the town of Ibarra, and here, in the market-place, I came across some avocados which immediately commanded my enthusiastic attention. They appeared to be of the Mexican race, but were larger and finer than any I had ever seen in Mexico, or in California. I was told that they came from the valley of the Rio Chota, half a day's ride north of Ibarra. Immediately I made my plans to visit this valley, and I was just about to depart when I was unceremoniously grabbed by the police and whisked off to jail. Ordinarily I do not mind a thing of this sort—I had become quite accustomed to it in Guatemala—but just at this moment, when I had some new and remarkable avocados almost within my grasp, I found it decidedly annoying. The chief of police refused to tell me the nature of my crime, but informed me that he was familiar with my past. This, of course, explained my arrest; in fact, I often wondered that I had so long been allowed to remain at liberty. I argued; I entreated; I attempted to bluff a little, in a half-hearted manner, but all to no avail. I was to be held until orders came from Quito.

Realizing that a mistake had doubtless been made, I telegraphed the American Minister, and before morning received his reply, which read: "Have presented your

case to the Minister of Foreign Affairs. Orders for your release will be issued tonight by the Minister of the Interior." This brought joy to my troubled heart, and I again saw the avocados of the Chota valley within my grasp. In the morning I was allowed to depart, after learning that I had been mistaken for a German who was reported to be escaping from Colombia with stolen property, and I was soon in the hottest and dryest spot I had seen in many a month—the Chota valley of northern Ecuador.

This remarkable region contains several thousand avocado trees, most of them belonging to the Mexican race. There are a few West Indians, and perhaps a few hybrids. The Mexicans were probably carried there by Spanish monks, who owned and operated a large Hacienda in the valley for two centuries or more.

For the following three months I was occupied in getting out bud-wood from this valley, and shipping it home to Washington. It was about the most difficult job of this sort which I have ever tackled. First of all, the trees were dirty and in bad condition, which made it impossible to secure first-class bud-wood, and secondly, I had to cut it, carry it on mule-back to Quito, a journey of three days, then pack it and ship it down to Guayaquil, whence it was carried by steamer to New York. It took a full month to land the bud-wood in Washington, counting from the day I cut it in the Chota valley, and out of three shipments which I made, we saved only a few buds of five varieties. The most promising of these I have named Tamayo, in honor of my excellent

friend, Jose Felix Tamayo, a young Ecuadorean who gave me all possible assistance during the time I was in northern Ecuador, and without whose good offices it would have been well-nigh impossible to secure the Chota avocados. Tamayo is, as far as can be judged from its appearance, a Mexican avocado; but it weighs eighteen ounces, has a small seed, and the flesh is free from fiber and of excellent quality. The four other varieties which have been successfully introduced are slightly smaller than Tamayo, but all of good size and quality. If these avocados are true Mexicans, they ought to prove as hardy in the United States as other varieties of the Mexican race, and in this case they will be extremely valuable; for everyone is learning that it does not pay to plant any but the hardiest avocados in most parts of California and Florida. At least, there is a frost-hazard which is sufficiently serious to merit consideration.

Outside of the Chota valley, I found nothing of interest in Ecuador, so far as avocados were concerned, though I got some very interesting blackberries and raspberries, a remarkable cherry, and several other promising fruits. I went down to Peru, and looked over the avocados in the vicinity of Lima, but they proved to be ordinary West Indians, inferior to the best varieties of southern Florida, so I did not tarry, but proceeded to central Chile, where I knew there were many avocados of the Mexican race. In the vicinity of Quillota, between Valparaiso and Santiago, I found several thousand trees, but from all I could learn, they are small-fruited and not likely to be of much value

to us. I therefore filled a huge trunk with strawberry plants, native varieties of apples, peaches and plums, and a few trees of a remarkable dwarf orange which was given me by Salvador Izquierdo, one of

Chile's best known horticulturists, and then climbed on board a direct steamer for New York, which port I reached after twenty days, just two years from the time I had embarked for the tropics.

Possibilities of Sub-Tropical Fruits in Florida

H. E. Stevens, County Agent, Lee County, Fla.

In a paper before this society last year, Mr. Krome brought to your attention some recent developments of sub-tropical horticulture in Florida. Today I would like to consider for a short time the future possibilities of some of our present known tropical fruits, omitting entirely the citrus group, which has long since become our leading fruit crop. We have made considerable progress during the last decade, especially with the avocado, and I believe the day is not far distant when the commercial production of avocados will assume proportions equalling that of citrus, in a good many sections of our State. There is a large area in Florida where the avocado may be grown and as soon as we can settle on the more desirable varieties to grow, which is rapidly coming about, there will be a great impetus to the planting and production of the avocado. The food value of the avocado is a strong point in its favor. It is more than a luxury although it may be considered as such now, when we think of the prices some of these fruits bring, on the northern markets. The food value of the avocado will encourage its greater production for local use, and, if properly distributed and advertised, I do not believe there will be any danger of over production in commercial plantings, for years to come. Our prox-

imity to the markets, our climate and the large area within the State that may be devoted to the growing of avocados peculiarly fits Florida to lead in the production of this commodity if the growers of the State wish to assume that lead. The industry is yet young, but interest is becoming more manifest and unless I am badly mistaken, there will be a large acreage planted to avocados during the next few years. There will be mistakes and some failures as is true in the building of any new industry, but we may expect these and we must overcome them. Mistakes and failure are more apt to be due to the individual rather than the principles underlying the industry.

The growing of fruit or other crops on a commercial scale is a business proposition, and business principles can no more be ignored in the production and marketing of avocados than in any other business.

In my own section of the State, Lee county, considerable interest has been awakened during the last year or so in planting avocados. There are several commercial plantings now under way and one small nursery that had 4,000 trees for sale this season sold out its entire production and could have sold twice or three times as many. This, to me, is a favor-

able sign for the industry, and the demand for trees far exceeds the supply.

Every home owner in Florida may have an avocado tree in his door yard if he so desires, and I heartily indorse the slogan of "Plant an avocado tree or seed" where it is possible to do so. The Mexican avocado is very hardy and will withstand the low temperatures in northern Florida if the tree can be brought up to three or four years without severe freeze injury. For home use, especially where the more tender varieties can not be grown, the Mexican type will serve every purpose. It is not desirable as a commercial fruit. The Guatemalan types can be grown in the central and southern parts of the State where the temperatures are not so low. This type will, no doubt, furnish us with our leading commercial varieties. The West Indian type will have to be confined to the southern part of the State as they are very susceptible to low temperatures. I will not attempt a discussion of the different varieties at this time as a great deal has already been written on this subject and we have much more yet to learn before the matter is finally settled.

The critical period in the growing of an avocado tree is in its first few years of growth. If it can be protected from frosts or freezes until it has attained three or four years' growth, I see no reason why a grove or planting could not then be carried through any ordinary freeze by some system of orchard heating.

In addition to the avocado we have other sub-tropical fruits that in my opinion offer wide possibilities for development. We do not seem to have made as

extensive use of some of the fruits we have in our midst as we might. As citrus culture has been developed and as we are developing the avocado, why not apply this to the mango, the guava, banana, papaya, surinam cherry, carissa and other fruits we are now growing largely as novelties?

The increased production of these fruits may be considered from two view points: that of home use and commercial production.

For the home we should make use of as many different fruits as possible and arrange our plantings to have fruit the entire year. In many sections of Florida, especially the southern part of the State, this is possible.

We should confine ourselves to the fruits that are adapted and do well under our particular climatic conditions, and, if we do this, there is generally a wide field to select from.

I find that it is difficult for the newcomer in our section, especially if he comes from Northern states, to forget his taste for northern fruits, and he will invariably want to plant out many of the fruits he has been accustomed to. He wonders why peaches, pears, plums, apples, cherries, gooseberries and the like will not grow as well in Lee county as they do back in Illinois, or some other state.

Nature has seen to it that the northern and southern fruit growers will not come into direct competition with each other as far as the same commodities are concerned, and we can not always make a satisfactory change in the laws of nature.

I suppose there are few of our northern friends, or southern either, for that matter, who would think of planting citrus, mangos, or avocados in either Michigan or New York, yet each of these are famous fruit producing states. So why waste time with fruits peculiarly adapted to our northern climate here in the South when we have so many at home that can be readily utilized.

For the home, lack of space is no valid excuse for not having a liberal supply of fruit. The ordinary building lot or door-yard will supply space enough for a sufficient variety of trees to keep the family in fruit. Our tropical fruit trees do not object to crowded conditions, as this is more nearly their natural environment. A single citrus tree, by the simple process of budding, can be made to carry early, mid-season and late oranges in addition to grapefruit, and on three trees the entire list of citrus fruits of economic value may be had. These should supply the ordinary family with citrus fruits in season. A seedling mango tree can be made to bear, by top working, four or five of the choice varieties, and the avocado can be treated in a similar way. Guavas, papayas, bananas and other fruits can be added to the list until the home planting is made complete and sufficient to meet the needs of the family.

It appears to me that we have neglected the home planting sadly in many cases, and that we are not utilizing the fruit trees we have at hand to the best advantage.

The home planting can be made the means of stimulating a wider use and de-

mand for a number of the tropical fruits which are now grown as occasional specimens. By using more of these fruits ourselves and by preparing them in a variety of ways, a greater demand can be created for them.

Many of us may not care particularly for some of these fruits in their raw state, but, if they are cooked, preserved, made into jelly or conserve, a pleasing and appetizing product is produced. In this connection the ladies of the State, the Home Demonstration Clubs, and the Home Economics Department of our Extension Service can aid materially in creating a demand for these fruits, by finding new ways for serving them or new uses to which they may be put.

If you will pardon a local reference I would like to cite one illustration along this line which brings out the point I have tried to make. The ladies of the Home Demonstration Council of Lee county, recently published a cook book. This cook book is rather unique in that the recipes were furnished by various ladies of the county, and they applied chiefly to the use of the local grown products. Many of them were new and original. Some fifty or sixty of these recipes apply to the use of the fruits grown in Lee county. So if the ladies interested in our home fruits will exercise their ingenuity a little further on some of our lesser known tropical fruits, I feel sure that a greater demand will be created for these fruits and their products. If we use these more extensively among ourselves, it will not be long before our tourist friends become acquaint-

ed with them and a market practically unlimited will be created.

Turning again to the commercial production of sub-tropical fruits the mango may be considered next in importance to the avocado. There is a ready market for the finer varieties of this fruit grown in the State at the present time, and the common seedlings are easily disposed of locally. The uncertainty of the crop has been a drawback to the development of the industry, and if we can overcome this by suitable varieties and better cultural practices, there is a future for the production of mangos in Florida.

In Lee county the common seedling mango trees make a rapid, vigorous growth, with very little care and practically no fertilizer. The fruit is generally small, full of fibre, but of fairly good flavor. It is not suitable for shipment to the northern markets in competition with the better varieties. The crop is uncertain although the trees bloom profusely every season.

If we can put a larger and better quality of fruit on such trees and insure the production of an average crop each year, there will be large profits for the mango growers in this section. These are some of the problems to solve in connection with the growing of mangos, and I believe in time they will be solved. It is an industry that offers promise and one that should command more interest.

In the guava there are commercial possibilities that have barely been touched upon as yet. This fruit grows well in South Florida with very little attention or care, and it produces well. If proper va-

rieties were developed, planted in grove form and brought under cultivation as any other fruit crop, the production of guavas could be made to pay well. It is a fruit that lends itself to a variety of uses, and the products made from it have met with favor in many places in the North. Guava jelly is a well known commodity and easily disposed of, and other products of the guava would no doubt find a ready market. Except locally, the guava can never be marketed as a fresh fruit, but the canned guavas, jelly, preserves and other products could be put on every market in the United States. I believe the canned guava would take well. I see no reason why it should not easily compete with the canned peach, if put up as attractively and given a reasonable amount of advertising.

We consume thousands of cans of peaches in Florida each year which come from other states in the North. May we not substitute canned guavas for some of these and in addition send our canned guavas into the northern markets. A guava industry would necessitate the establishment of canning factories in the State and these could be put to use in caring for other products, that annually go to waste.

A canning factory or enterprise for taking care of waste products is an important adjunct to any fruit industry, and it is something sorely needed by the fruit growers of this State. We can create a ready market for all the guava products we can produce and there are acres of land in South Florida today producing only sand spurs and palmettoes which might be devoted to the growing of guavas.

The banana is another fruit that we have done very little with, and which has latent possibilities both for home consumption and commercially in a local sense.

We pay handsomely for the fine bananas furnished us from the South American countries by the American Fruit Company. These usually sell for 50 to 60 cents per dozen in our local markets, while the home grown product can be bought for half that much when obtainable.

I recently read a little booklet on the banana, published by the American Fruit Company, which gave in detail the trouble and expense involved in supplying us with the excellent banana. They may be fully justified in the charges they make for their product, but why should we, here in Florida, pay such prices when we can grow bananas at home for about half that price?

There is a lot of land in Florida that will grow the banana, and it should not be an expensive crop to produce in a small way.

I believe that in any county where the banana can be safely grown, sufficient soil can be found to produce fruit enough to supply the local markets in that county, and a few banana plantations in the State could easily take care of the Florida markets and some of those in our neighboring states.

We have done much to develop and extend our citrus industry and it will continue to extend, always remaining the leading fruit crop in the State. However, it seems to me that there are great possibilities in some of these fruits I have mentioned if we devote the same interest and energy to their production and marketing. The Horticultural Society can aid materially in encouraging and fostering this development.

Avocados on High Pine Land

John Morley, Lake Alfred

My remarks are described as "Avocados on High Pine Lands," but before going into this, I must say, that I am experiencing this evening a somewhat novel sensation, for although I have been greatly attracted to the avocado for the past five years, my stimulus has been greatly increased after hearing such a good report from Mr. Stevens, and so much so, that I shall be inclined to plant more and more.

The avocado, so far as I can gather, was first introduced from the West Indies in the year 1739, and from this we may note, it has been on record a long time. In my opinion the fruit, from a nutritious standpoint is unrivaled and may be gathered when ripe without any treatment or curing; further, the most delicate stomach can digest the avocado fruit, when animal fats may upset it. I would further say, that I long for the day when we can have this fruit in plenty. For although I am not a vegetarian, I am thinking that as I love the taste so much, when the day does come that we can have them in abundance, I shall not need much of the bovine, that tells no lies, wanders on the prairie and on mischief bent, lustily tears and eats up our vegetation in yards, gardens and groves.

The avocado tree in my opinion would make a good shade tree on our way-sides and should be used more than it has been in the past, for it has a singular striking appearance, combined with good spreading branches. Probably it may not be generally known, that it is said, that marks made with the seed on a white wall will turn as red as blood and cannot be effaced until the wall is whitewashed and even then only with difficulty.

I am not in a position to say that you should follow a definite plan in your planting on the so-called "high pine lands," for although I have spent my whole life in studying and working amongst trees and plants, my experience on the subject before us only covers five years. However, in all our works we must form a base or construction line to work from, particularly so, when you are not growing your trees on a well enriched humus area, for you must realize that the sudden fluctuations of heat and moisture quickly affect the avocado, more particularly during its early life.

Just as individual tastes differ on various matters, so does the result change according to the treatment you give your trees in the first place. It is well known that good food is requisite for this tree, or

good humus, whereby food can be incorporated. This brings to mind a true story of a gentleman who, with his gardener was showing an interested friend around his garden and pleasure grounds. After they had passed over all the interesting trees, they came to an enclosure in an obscure corner. The gentleman paused a moment and with a smile of satisfaction and finger pointing to a manure heap said, "There, is my head gardener."

In my opinion, to obtain returns in the early days from your trees on high sandy pine lands, it is necessary for them to be provided with a stable manure, under and on each side of the plant, though not nearer than say three inches to the roots. Should this not be procurable, then use the next best thing, decayed vegetable matter, such as may be termed "muck." Added to this, do not omit steamed bone, for I have found in experimenting, that where I have opened up the soil, the young roots have literally hugged the small particles of bone.

It is of no use "beating about the bush," as the saying goes, for there are a great many of us in our planting schemes and after attention thereto, who seem to forget the words, "*be thorough.*" This brings me to a remark made by a well known lady in the Florence Villa district, who said, "Yes, we see today so many instances where in the past, people planted their five-dollar trees in less than one-dollar holes." The moral being, that had they put more money into the preparation for the plant, better returns would have followed.

We now come to water, which is a

greater necessity than we have hitherto thought and in my opinion all plant life on these high sands needs much more than they receive from the clouds. I like water, even sometimes mixed, but in any case regularly during my waking hours, and we are apt to forget that these trees require water regularly just the same. If our neighbors are all following the same method, like one goat follows the other on the mountain trail, we are inclined to follow in like manner and go harrowing and harrowing. So far as it goes, it is alright, and we preserve our trees by so doing, but to get the best out of them in our early as well as later days, we must watch and give them water before they get too far, for although we stir the ground by harrowing, this necessity of water calls, I think I am right in saying, at some period or other every year that goes by.

Our first trees of 590 Trapps and 10 Pollocks were planted during July, 1917, and are now of various sizes up to 16 feet and even more than that in width. There is one distinct observance I have made, that we on high sand can produce a tree with many more short fruiting branches than is usually found on trees on muck soils; naturally we fail when it comes to producing long vigorous shoots.

The method of planting the first batch will show you an omission of stable manure, for each hole was cut out to a depth of $2\frac{1}{2}$ feet and about 3 feet in diameter. The top soil was used in the bottom and on the sides of the ball of the tree, then a mixture of 2 pounds of steamed bone, 1 pound of castor pomace and $\frac{1}{2}$ pound of goat manure was carefully put around the

sides and bottom so as not to be nearer than 4 inches from the roots. I must say that this is dangerous quantity to use if not carefully carried out; however, I personally saw to this being dealt with in every case. Careful shading was adopted so that the mid-day sun could not reach them and frequent watering, which is very important, was attended to.

FERTILIZING

This has been given as follows: First year, 1 pound in one application during September; second year, applied four times, at the rate of $2\frac{1}{2}$ pounds per tree; third year, $4\frac{1}{2}$ pounds each time of three applications; fourth year, $6\frac{1}{2}$ pounds per tree three times during the year, and this year 9 pounds at each application. So far, I have never applied commercial fertilizer later in the year than September.

MULCHING

This has been carefully carried out up to this year on the first batch of trees and I have now decided to abandon this, after the fourth year, on our sandy soil, and follow up by periodic harrowing, as I am of the opinion that the nursing of small roots near the surface after this age is liable to court disaster and I would prefer keeping the roots deeper and encourage them nearer the center of the rows. The time may come when the trees will make a general shade over the ground, and I may then, again consider the necessity of a general mulching, for weeds and natal grass should not be such a menace at that period.

With regard to insect pests, our greatest trial has been the pyriform scale on some of the trees amongst the Trapp variety only; however, with three applications during December, January and end of May of 1 to 70 and 1 to 80, respectively, of Oil Emulsion we have kept them down fairly well. During February we have given lime sulphur at the rate of 1 to 60, and again in March, Bordeaux and Black Leaf 40 during the flowering season.

Our Trapps produced a few fruits after the second year after planting and the third year they set on an average six fruits to each tree, but all these did not fully develop. Last year we had few blossoms and hence little fruit. This year nearly every tree was laden with blossoms. Unfortunately I may say, owing to the unusual dry period, the setting is not good. In future, we trust now that we have bought some experience that a water scheme or irrigation may assist us to obtain better results. As to the Pollock variety, this shows blossom, but has not brought any fruit as yet.

PROTECTION

So far we have relied on hay piles and wood during the past year, but in future we shall adopt other means, as our trees are getting larger each year.

Under experiment we have over 23 distinct kinds and about 40 Guatemalan seedlings, which show distinct characteristics, therefore we have some hopes of seeing something new as time goes on.

As to propagation on general lines, I leave this to the nurseryman, for he has to

go on and I have only experimented in a small way, chiefly on the Mexican stock; however, from experience I might say that as a stock as seen here I shall not favor it in future, for it pushes forth into growth much earlier in our locality than

the West Indian or Guatemalan, therefore leaves us open to danger if a cold snap comes along.

In conclusion, we must be thorough in all our work and hope that this nutritive food may stand us in good stead.

A Hardy Mexican Avocado

C. C. Shooter, Earlton

A good deal of interest is being taken in the Mexican avocado growing at my place at Earlton, on account of its exceptional hardiness and the good quality of the fruit. It has stood the test of 22 winters, including 1917, without ever losing any wood and only a few leaves. Orange trees on the same block have been badly hurt and grapefruit trees killed outright. It is a vigorous grower, making an immense tree 40 to 50 feet high and seems to be practically free from insects and other enemies. It makes a magnificent ornamental, growing much quicker than the magnolia.

So far, it has produced 800 to 900 fruits per season; would probably bear much more with irrigation or on damper soil.

The fruit, although of only medium size, is very rich and fine flavored and was noticeably larger last season as the result of a little fertilizer.

It does not seem to be generally known that the avocado can be used otherwise than as a salad. We have found it excellent cooked in a variety of ways. Avocado custard pie is truly delicious.

The Satsuma Orange

H. K. Miller, Monticello

Once upon a time, in the not very distant past, the center of Florida's citrus industry was many leagues north of its present limits, and there are those present who remember when all the counties of North Florida boasted of the excellence of their oranges. However, the recurrent visitations of Old Boreas have pushed the citrus industry down into the peninsula or central and southern part of the State, leaving only here and there an isolated specimen of an orange tree, more persistent than its one-time fellows, as a mute and lonely witness to the past golden age of North Florida. In the days of which I speak citrus culture was more of a luxury than a commercial enterprise and it seems to me that the wintery visitations did far less injury in killing the groves, than it did by producing a chronic case of cold feet throughout all North Florida. Had this section of the State persistently striven to produce oranges in spite of adverse circumstances, I believe it would, today, be contributing annually, thousands of cars of Florida gold to the markets of the North. This would have become possible by adopting the Satsuma orange for that section, growing it upon the citrus-trifoliata stock.

The Satsuma was introduced from the Orient and has been grown in Florida for more than forty years, in fact since 1876, having been first tried by Mr. Geo. R. Hall. It belongs to the Mandarin group of orange, so named as indicative of the high esteem in which they are held in the Orient. This variety is especially adapted to the trifoliata stock but appears to be incompatible with other stocks in general use. It is not only inherently hardy, but when grown upon the trifoliata it is decidedly so, due to the fact that this stock is a deciduous plant and becomes dormant during the winter season. It has been known to withstand a temperature of 14 degrees F. with no injury, not even becoming defoliated. The trees have been killed, however, when full of sap, by much less cold.

It is passing strange that the Satsuma did not immediately come into general use after the disastrous winter of 1894-5. Possibly the reason is because of the peculiar habit of the Satsuma to be largely influenced by the conditions under which it is grown and consequently the variety thought to be so uncertain as to be unworthy of extensive trial. Had it not been for this peculiarity or had its cultivation been better understood, there is little

question but that North Florida would have undertaken the growing of the Satsuma on a commercial scale soon after its introduction into the State. A small acreage was grown with decided success by the Glen St. Mary Nurseries at Glen St. Mary. This planting was made about 1890.

It was about 1900 that the planting of Satsumas assumed a considerable magnitude, hardly so much in Florida as in Alabama, Mississippi, Louisiana and Texas. A fair degree of successful production of trees planted throughout the Gulf Coast country soon led to a veritable boom in this enterprise. Millions of trees were imported from Japan. The inexperienced promoter soon occupied the center of attention and very extensive plantings were made in Texas with little regard to the type of soil or location with reference to frost protection. In that state alone the annual plantings exceeded the million mark. For the most part, this effort was put forward by new settlers who were inexperienced or else unaware of the periodic northerns which sweep over Texas from time to time. A succession of these blizzards from 1912 to 1915 practically exterminated the orange growing industry of that state. Such orchards as escaped the cold in the extreme south of the state were in a large measure unsuccessful on account of non-adaptability to the alkali soil prevailing in that section.

The widespread infection of citrus canker, which had been introduced from Japan on imported trees added to the general demoralization and retarded further ef-

fort, not alone in Texas but in all sections where the Satsuma was being tried out.

From 1907 to 1915 aside from Texas perhaps the most extensive plantings were made in southern Alabama, chiefly in Mobile and Baldwin counties. The plantings here as in other sections were for the most part pioneer work, engaged in by new settlers or those otherwise inexperienced in the cultivation of citrus fruits. As a matter of fact, very, very many undertook to grow Satsumas who had had no previous training or experience in any line of horticulture. The significance of this statement may be more fully appreciated when it is pointed out that the successful handling of a Satsuma proposition calls for as much and indeed probably very much more intelligent thought and action than the present highly complex business of growing and marketing of round oranges. Notwithstanding this initial handicap, the development in Alabama reached a considerable degree of success and was giving promise of a new and wonderful enterprise, when the unforeseen events came very near duplicating the disaster which had only recently befallen the industry in Texas. First the World War so upset calculations of many of the growers that progress was seriously impeded. Then a tropical storm during July swept the coast from some miles east of Pensacola westward into Louisiana with terrific force, defoliating practically every Satsuma tree in this wide region. The result was that the following fall found all these trees in full sap with tender foliage. As luck, or fate, would have it, a sudden drop of temperature to 22 degrees F. occurred in No-

vember without any previous cold or other condition to harden the trees for such an emergency, killed thousands of them to the bud and so injured others as to almost dishearten their owners completely. Add to all this the heroic effort to exterminate the citrus canker which had become thoroughly disseminated in this section, is it any wonder that interest in Satsumas was at low ebb? Many orchards were abandoned and comparatively few were given more than nominal care. In the course of two or three years many of the more favorably located orchards made rather remarkable recovery and at the earnest appeal of Dr. Winberg, president of the Gulf Coast Horticultural Society, many of the owners undertook to rejuvenate their orchards by taking them in hand for proper care. These have responded to a remarkable degree, so that the ravages of the storm and subsequent cold have been largely overcome.

Among those who never lost faith in the Satsuma is Dr. W. H. Ludewig of Foley. He persisted in caring for his 20-acre orchard regardless of the many discouraging circumstances and was rewarded by being the first to ship a car of Satsuma oranges from Baldwin county. He followed this initial shipment with six cars for each of the past two seasons.

To Dr. Ludewig's indefatigable optimism and untiring effort must be largely credited the present hopeful situation of the Satsuma industry of South Alabama. The two counties, Baldwin and Mobile, shipped 250 cars the past season, and these netted the growers very satisfactory returns.

A decided revival of interest is now manifest in Alabama and more attention is being given to spraying, cultivating and fertilizing the orchards there. It is estimated that additional plantings were made in Alabama last winter of more than 200,000 trees. This revival of interest is not confined to Alabama, but is also in evidence in North Florida and states further west.

Having in mind the experiences of the past twenty years, it seems only proper that we should endeavor to profit by them and avoid as far as possible the errors of the past.

That the Satsuma is a most excellent fruit and reaches the market at an opportune time for supplying a missing gap, cannot be gainsaid. It is also true that the Satsuma may be and frequently is, when grown under improper conditions, such a poor excuse for an edible fruit as to be worthless. It behooves us then to see to it that we learn how to produce good fruit and above all things never allow inferior fruit to reach the market, else it will become impossible to induce the public to buy. This is especially true of such products as the Satsuma, which cannot become staple articles of trade like the apple or the round orange which enjoy a prolonged season of sale.

A well known writer has written, "For ways that are dark and tricks that are vain, the heathen Chinee is peculiar." Now the Satsuma is a full-blooded "Chinee" and coincides to a nicety with this author's opinion of its fellow citizens. You will get the point if you attempt to grow this variety upon sour or-

ange stock. It will be abnormal in size, coarse textured, mostly rag and otherwise totally unfit. The same condition prevails when grown too rapidly even on the trifoliata stock. This calls for due care in the selection of soil and climatic environment, and also in the manner of fertilizing. If any one of these conditions is not right it will be manifested in the quality of the fruit. Under the most favorable growing conditions there will always be some inferior fruit that should invariably be discarded and not allowed to get into the market. The experienced packer can usually tell such fruit at a glance.

In Florida there is an extensive area in which the Satsuma may be grown with success. This extends from Perdido Bay on the west to the Atlantic on the east and as far south as Gainesville. Within this region there are numerous types of soil and other factors, such as elevation, exposure to undue cold, etc., which would disbar any attempt at the cultivation of citrus fruits, but on the other hand, where the soil is suitable and the location good it would seem that the Satsuma can be grown with about the same degree of safety and assurance of success, as pertains to the growing of round oranges in the present confines of the upper citrus belt of the peninsula. To my mind, North Florida has been overlooking a splendid opportunity for developing the production of the Satsuma on a commercial scale. Here we have advantages of soil, climate, proximity to markets, freedom from storms, in a degree possessed by no other section of our country. Perhaps this section may yet come into its own by taking

advantage of the experience gained in other sections so that the foundation may be laid on more dependable knowledge of the essential requirements.

To the prospective grower of Satsumas I would suggest and even urge a deliberate and careful study of the subject in all its relations before embarking in the enterprise. The question of suitable soil and proper location for immunity from cold, the nearness to shipping facilities, possibilities for irrigation and other factors which may have a decided influence on the operations should be given intensive and profound thought before you become anchored to a situation which may prove objectionable. By no means secure a location because it is inexpensive as to first cost, as in the end it may prove a costly investment. Rather make a study of the orchards which have proven the most successful and endeavor to duplicate as far as possible in your selection of a site the good features which are prime factors making for success in these orchards.

There is little excuse for making an unwise selection of a location at this stage, since there is an abundance of good soil adapted to the matter under discussion, well elevated with good air drainage to afford protection. The price of suitable land is a consideration which should never cause one to select an undesirable site. At this time there are thousands of acres of ideal locations at prices ranging from \$15 to \$50 per acre. In many cases the land is cleared and free from stumps. An orange grove is a life-long enterprise and is worthy of the best land available. "Why

kick against the pricks" by endeavoring to make a market for some cheap cut-over land fit only as earth ballast, when the best can be had at a price less than the cost of clearing the poorer land?

Endeavor to visualize the future and see the orchard in its fruition with all its problems of maintenance and marketing

and resolve to equip yourself with all available knowledge for the successful prosecution of the enterprise. In this way you may contribute to the upbuilding of this wonderful country with interest, with pleasure, with pride, and I sincerely hope and believe, with profit.

Recent Experiments With Thrips on Citrus

J. R. Watson, Gainesville

Thrips injure citrus in two ways. (1) Their feeding and egg punctures cause considerable of the fruit to drop. This would be more serious if the citrus tree did not normally bloom so profusely that a large proportion of the fruit must necessarily drop.

(2) Their feeding punctures on the young ovary result in shallow injuries which develop into scars that mar the appearance of the fruit and lower its grade. The work during the two years just past has had more to do with the latter type of injury, namely, the scarring of the fruit.

The scars produced by thrips are very characteristic and need not be confused with those produced by other causes, although, of course, they may be complicated by the latter. They differ from scab in being sunken rather than raised, but are not as deeply sunken as those resulting from the feeding of grasshoppers and katydids. They differ from melanose and mechanical injury including rubbing against twigs or leaves in that they are smooth and shining rather than rough, as well as in their peculiar irregular shape.

Oranges are much more severely injured than grapefruit. Thrips are not present in numbers in the trees until the

bloom begins to open. They then fly into the trees, mostly from other blossoms, especially weeds. In the flowers they feed mostly on the bases of the petals and stamens. They are sucking insects but their mouth parts are very short, only a fraction of a millimeter, less than a hundredth of an inch, and consequently their punctures are very shallow but numerous and placed close together.

Attacked stamens and petals turn brown in spots and fall prematurely. Eggs are never laid in the petals or stamens but always in the receptacle, the enlargement of the stem to which the fruit is attached. They are laid in shallow slits just beneath the epidermis of the plant. They hatch in three or four days and the young at once crawl into the blossom or onto the young fruit. The scarring of the fruit seems to be caused mostly by these young thrips of the second generation. As soon as the petals and stamens drop, the winged adults practically all leave and fly to other blossoms; but the young which have no wings remain and feed on the young fruit. However, they do often crawl from the receptacle on which they were hatched to neighboring freshly opened blossoms. But even in fresh blooms they collect largely at the base of the ovaries. Their

preference of feeding grounds is somewhat different from that of the young thrips. They require about two weeks to complete their growth.

CONTROL

The most efficient insecticide, all things considered, is a combination of lime sulphur and tobacco. Soap and tobacco will kill the thrips fully as well, but because of its greater value against rust mites and red spiders, which are often beginning to increase about blossoming time, the lime sulphur is preferable.

Lime sulphur alone is not an efficient insecticide for the Florida flower thrips. I want to emphasize that point, for not a spring passes without some one breaking into print with a recommendation of straight lime sulphur for this thrips. This idea originates, I think, from the publications on the California orange thrips. The latter is not only a different species from ours, but belongs to a different genus as well, and is a smaller and more delicate insect.

On the other hand, tobacco alone is not an efficient agent unless used at a concentration which makes it very expensive. As to the amount of tobacco, we have found that in combination with lime sulphur solution at the ordinary rust mite strength, i. e., 1:65 or 70, a full pint (13 oz.) of nicotine sulphate is necessary for efficient killing. By increasing the strength of the lime sulphur to 1:40 the tobacco can be cut to 10 oz. And this is a cheaper formula as well as a more effective one against citrus scab.

As to the best time to spray, the experience of the past two years has strengthened our former recommendation to spray into the full bloom, i. e., when the maximum number of blossoms are open. It is, however, better to be a day or two early rather than a day or two late.

Our experience has been that in the hands of most spraying crews better killing is secured by the use of a spray gun than with a rod and nozzle. The driving force of the discharge from a spray gun is more likely to force the liquid into the interior of the blossom, behind the column of stamens where thrips are most numerous.

DUSTING

In co-operation with Mr. W. W. Yotherers some experiments were started this spring to test the practicability of controlling thrips by the use of dusts consisting of lime impregnated with nicotine sulphate. Three different strengths were tried containing respectively 2.2, 5 and 10% of nicotine sulphate. Wherever this material was driven into the blooms with sufficient force to penetrate behind the column of stamens the thrips were killed. The killing was fully as thorough as with spraying and as high with the 2.2% material as with the 10%. But in blossoms exposed only to the drifting cloud of dust the penetration was not as thorough as could have been desired and a large proportion of the thrips escaped. It was estimated that between 50% and 60% of the thrips were killed as compared with 85% or 90% in the case of thorough spraying. It is as yet too early to form any reliable conclusions as to the practi-

cability of controlling thrips with dust. But we have demonstrated that the lime-nicotine dust will kill them.

UNDER WHAT CIRCUMSTANCES WILL IT PAY TO SPRAY FOR THRIPS?

This is a question that we have kept constantly before us. As with all spraying, there are several factors involved in the answer to this question. At least five are of prime importance.

(1) *Abundance of Thrips.*—How many thrips per bloom before spraying will pay? We have heretofore set this at about two dozen, and now see no reason to change it; i. e., under average conditions as to other factors, if spraying for thrips alone is to pay they should average about two dozen per bloom.

(2) *The Amount of Bloom.*—When the bloom is scanty, spraying for thrips becomes correspondingly more important, as an effort should be made to save as much of the bloom as possible.

(3) *The Variety of Citrus.*—A smaller number of thrips will damage oranges than grapefruit.

(4) *Quality of Fruit.*—Fruit which is fancy in other respects will repay more care than a lower grade. If one is raising small fruit on white-fly and scale-infested trees, and russeted by mites and melanose, a few thrip marks in addition will be a minor matter.

(5) *Possibility of a Combination Spray.*—If one is spraying with other insecticides at blooming time it will usually pay to add the nicotine sulphate, where spraying for thrips alone oftentimes

would not pay. For instance, in one grapefruit grove the owner was spraying to control citrus scab. There was an average of only ten thrips per bloom. Yet we estimated that the improvement of the appearance of the fruit on a block where nicotine sulphate was added to the lime-sulphur paid twice over for the cost of the insecticide; but it would not have paid for the entire cost of spraying. We have had similar results in groves which were being sprayed with bordeaux oil.

DESTROY WEEDS ABOUT THE GROVE

As a preventative measure against an infestation of thrips, it is important that weeds whose blossoms are breeding-grounds for thrips, should be kept down in and about the citrus grove during winter. Most growers practice clean culture in their groves during winter. But some low-hammock groves are never cultivated and in some groves on drained land there are often waste places, especially along ditch banks, which grow weeds. Other growers are inclined to allow weeds to grow under the trees where the cultivator does not reach and also in fence corners. One of the most common weeds in such places is the white-blossomed Spanish bayonet, *Bidens leucantha* (L) Wild. A blossom head of this plant will harbor as many thrips as a citrus blossom and, when allowed to bloom in a citrus grove, is a source of continuous infestation to the citrus. Indeed, experience during 1921 demonstrates that it is useless to spray citrus groves for thrips where these weeds are allowed to bloom. In one grove observed, these weeds were present only in

part of it. The difference in the appearance of the fruit was striking. One could easily point out by inspecting the fruit whether or not it came from the portions of the grove infested by these weeds. It

is very important that these weeds be cut, not only in the grove but about the margins as well. This should be done by January, so that the thrips will die before the citrus trees begin to bloom.

Cover Crops and Humus

E. F. DeBusk, Tavares

The difference between some of our good citrus soils and a mass of sand lies in the amount of organic matter in the former. The sand is the frame-work; the organic matter is the material that cements the frame together into a structure that functions.

We have what is known as active and inactive organic matter. The latter is usually known as humus, but this paper will treat to some extent organic matter in its various forms, and relations to crop production.

Organic matter in the soil is essential to crop production in general. This is fundamental, and no less true in the production of citrus fruits. It is generally conceded that most of our Florida citrus soils are lacking in this essential soil constituent. I shall discuss briefly how and to what extent this deficiency of organic matter affects maximum production of citrus fruits, and how this integral constituent of our citrus soils may be supplied most economically. Technical discussions of the subject will be avoided as far as possible.

Let us consider the correlation of the organic matter in our soil with: (1), its physical condition; (2), the chemical change that takes place; (3), its bacterial flora. In this brief paper the last two

divisions must come under one discussion.

During the drought through which we are just passing, attention has been called very forcefully to the relative water-holding capacity of the same type of soil in different groves and under different soil managements. The fact that organic matter increases the water-holding power of our citrus soils has been clearly demonstrated, and needs only to be stressed at this psychological time. Failure on the part of many of our growers to prepare for these occasional droughts has cost the fruit industry many thousands of dollars in loss of fruit and withered trees. While these droughts come so few and far between that they scarcely make an impression, still at the same time many of our growers lose fruit and growth every spring that could be saved if more attention were given to building up the organic content of the soil. The sand particles of our soils can hold but very little capillary moisture, the kind of moisture that our trees depend upon. The more decaying organic matter that can be added to this frame-work of the soil, the greater the percentage of capillary water over that of the hygroscopic water, and consequently the greater the percentage of the total water content of the soil that can be delivered to the growing crop. Organic matter,

therefore, increases the water-absorbing or receiving capacity of the soil and in turn increases its power to deliver the goods to the growing plant.

We must not lose sight of the fact that the loss of moisture under drought conditions is not the only loss suffered by a soil deficient in organic matter. A greater loss in many cases comes through abnormal leaching of essential and expensive plant food, especially nitrates. Our citrus soils, as a rule, have a very porous sub-soil and permit free downward passage of soil water, carrying much plant food in solution. Leaching of nitrates is often the limiting factor in maximum crop production in a grove. This can be overcome in a large measure by deepening and building up the organic constituent of the top soil, forming a sponge-like mass to absorb more plant food as it goes into solution. Deep-rooting cover crops will aid much in building a deeper soil. Attention should be given to this soil building while the trees are young or even before the grove has been set.

Adding organic matter to some of our sandy citrus soils is like tightening the hoops on a dry rain barrel. It is said that a cubic foot of soil high in organic content can hold twice as much water as a cubic foot of sand.

In crop production, there is a close and very important relation between the flora of the soil and chemical changes that take place in same. Right here I should like to say, it is my humble opinion that the solution of some of our big problems in citrus fruit production will be solved only through a more extensive knowledge of

the flora of the soil and its relation to higher plant growth. It is interesting to note here that we must depend largely upon the action of bacteria to bring about decay of organic matter and to make chemical changes necessary to plant growth, and that these bacteria as well as other necessary soil organisms derive their source of energy from the organic matter of the soil. A rich bacterial flora, therefore, depends upon an adequate supply of organic matter in the soil. When a citrus soil becomes deficient in organic matter the action of necessary soil organisms is greatly impaired, resulting in poor crops and often diseased trees.

A large percentage of our plant food comes from organic sources and depends upon the action of bacteria to render the plant food therein available to plants. The plant food in all animal and vegetable matter, such as bone, tankage, guano, cotton-seed meal, tobacco stems, etc., must undergo decay through certain micro-organisms before it can be used by the orange tree. The organic nitrogen must be converted by the action of ammonifying and nitrifying bacteria before it is available to the plant. Keep in mind that these bacteria depend upon the organic matter of the soil for their energy. Organic matter of the soil also has a beneficial effect upon the inorganic constituents of our fertilizers. Organic acid compounds formed by the decomposition of organic matter change insoluble potassium and phosphorus compounds into soluble form. Carbon dioxide, which comes from decomposition of organic matter, increases the solvent power of soil water on phos-

phate, and potash salts. Thus we see that an adequate supply of organic matter improves the soil as a foothold for plants, and increases both directly and indirectly the available food supply of the crop.

It can be readily seen that soils deficient in organic matter are not in condition to make the best use of commercial fertilizers. Right here is the moth that eats a hole in many a grower's wallet. Expensive fertilizers are applied and expected results are not realized because of poor delivery of the soil due to a lack of organic matter.

Many of our growers are depending upon commercial fertilizers alone to maintain soil productivity. The results will become more and more disappointing. Organic matter must be supplied from other sources, the most practical and most economical of which is through the growing and turning under of cover crops. In many cases animal manure may be used. The soil should be well stocked with organic matter while the grove is young or even before it is set, and this stock should never be allowed to run down. This can be done by growing and turning under velvet beans, beggarweed, cowpeas, and several of the grasses. Some of these crops should be mowed a time or two during the season, in time to partially decay before the crop is turned under in November. Where the root system of old trees will not permit deep plowing, the cover

crop should be cut with a disc so that it can be turned under by plowing shallow. Both cover crops and manure should be well incorporated with the soil.

Velvet beans, and in many cases cowpeas, should be planted in rows and cultivated a few times to give the best results. In sowing beggarweed, prepare the seed bed thoroughly just before the rainy season begins, and while it is yet fresh sow the seed with something like a cyclone seeder, and leave it. Don't harrow the seed in. Three to ten pounds per acre should give a good stand. As the trees grow larger, shading the ground more, and the soil becomes better, the grass cover crops should, under usual conditions, be sufficient to keep up the organic content of the soil. This, however, depends upon the character of the soil and cultural methods followed. Where the trees are close and the ground largely shaded, much less organic matter will oxidize than where trees are wide apart and the soil kept bare through the hot season, and consequently not so much cover crop is needed to replace wasted organic matter. Between these two extremes we find innumerable conditions affecting the supply of organic matter in the soil. In proportion as this integral soil constituent is supplied and maintained can the soil make the most adequate use of our sunshine and rain, and of the commercial fertilizers applied.

Refrigeration and Pre-Cooling of Citrus Fruits

J. W. Andrews, Pre-cooling Engineer with Florida Citrus Exchange, Tampa

The subject of "Packing and Shipment of Citrus Fruits" is so broad and complicated that I have chosen to treat upon only one phase of its problems, viz: on the application of refrigeration and pre-cooling.

The use of the physical state of "cooling" to assist in the keeping of perishables is of ancient origin. Since the development of modern ice making and refrigerating machines, the subject has become of deep interest to those who grow and market perishables in the warmer climates. This development has caused, in recent years, the formation of a system of specially designed "refrigerator" cars which are in increasing heavy demand for movement of the highly perishable commodities.

Any discussion of the value of refrigeration for the movement of citrus fruits must necessarily be based upon some predetermined data as to what point on the thermometer scale it is most desirable to reach. Cooling, in the first place, tends to keep fruits and vegetables fresh and to hold back the ripening process. It reduces the rate of, but does not eliminate respiration of all vegetation and, in doing so, tends to keep within the commodity its water content. Aside from this desirable feature we have the equally important one

of retarding decay. Competent scientific investigators seem to have established that blue mold, an ever present fungus disease of our citrus fruits, develops quite slowly below 40 degrees F. while it becomes active at temperatures from 50 degrees upward. Stem end rot, whether due to *Phomopsis citri* or *Diplodia*, seems to be comparatively slow in its development at temperatures around 50 degrees and almost dormant at 40 degrees. As these decays are responsible for most of Florida's losses in distribution, refrigeration has, within the last few years, assumed a prominent place in our marketing scheme.

The rate of cooling in a refrigerator car depends largely on the arrangement of ice bunkers and the nature of floor, together with the general arrangement of load. In the case of plain box bunker equipment without floor racks the air circulation is often so retarded that cars promptly moved to eastern markets can reach destination before a desirable "keeping" temperature is reached. If vertical air columns are maintained along the sides of car ice chambers and a false, slatted floor is provided, the general average temperature drop is materially hastened. As a rule, however, a Florida car moving in our fall or spring months is from $3\frac{1}{2}$ to 5 days on its journey before the temper-

ature average of its load is reduced to 45 degrees.

Within the last few years there has been a decided drift toward the idea of pre-cooling in many of the fruit and vegetable centers of our country. Pre-cooling, as we are accustomed to speak of it, means a forced process of refrigeration, this being done as soon after the fruit is picked as is consistent with modern packing and handling methods. This is done usually by means of mechanical refrigeration in rooms especially designed and heat insulated. At present there are six pre-cooling plants in this State and, roughly estimating, they represent a capital outlay of over one-half million dollars. Should each one of these plants operate at full capacity they could put out a total of over 50 cars per day. While definite figures are impossible at this time, it is safe to say that 2,000 cars of citrus fruits and 500 cars of vegetables will roll pre-cooled from Florida this season.

If the process of pre-cooling is to become widely distributed over our State it must hold out, for our consideration, some basic economic merit. To date it bids fair to do this, as it is possible to rapidly reduce the temperature of perishables to a point where decay is practically arrested. It also appears, from records carefully compiled, that under favorable conditions, the pre-cooled method of shipment can be done with financial gain as compared with the present standard refrigeration method. In moving a pre-cooled shipment it is entirely feasible to properly cool the fruit within 24 hours; load it into a car with the bunkers filled

with ice and then ship it to destination without further icing providing the time in transit does not exceed 11 or 12 days in the winter months and from 8 to 10 days during the fall or spring months.

The process of pre-cooling cannot be considered as a cure-all for our many citrus ills. It should only be used as an aid in marketing and should never be considered as a preserving or pickling process. Let us consider the case of one single orange: First it becomes injured in the picking process; it then goes to the packing house and stands there for a day or two, after which it is dumped into a soaking tank heavily charged with blue mold spores. From this tank it goes through the packing house routine and finally into a cooler, where the temperature is reduced to a point around 50 degrees. The chances are that this orange will never enter into consumption. However, if the injured orange had been put through the house in a reasonable time and had been properly cooled, the odds would have become reversed and any tendency for the development of decay would have probably been arrested enough to allow it to make for its grower a satisfied final customer.

Let us consider for a minute the difficulties which nature and the industry have devised to worry the engineer who plans on extracting the heat from the modern package of citrus fruits. An orange is over 90% water and water has the highest specific heat of any known substance. Added to this, nature has surrounded the liquid contents with a covering composed of light, pithy material which ranks very

high as an insulator against the transmission of heat. For these reasons it takes, under favorable conditions, at least one hour to cool one orange from 85 degrees downward to 40 degrees. In order to further complicate the cooling process, this orange is now wrapped in a layer of paper, thus adding an extra layer of heat insulation and also creating a dead-air space between the orange and its wrapper. After this the orange is placed in a box with others and the loose paper of the wraps is carefully tucked between the several fruits, making it extremely hard to even force an air circulation through the packed box.

These conditions have so complicated the situation that now, under the most favorable circumstances, it will require about 6 hours to cool the several oranges in the box through the 85 to 40 degree range, and to this we must add another hour if the so-called "wad pack" is used. These last figures as to time are given for concentrated cooling effort on a single box and must be multiplied by at least three or four when a large number of boxes are stacked in a typical pre-cooling room. From the foregoing it can be seen that we have come up, step by step, from one hour to approximately one day and, with improper air pressure and distribution, together with other minor details, it is easily possible to consume two days' time in reaching a desirably low and uniform temperature.

Pre-cooling carries with it many new responsibilities for the individuals or associations who choose to adopt it. Under the standard refrigeration method as fur-

nished by our common carriers it is customary to order an iced car, load it and await results. With pre-cooling, the entire order is changed. All that can be done to deliver the fruit to market in sound condition must be done before the car doors are sealed. First, the management is entrusted with properly pre-cooling the fruit to a desired temperature. Again, only such cars as are in good condition should be used, as cracks at doorways, hatches and similar defects are sure to add elements of danger in transit. The proper amount of ice must be supplied before the car leaves for its destination. If any one of these three items is neglected, the chances for sound delivery are lessened and the process can soon become a heavy liability instead of a valuable asset.

The fundamentals of pre-cooling as well as its possibilities have long been determined. Much work of an investigational nature has been done by the United States Department of Agriculture, dating from 1907. Much of this work was done in California during a four-year study of conditions there and later the work was continued in Florida. In this investigation it was practically determined that it was not commercially advisable to attempt pre-cooled shipments from California to the far eastern markets unless re-icing was done at least once in transit, this being made necessary by the length of time required for the trip. Florida conditions are, as a rule, entirely different in that our principal markets are much nearer as regards both distance and time. During the last two seasons I am not aware of any pre-cooled cars that have been re-iced in

transit from Florida plants. A careful study of individual car records on approximately 2,000 shipments warrants the statement that transit re-icing is not necessary from this State under normal shipping conditions if fruit is properly cooled and iced before shipment.

In closing, I wish to voice the conviction that pre-cooling is with us to stay. Its advantages are becoming more and more apparent each season and it will, in the not far distant future, become a truly

important branch of the State's marketing operations. Of necessity it will be limited to the larger producing centers and larger packing houses, as the overhead charges incident to its adoption preclude its universal use. Notwithstanding this added expense, to the house that ships under refrigeration 50,000 boxes or more yearly, it becomes of great interest and, if properly handled, it will soon demonstrate its value.

Spraying for the Control of the Florida Red Scale

W. W. Yothers, Bureau of Entomology, Orlando

The adult females of this scale are exceedingly resistant to the effects of the oil emulsion insecticides. The usual dilutions of oil emulsion do not produce any mortality on them at all. The crawling young, recently settled young or first instar and males are readily killed by the usual dilution of the oil sprays. The usual recommendation heretofore for controlling this pest has been two sprayings at an interval of a month or six weeks with a spray mixture containing 1% of oil in the diluted material. The first application was designed to kill all young stages. The interval of time would then permit the adult females present to finish depositing eggs when they will die, and all the eggs will then have hatched and have developed into young scales. The second application was then intended to kill these young stages. While these recommendations were usually followed by beneficial results they never produced a mortality that could be called entirely satisfactory. A heavy infestation of this scale on the trees growing on the laboratory grounds gave us an opportunity to conduct further experiments for its control.

TESTS WITH 1% OIL

One Application.—July 28, 1921; examined August 4, 1921. Used 50 gallons

spray (emulsion made from $\frac{1}{2}$ Corvus, $\frac{1}{2}$ Nabob oil). Killed all young stages that had begun to form a covering, but after turning over more than 500 adult females not a single one was observed to have been killed. Normal eggs and crawling young were present. A second examination of ten leaves made August 15th, or eighteen days after the application, gave 280 living and 25 dead adult females. Normal eggs and crawling young were present in great abundance.

Two Applications.—July 28 (1%), August 16 ($1\frac{1}{2}\%$). Emulsion July 28th made of $\frac{1}{2}$ Corvus and $\frac{1}{2}$ Nabob; August 16th all Nabob. Used 50 gallons of material and sprayed the same trees on August 16th as given under 1% application. Examined August 24th or eight days after application. Recently settled young had been killed. On ten leaves there were 228 living and 166 dead adult females, or 58% living. Many crawlers were alive and numerous eggs appeared normal. A second examination of 25 leaves made August 30th, or 14 days after application, gave 254 living and 238 dead adult females or 51.6% living. A third examination of 10 leaves made September 20th gave 151 living and 137 dead adult females or 52.4% living. There were not

so many eggs and crawlers as is usually present—perhaps not more than 20% of the females had either eggs or crawlers. Quite a number of first instar young were present. A single tree in the front yard was sprayed June 15th and again July 28th with 1% oil. On August 15th there were 117 living and 43 dead adult females present on 13 leaves or 73% living. Eggs and crawlers were present but all recently settled young had been killed.

Three Applications. — Sprayed July 28th, 1%; August 16th, 1½%, and September 20th, 1%. Used 50 gallons of material and sprayed same trees on September 20th as given under one and two application tests. Examined September 29th or nine days after spraying. An examination of 25 leaves gave 178 living and 227 dead adult females or 44% living. There were also 67 living females nearly adult which were beneath other scales, 283 crawlers and 156 normal eggs. A final examination was made December 7th, when 29 living adult females were found on 15 leaves. The three applications certainly reduced the red scale, but enough were left for a rapid re-infestation. The health of the trees improved and no damage was done to the limbs or foliage, but some spotting was done to the fruit.

TESTS WITH 2% OIL

One Application. — Sprayed August 16th; used 50 gallons material. Emulsion made of Nabob. On August 24th or eight days after spraying, an examination of 10 leaves gave 53 living and 199 dead adult females or 21% living. A second examination of 33 leaves made on August

30th, or 14 days after treatment, gave 82 living and 332 dead adult females, or 19.8%. It is thus seen that there were as many dead eight days after spraying as there were on 14 days. On September 20th sprayed additional trees infested with red scale. On September 29th an examination of 25 leaves gave 344 dead and 9 living adult females. Only 3 crawlers and 32 eggs were counted. A final examination was made on December 7th, and we were unable to find enough leaves with scale on them to make a count. This single application of 2% produced highly satisfactory results.

Two Applications. — Two per cent—½ Corvus, ½ Nabob. Sprayed August 16th and September 20th. Examined September 29th. On 25 leaves there were 198 dead and 5 living adult females, 6 nearly adult females beneath other scales, 3 crawlers and 12 apparently normal eggs. On December 7th there were no scales present, so no count was made.

TESTS WITH 3% OIL

On August 16th we sprayed four rows of nursery trees using 3% Nabob oil. The work was most carelessly done. On August 24th an examination of 10 leaves gave 414 living and 344 dead adult females or 54% alive. The test with 2% applied when I was present gave 21% alive. Subsequent observations certainly indicated that many were left unharmed by the spray. A second examination made on August 31st gave 476 living and 369 dead adult females, or 56 1-3% living. Owing to the unsatisfactory results obtained spraying August 16th, it was

thought best to repeat the experiment. On September 20th the same trees were sprayed again and an additional row included. On the trees sprayed once September 20th there were on September 29th; 676 dead and 23 living adult females, 19 almost mature females beneath other scales and 117 crawlers and 126 eggs. On December 7th there were 13 living females on 15 leaves. The trees had vastly improved in appearance and few scales could be found.

Two Applications.—Three per cent sprayed August 16th and September 20th. Examined September 29th. On 25 leaves there were 696 dead and 4 living adult females, 22 almost mature females under other scales, 19 crawlers and 10 apparently normal eggs. On December 7th there were not enough scales present to make a count. The tree had improved in appearance.

Check.—December 7th. On one leaf there were 25 living adult females. The scale generally was most abundant and had defoliated many of the trees.

All of the tests with 3% of oil were made on sour seedlings about 4 feet in height. The tests with 2% were made on small sour seedlings and both budded and sour seedlings about 6 to 8 feet in height. The tests with 1% were made on budded trees about 8 feet in height. While great care should be exercised in using strong dilutions of oil emulsion to bearing trees, one application containing 2% of oil is reasonably safe if the fruit is 1½ or 2 inches in diameter.

CONCLUSION

From the foregoing tests and experiments the following conclusions may be drawn:

1. A single spraying with a mixture containing 1% of oil is not satisfactory.
2. Two sprayings are not satisfactory if given at an interval of only two weeks.
3. Two may be fairly satisfactory if most thoroughly applied at an interval of about six weeks.
4. Three applications of 1% may be satisfactory to control this pest.
5. One application containing 2% of oil will produce satisfactory results if thoroughly applied.
6. One application of 3% will also produce satisfactory results, if applied thoroughly.
7. Neither 2% nor 3% will give satisfactory results if carelessly applied.

Krome: If Mr. Yothers' subject is of as much interest to the other members of the society as it is to me, and if the Florida red scale has done to others as it has done in my grove, I am quite sure that some of the members might wish to ask some questions. I am sure he would be glad to give you any information you might wish. Mr. Yothers, does the 3% injure the fruit in any way?

Yothers: I should have brought that out in my paper. It was used on nursery trees, but I used the three applications of 1% on bearing trees that had fruit on them.

_____: Do you conduct experiments during warm weather?

Yothers: The sunlight was very hot along about September 20th, about the hottest weather of last year. No, I guess the hottest was in May, but I remember it was extremely hot.

_____: What per cent of oil should be used in spraying?

Sadler: Use 1 to 63, and in using Fico, 1 to 60, and Ideal paste, the same. They contain 63 to 65% of oil.

Last year we used the paste and it took all the leaves and the fruit. Had very satisfactory results in spraying for white fly; sprayed Dec. 1st, but in every case had some leaves fall and scalding of fruit.

_____: How satisfactory is it in using hard water?

Sadler: We use Mt. Dora well water and it is 135 feet deep, very hard and called good drinking water.

Krome: You did not do anything to break it?

Sadler: No. I have had a fourth of a tree killed by spray. I think it was due to a little oil on the surface of the last of the tank. I know too much oil will kill everything and that happened while I was not present. We have to have dependable help in spraying trees.

Krome: When I used the water without breaking I got that same burning that you got.

_____: Mr. Chairman, I used to have the same experience in my groves from free oil in the bottom of the tank. When

a product is put on the market it should be dependable and not allow the grower run a risk like this. I have seen lots of fruit that has been burned and also destroyed by the spraying.

Yothers: You will get some shadowing, even when the soluble sulphur is used with the oil. That is the only objection we find to the use of oil in the trees. It does produce some shadowing when the temperature is very hot. That shadowing can be eliminated by a slight mixture of Bordeaux Mixture. I am not prepared to say how little a quantity of Bordeaux will prevent shadowing. I regret to say that is the only objection the oil emulsion has, there will be some shadowing. In Pinellas county, because the emulsion produces that shadowing, they spray in winter time. They stop spraying in summer time and spray about twice in the winter time, and let it go at that.

_____: Will not the use of hydrate of lime prevent that shadowing?

Yothers: I don't know.

Krome: I have tried the use of hydrate of lime and it prevented any shadowing. My experience with soluble sulphur has been directly in line with yours. I have had severe shadowing and burning and it is traced directly to the use of soluble sulphur.

Sadler: Can you mix lime sulphur with oil emulsion?

Yothers: That is a rather delicate question to answer. Several people have mixed lime sulphur with oil emulsion. In fact I think if used by the proper grower, is all right. I know one grower in Orange

county that has used that combination for three years. He is a small operator and he looks in every tank before and after, and he never has any trouble and I have used the combination and it seems to be all right when used right. I would say that it is a rather dangerous combination unless you are very careful what you are doing. I rather think it is all right if you

feel confident of your ability to handle the mixture.

_____: Have you had any burning by the use of Bordeaux oil?

Yothers: I think not, not since 1917 have we had any injury. Mr. Krome just advised me that there was some injury done at his place.

Another Apparently New Entomogenous Fungus from the Hammock

E. W. Berger, Entomologist, State Plant Board, Gainesville

The subject of this paper as it was originally handed to the secretary, read as follows: "Another Apparently New Entomogenous Fungus from the Hammock." However, as I plan, in part at least, to give again my discussion on "New Strains of Entomogenous Fungi," presented before the Citrus Seminar at the University last October, I will now add that subject to the one printed in the program and discuss it first, after making a few brief general statements.

For the benefit of any who are not familiar with the subject of diseases that destroy insects, I should explain that very many insects are destroyed annually by fungus parasites peculiar to them. It is a remarkable fact, furthermore, that the diseases of insects consist mostly of fungi, although there are a few bacterial diseases known. Useful as well as injurious insects are destroyed (the honey bee among the useful), but the importance of the subject to the citrus grower and horticulturist in general, lies in the fact that many injurious insects are greatly reduced and often controlled by their diseases. This is particularly true of white flies and scale insects often found infesting citrus trees. I sometimes doubt whether there

would be such an extensive citrus industry in Florida today if it had not been for the assistance of the fungus parasites of scale insects and later of white flies. Some of you may recall my stating some years ago that, back in the 30's, when scale insects were first discovered in the citrus plantings at Mandarin and later at St. Augustine, these insects nearly killed the trees until probably the White-Headed Scale-Fungus (*Ophionectria coccicola*)*, if not other fungi also, controlled the scales and the trees began to recover and produce fruit. This happened after the growers had failed to control the scale by artificial means.

I may further explain, that for the past six years the Entomological Department of the State Plant Board has been artificially growing the Red Whitefly-Fungus and the Yellow Whitefly-Fungus, and more recently several others, in the laboratory and furnishing them to growers at 75 cents per culture. A rather comprehensive account of the entomogenous fungi, known at the time the paper was published, can be found in Vol. V, No. 3,

*Identity of fungus surmised from Fig. 2, Plate II. Insects affecting the Orange, 1885.—Hubbard.

1921, of the Quarterly Bulletin of the State Plant Board. Reprints of this account are available at the Plant Board Exhibit, Hotel Thelma, or they can be obtained by addressing the State Plant Board, Gainesville, Florida.

At the exhibit just referred to, the writer is also showing cultures of the several entomogenous (insect-living) fungi that he has been growing: Two strains of the Red Aschersonia, one each of the Yellow Aschersonia, the Goldiana Fungus, the Orange-colored Fungus, the Cuban Aschersonia, and the Cephalosporium Fungus.

Heretofore we have listed five fungi as known to be parasitic on whiteflies in Florida: namely, Red Aschersonia (*Aschersonia aleurodis*), Yellow Aschersonia (*Aschersonia flavo-citrina*), Brown Fungus (*Aegerita webberi*), White-Fringe Fungus (*Microcera* sp.), and Cinnamon Fungus (*Verticillium heterocladium*). On the so-called Armored Scales (hard-shelled scales) there are four: Red-headed Scale-Fungus (*Sphaerostilbe coccophila*)*, Pink Scale-Fungus (*Microcera fugikuroi*), White-headed Scale-Fungus (*Ophionectria coccicola*), and Black Scale Fungus (*Myriangium duriae*). For the so-called Soft Scales, including the Florida Wax Scale, we have three: The Cuban Aschersonia (*Aschersonia cubensis*), the Turbinate Fungus (*Aschersonia turbinata*), and the Cephalosporium Fungus (*Cephalosporium lecanii*).

*The name of this fungus, probably also of some others as listed in this paragraph, will very likely be changed in future publications. [Two papers by T. Petch in the Transactions (1920) of the British Mycological Society.]

In a talk presented at the Citrus Seminar last October (1921) on "New Strains of Entomogenous Fungi," I spoke of finding and then recently growing artificially a new strain of (1) Red Aschersonia (5805), or Red Whitefly-Fungus, of growing (2) the Goldiana Fungus (*Aschersonia goldiana*), (3) the Cuban Aschersonia, and (4) another yellow aschersonia (5804) (since that time identified as the Goldiana Fungus). The first and last of these were taken from fungus material found infecting whitefly larvae on holly and bay collected in a hammock near Winter Park by Messrs. F. M. O'Byrne and C. E. Whittington, in November, 1919. The Goldiana Fungus was grown from material that had been received from Cuba at the Experiment Station by Dr. O. F. Burger, and the Cuban Aschersonia from material sent to the writer by Mrs. D. P. Smith of New Smyrna, Florida, where it was controlling the Pyriform Scale infesting guava.

As the information given in my talk at the Citrus Seminar has not been published, I will here briefly review what I stated at that time.

I emphasized the finding and growing of a new strain (No. 5805) of Red Aschersonia, or Red Whitefly-Fungus, collected on holly (*Ilex cassine*) in the hammock near Winter Park. It was found infecting an unidentified species of whitefly and was recently re-collected by the writer in the same locality and on the same species of holly. I further explained that this strain of the Red Aschersonia fruited (produced spores) so much better than the other strains of Red Aschersonia

previously grown, that it was decided to grow more of it and try it out on the whitefly. On the Common Whitefly it proved to be as virile, and apparently more so, than any Red Aschersonia previously grown. It also has another desirable characteristic; namely, that it will fruit satisfactorily during the hot weather of June and July, which is something that other strains of Red Aschersonia heretofore grown would not do, it always being necessary to grow the crop of fungus during late winter and early spring and then placing it in cold storage until needed for distribution during the period of summer rains.

I explained that the Goldiana Fungus (8687) obtained from Cuba was effectively active on the Cloudy-Winged Whitefly there and that we planned to get it started on the Cloudy-Winged Whitefly in Florida.

It is of interest to note, that the apparently new yellow fungus (5804) obtained from the hammock and reported upon at the Seminar has been identified by Dr. A. T. Speare, of the U. S. D. A., as *Aschersonia goldiana*, or the Goldiana Fungus. That it should be the Goldiana Fungus, namely, the same that exists in Cuba, was something of a surprise. Why it has not spread from the hammock to the whiteflies infesting citrus and other cultivated plants in Florida has not been explained. Practical tests contemplated with the two strains of Goldiana Fungus, namely, the one from Cuba and the one from the hammock near Winter Park, during the coming summer may give us an answer.

This brings me to the fungus that I

wished principally to display today. I am calling it the Orange-colored Fungus (No. 10592) (*Aschersonia basicystis*)*. Last November I visited the hammock at Winter Park for the purpose of getting fresh material of the Goldiana Fungus when I recognized what appeared to be a slightly different fungus than the Goldiana, but growing on the same leaves with it. Upon growing it artificially in pure cultures it soon showed up differently and characteristically. During the latter part of last December Mr. C. A. Reese and myself (each independently) collected the same fungus infecting unidentified whitefly larvae on the common holly (*Ilex opaca*) in the woods adjoining Newnans Lake, near Gainesville, Florida. At first we supposed that we had the ordinary Red Whitefly-Fungus, but in artificial cultures it grows and colors up exactly like *Aschersonia basicystis*. This gives us two locality records for this fungus in Florida. Dr. Speare, who made the identification of the material from Winter Park for me, had previously referred material of this fungus to Professor T. Petch, of Ceylon, for verification.

The interesting part, however, is the existence of this fungus on a native whitefly in Florida and the prospects that it offers us of getting it started on whiteflies infesting cultivated plants. The coloration of this fungus when grown on artificial culture material is, furthermore, a beautiful orange and I certainly desire that all the ladies should see it at the ex-

*Identified for the writer by Dr. A. T. Speare, U. S. D. A., Washington, D. C.

hibit. It doesn't matter about the "mere men."

This brings me to two more fungi found on insects, namely, *Aschersonia brunnea* Petch*, and the Cephalosporium Fungus previously listed.

The Brunnea Fungus is another species that occurs on the material collected at different times since November, 1919, in the hammock at Winter Park. Personally, I am almost convinced that *brunnea* is a super-parasite on the Cuban Aschersonia and if that should prove correct it is not an insect-destroying fungus. Cultures of this fungus have not yet been attempted.

The Cephalosporium Fungus noted has been frequently received and collected, especially during the past winter, effectively reducing such scales as the Pyriform Scale, Liriodendron Scale, Tessellated Scale, *Coccus acuminatus*, and (in the Virgin Islands) *Coccus magniferea* (No. 11057, specimens received from C. E. Wilson, of St. Croix). While this fungus was grown artificially at the Experiment Station by Dr. H. S. Fawcett and the writer some years ago, it now appears that it may play a more important role in the control of certain soft scales than was believed in 1910 (Experiment Station Report, 1910, p. lxii).

*Identified for the writer by Dr. A. T. Speare,
U. S. D. A., Washington, D. C.

Making Florida Home Grounds Attractive

Lantern Slide Talk Given Before the Florida Horticultural Society
at Lakeland

William A. Cook, Oneco

It is now seventy years since the tragic and untimely death of the father and dean of landscape art in America, Andrew Jackson Downing. But the impress which he made by landscape works achieved, in voluminous writings, and, perhaps more than all else by the genuine inspiration of his life and personality, has had a profound influence on the thought and viewpoint of the American public toward the profession of landscape design.

But as the ripples created by the dropping of a stone into a clear surface of water become less and less pronounced as their spread increases, so does the influence of such men appear less and less marked as it approaches the outskirts of our vast civilization. Florida, with all her manifest advantages, we must confess (if we will be perfectly sincere about it) is just outgrowing that crude, awkward stage of pioneer life perhaps best likened to the half-grown boy just donning long trousers and smoking his first cigar!

Those who have been responsible for the laying out of our towns and for associated civic activities have been, in the main, woefully deficient in broad, con-

structive vision. It what attempts that have been made toward the beautification of grounds, both public and private, there has too often been a lack of intelligent understanding of even the basic principles of art and good taste. All too frequently those who would be most confused and "at sea" if required to paint a canvas or compose a piece of music, seem to imagine that no special talent or study is necessary to lay out attractive grounds.

Do not misunderstand me—I do not mean to imply that the amateur gardener cannot achieve a fair measure of success and derive vast pleasure from the study of the art of landscaping, but he must make some study of the problems involved before he can create what will in any sense be an intelligently and comprehensively attractive landscape picture!

The slides that I am going to show this evening, have been especially selected to bring out, *first* some of the basic principles I have mentioned, and *secondly* to show how it is possible to accomplish vastly more than we have done toward putting Florida on a par with California

in the matter of civic pride and home development.

This first picture was not taken in Italy or Spain, but right here in Florida, and serves to illustrate how graphically real the illusion of Mediterranean life can be recreated in our own land. Further than that, for years I have been stressing the great value and desirability for the general adoption of the Mediterranean type of architecture by Florida builders. Not only is it peculiarly well adapted to our life and climate, but it will serve to lend that atmosphere of rare charm and romance so strongly coupled with the name but not the reality of Florida!

This next slide serves to make clear the point that while a plant picture may be grotesque in character, yet it *can* at least be *consistently* so! And again in this next view, note the delightful harmony of texture in the several kinds of plants making up the group. Remember that in making your selection of plant materials every element of your composition should contribute to the harmonizing and refining of the picture as an entity.

While good lawns in Florida are often not easily obtained, they are *always* most essential to the completed picture, for without them landscape effects lack the finished foreground so necessary to afford proper proportion to all the various structures and planting elements. Note in these several slides how the smooth green lawn gives a feeling of dignity and repose to the view and how the tree shadows softly lace the surface into a charming net-work of sunlight and shade, a most

important consideration in the location of lawn specimens.

So many times we see a property where there has been considerable attention centered on the planting about the house and other buildings and as far as lawn specimens are concerned, yet as one views the scene there seems to be something lacking in clear definition—the eye and mind travel beyond the property and thought is dissipated in the indefinite beyond. The result is unsatisfying, naturally, and the reason, on more mature consideration, is quite obvious—there is an absence of an embracing border planting to enclose the thought-picture as originally conceived in the mind of the designer. This is a fatal error conspicuous in many otherwise fairly attractive developments. Virtually it is as though one tacked good pictures on the walls instead of hanging them in frames. For the border planting to any grounds is just as valuable—or more so—and like any picture frame, should be of size, proportion and design to best elaborate the original conception of the picture itself.

But it is the absence of foundation plantings around houses that expresses the crude, uncultured stage of our growth more than any other one factor. From north to south and east to west of the State it is the same story—bare, ugly, unscreened bases of houses that are more often than not stuck on stilts of concrete or brick or even wooden blocks. Sometimes these are screened, or partly screened, with lattice in more or less good condition—sufficient perhaps to keep Fido from dragging underneath all the old shoes and bones and other rubbish he can

collect in the neighborhood. If they are screened by lattice, some planting is done as a rule, but this is usually pitifully inadequate and reproachfully unsightly, consisting of ragged wild ferns, scraggly geraniums or scrawny Poinsettia stems. The chief advantage derived from an absence of lattice or solid planting seems to consist in giving little Johnny practice in proving his marksmanship by throwing sticks or stones at Fido or the neighbors' chickens when they lodge under the house.

But, lattice or no lattice, *plant that house foundation!* Make the building appear as though it *grew* on the land, not just *set* there. If people think that they can't afford exotics from the nurseries, let them go to the woods and appropriate the wealth of evergreen materials that nature has been growing there—she'll be only too glad to *give* them to make our homes and towns look more homey and livable and worth while!

The value of the vista in the landscape is not properly understood—but an attractive one is always appreciated nevertheless. Here is a drive which has been built in to a "continuing" vista—that is, as one drives up to the house on this curved drive, the view, while always shifting, always preserves the elements of a good vista. And at no time is the building ever seen in its entirety—always there is something obscured, something left to the imagination and to be anticipated just beyond. This is landscape art in its utmost refinement.

But vistas are often spoiled—note how in this one the long, low, horizontal lines of the building are broken by these tall

spire-like cypress trees planted on each side of the broad entrance—defeating the very genius of the architect of the structure. And, again note how the entrance has been obscured by this mass planting, which also in turn blocks the view down the drive from the house.

On the other hand, note how in this second instance the landscape architect has preserved the long horizontal lines in a building of similar proportions, not only in respect to the position of the plants, but their character—note how many of the trees and larger shrubs are horizontal in habit and growth. In this connection, note this garden vista—the way is long and narrow and the straight vista lines of walk and lattice fence and border plantings all conform and focus on the garden feature at the terminus.

The planning of drives and walks is frequently poorly done—so many amateurs think that a drive or walk must of necessity be curved and so many times we see short approaches on restricted areas which should be straight made tortuously crooked in mistaken conception of purpose and vain attempt at naturalistic effect. Remember that it is quite as necessary to know when a drive or walk should be direct as when it may be informally curved. Either type may be inappropriately at fault under varying conditions.

When one mentions "formal garden" most people are dismayed and envision great sunken gardens and terraces and costly ornamentation. As a matter of fact a formal garden may be as simple as the most unpretentious property would justify. It might be a quite tiny hedge-

encompassed area with just a cozy tea house, miniature mirror-pool, a palm or two, perhaps an overhanging shade tree, and borders of annuals along the background and edging the walks. Frequently they can be combined with the rose garden so much sought by "flower-lovers" in the South as well as North.

Or the garden close may be strictly informal in character, as is this delightful "out-of-doors living room"—I like that expression, "out-of-doors living room"—it so aptly conveys the real purpose of the enclosed garden. And for those of us who are favored in being able to live in Florida where our climate permits an out-of-door life almost every day of the year, no house is truly a home in the fullest expression until the owner can pride himself in one!

Primitively the pergola was merely a vine-covered passageway from one point to another, but in our modern carelessness in definition we use the word to include any structure with "open-work" overhead. Such structures serve a variety of purposes—as a covered way, as a terminal feature to a garden view, especially as strengthening the axial line, as a boundary treatment in itself, as a means in picture-composition to secure repetition of the motif of the dominant architectural scheme, and then in a variety of less important ways for rest houses, tea houses, entrance ways with infinite variation. But never, *never*, NEVER set them out in the open lawn, there to have to stand with detached and meaningless expression, pitifully alone and about as fitted to the im-

mediate environment as an ice factory at the north pole!

In the garden picture there is nothing serves quite so well to lend an atmosphere of charm and interest as the pool. This may be large enough for a pond or as tiny almost as "mi' lady's kerchief," but always serving as a mirror in which are reflected blue sky, fleecy white clouds, the columned pergola, towering palm and diminutive plants that margin the rim. But it can be overdone, and this first picture shows how one amateur "fell down" on the undertaking. Note that the pool is all out of proportion to the area involved, the location poor, the rim too high and the pile of rock in the center surmounted by a sprinkler stand-pipe is all out of keeping with the material and environment. There are other errors of technique such as the location of the sun dial, poor treatment of planting and so on, but note particularly the pool and compare with this next slide. What delightful atmosphere—what refinement of design—what exquisite composition—what perfect harmony of thought and purpose in conception and execution!

Our State has far more lakes within its confines than any other, yet I think nowhere is the value of water so little appreciated. Perhaps it is because of this very fact in itself that the neglect arises, but be that as it may, it is none the less disappointing to those who can vision the tremendous potential value of our magnificent length of coast line and unnumbered lakes to see them so consistently ignored. From the scenic standpoint alone they are our one *greatest* asset, yet so obsessed are

we with the desire to have groves and the idea that a lake on a property is so much waste area that we are selfishly, blindly, and ignorantly wiping out much that might some day make our State a second "Paradise Regained." It is the same way with the unintelligent road system that has prevailed in the past, and our general deficiencies in respect to civic effort and enterprise—we have sacrificed many of our best interests through narrow, shortsighted policies that are threatening to engulf many of our greatest potential assets.

I know so many people of delightful taste and most excellent judgment for interior decoration who commit veriest atrocities out-of-doors. To them a string of ragged, lonely, dejected-looking Poinsettias strung along the house foundation is perfectly all right and to cut up the lawn with a meaningless array of horticultural "junk" is perfectly legitimate. They can expatiate at length on the value of composition, and line in illustration, of texture and design in fabrics, of composition and tone-harmony in music, yet almost any old thing looks all right in the yard or on the lawn!

Now the one particular message I have for you tonight is this—it is our duty as disciples and exponents of those things that are useful and worth while in the daily life of our people, to carry the mes-

sage of art and cultured good taste in home surroundings abroad throughout the State. And what is useful and worth while? Victor Hugo answered that when he wrote—"The beautiful is as useful as the useful—more so, perhaps!"

This is the viewpoint we must inculcate in the minds and hearts of our people. I recall giving a talk in a certain town which had had considerable advance publicity. One man said when the purpose of the lecture was explained to him: "Well, if that fellow would talk about how to get grits and bacon maybe I'd go up to hear him!"

That is the crude, short-sighted, wasteful, narrow and distressingly provincial frame of mind which *must* be corrected if we are ever to have a genuine expression of culture in the State. And by culture, do not misunderstand me—I do *not* mean "high-brow" affectation, but rather that simple, wholesome enjoyment of the truly worth while things of life. One philosopher aptly put it about like this—"Culture may be measured by one's capacity to enjoy a variety of good things."

And we might not inappropriately add—not the least amongst these "good things" should be an artistic and sympathetic appreciation of the gentle art of gardening!

State Beautification and Conservation

Mrs. A. B. Whitman, Orlando

In the brief space of ten or twelve minutes it is not possible to go very thoroughly into either division of the subject assigned me. The phase of State Beautification given me to present this evening for the purpose of calling forth a general discussion is "The Possibilities of a State Flower Show from the Standpoint of the State Federation of Women's Clubs." The line of Conservation which I have chosen from the divisions of that work in the Florida Federation of Women's Clubs because of its possible interest for a gathering of this kind, is that of Highway Beautification, and I shall consider this second topic first.

It is a matter of regret and surprise that among our own home people there is so little realization of the fact that conservation of our natural growth means a wonderful state-wide beautification, something distinctive, novel, luxuriant, and possible with the least outlay of time and funds.

All over the State at the present time plans are under way for building and maintaining a splendid system of hard-surfaced highways and along with plans for this work are plans for highway beautification. Our bond issues provide for engineers but not for landscape architects, and the ornamental work along our high-

ways depends upon the interest and knowledge of volunteer groups, willing to work and anxious to get results and filled with a great desire to *do* things at once. You all know that this desire to do something usually takes the form of cutting something down in order to plant something in its place and you also know that engineering work usually has in its scheme of things in road development the absolute cutting down and clearing out of everything growing in the right of way.

Our new roads are planned with a very wide right of way, less than half of which is to be taken up with paving and drainage provision and what I should like to see, and there are many who agree with me, is the natural growth, trees, shrubs and scrub palmettoes left along the outer edge of the highway rights of way. I am not as familiar with the habits of growth of the trees and shrubs of other states, but I do know that in Florida the tendency of growth along the roads is for grass to spread out from the paving, then a fringe of shrubs and at the outer edge the trees common to each particular locality, arranged by nature according to the best principles of landscaping.

Our ideas of highway planting are mostly taken from the plans followed in other states, states that have little natural

growth, if any, along their roads. Conditions in Florida are different. Here we have the most advanced road building taking place through primeval forests and we have opportunities that others would pay generously for having. We have a wonderful wealth of tree and shrub growth differing in different sections of the State. Why not make use of it?

As we all know, soil conditions vary in almost every locality, five miles of road often passing through as many different kinds of growth. In our gardens and groves and farming we consider this fact, but in the articles on highway planting we find no consideration of it, ambitious plans being set forth calling for regular, uniform planting of trees and shrubs for miles of highway and the result is visualized as a uniformly luxuriant growth of the same kind of planting.

With very little expense the natural growth which is to be found along most of our roads could be cultivated a little, encouraged, added to by plants and trees common to each particular locality, flowering shrubs gradually added as predatory cattle and forest fires allow, and at a moderate expense the grass could be kept in flourishing condition along the paving by two or three mowings a year. Such a plan would give us quick results, would give us a highway border that would be of the greatest interest to our visitors from other states and could be carried out with the minimum expense. It would preserve specimens of trees that will soon be almost extinct unless the policy of forest destruction followed in our State can be changed.

We do not have to wait for large funds and better laws before we can make a beginning in highway improvement. The funds and the laws will come, but in the meantime let us who live along our highways make our own places attractive; let us plant vines and flowers along our fences, saw off our fence posts to an even line, tear down disfiguring signs and save what nature has given us and before we know it our highways will be vistas of loveliness. While working to attain an ideal we can idealize the attainable.

The Florida Federation is also working for at least one county park in every county. Such a park should preferably be a spot having something distinctive in the way of natural growth; a beautiful tract of untouched high pine land, a jungle-like portion of hammock, a tract of cypress growth. Unless something of this sort is done, the time is near at hand when our State will be as barren of forests or anything suggesting forest growth, as the prairie states of the West.

With a conservation of natural growth along our highways and county parks in every county, we could in time have a continuous botanical garden.

In considering the matter of a State Flower Show I feel that it should be the culmination of stages of preparation rather than a starting point for flower culture in the State.

A State show to be the success it should be if it is to be a credit to Florida, must have the interest and support of the people as a whole rather than of just a few. In order to get this interest every county must become a possible exhibitor, for if this is

not the case a State show does not deserve the name.

Personally, I do not believe we are ready for a State show.

So far as I know, the first Flower show in our State taking in a whole county and part of another was held last February in Winter Park. This show was planned and carried out by the Winter Park Woman's Club and was a wonderful success. In spite of the fact that sufficient time was not given for the growing of specimen flowers or plants, the display was most beautiful and a surprise even to the home people, who had not realized the wealth of bloom and growth around them.

Co-operation and publicity for this exhibition was secured through the Orange County Federation of Women's Clubs, and from the results achieved I should like to see, as a preparation for larger shows, a Flower show in every county for at least three years. In this way a general interest in flower exhibits would be secured, every county would try to have the best show and with the Florida Federation members giving support and assistance and stimulating the movement, I believe the results would be surprising and gratifying. Flower culture appeals to most women and I feel sure that every club-woman would lend her support to this work.

At the end of three years it would be possible for each county to perhaps enter county prize winners in a larger Flower show, thus insuring the most creditable display.

Florida is such a large State that the time consumed in reaching certain local-

ties makes one State show seem difficult of accomplishment. It could be held only in a place with a large auditorium and the remote localities would never be able to compete with the nearby places, as the time consumed in transit would materially injure the freshness and beauty of many lovely plants that should have a place in the exhibition.

For general interest and best results I would suggest that instead of one State show, four district Flower shows be the goal to work for, a line from north to south and another from east to west determining the districts. In three years when through county shows there would be a general interest in the movement, there would also be many miles of completed highways making the transportation of exhibits much less of a problem.

Perhaps some one can work out a successful plan for one show, and I hope suggestions will be made in the following discussion.

I can assure you that the Florida Federation of Women's Clubs will give every assistance and with their means of getting facts, plans and requests to every part of the State in the shortest possible time they could be a valuable factor in the success of the enterprise.

We have seen a possible goal ahead of us. I hope we shall approach it step by step so that a path of flowers will lead to it from every part of the State.

Hume: I would like to call your attention to the flower exhibit in the lobby of the Elks Hotel. I would like also to announce two committees: The Auditing

committee, consisting of H. K. Miller, E. W. Berger and R. E. Lenfest, and the Final Resolutions committee, consisting of Campbell, Coult and Yothers. I will ask the secretary and treasurer to have their books in the hands of this committee not later than noon tomorrow. I will ask

Mr. Pool to take charge of this meeting the remainder of the evening.

Poole: I am glad to report that three inches of rain has fallen in Polk county today. Is Mr. Cline present in the audience tonight, if so, we will have his address on "Asparagus Plumosa as an Ornamental."

Asparagus Plumosa as an Ornamental

A. E. Cline, Altamonte Springs

Asparagus plumosa, commonly though wrongly called Asparagus fern, is one of the commercial products of Florida. As nearly all of it is shipped to Northern florists, I doubt if we at home realize its ornamental qualities. In the North it is used almost entirely for decorative work and as a background for flowers. There it is either greenhouse grown or comes as cut sprays from Florida. Here it grows out in the open all the year and we can carry the decorative idea of its use into the ornamental, for instead of dealing with cut flowers we can enlarge its use to porch, lawn and yard, both as a background for flowers and foliage and for its own beauty as a mass of green. Grown as a pot plant, it does not go to seed but its fine feathery close-grown sprays have a beauty all their own.

Another, and I think a better way of using it is as a screen for porch or window. Here given a trellis of wood, wire or even string, it will climb steadily upward, spreading out as it grows until it forms a dense mass of fine green foliage. In this form it will blossom and the seeds form, which with their coloring from green through purple to black give an added beauty to the screen.

It is a plant that is comparatively easy to grow, started from seed, then transplanted to a good bed in ground or pot, given water and fertilizer (especially the latter, as it is a heavy feeder), it will do the rest.

Once firmly rooted in the ground, it is there to stay. I know of plants in a commercial fernery that are twenty-three years old, and this fernery is still considered one of the best in the State.

Under the slight protection of the ordinary eaves of the porch or roof, it is immune to frost or heat, though I have seen it successfully grown on a trellis in the open yard. For decorative work or bouquets the sprays can be cut from either the pot plant or trellis to the great advantage of both the plant and yourself, a case of "eating your cake and having it too."

Almost the only enemy is the red spider, well known to citrus growers, and this is easily controlled by spraying with the ordinary lime sulphur solution. Although indigenous to Florida, it has become a true Florida product, and therefore my advice is, try it and live happy ever afterward.

Soft-Wooded Plants for Florida Gardens

F. W. Fletcher, Orlando

Soft-wooded, or herbaceous plants, include all the annuals and most of the perennials generally used. Without them we could have no real gardens. I am not going to weary you with a long list of botanical names and dry-as-dust generalities, but will give you a brief talk on this subject so full of interest to all garden lovers. First, I will briefly describe a few of the newer or less known plants, and then give a list of such flowers as we have grown or seen growing successfully in Florida gardens.

Among the newer introductions perhaps the zinnias deserve first place. You all know this once rather common or plebeian flower, but the newer varieties are in an entirely different class. Picture to yourself a dahlia flower, four inches or more in diameter, with 18-inch stem, in all shades of color except blues, growing on a zinnia plant. This is the dahlia-flowered variety, recently introduced. Seed is only obtainable in mixed colors at present, but we are promised the separate colors in another year. Another new variety is the cactus-flowered, with blooms closely resembling that of the cactus dahlia. Still another is the picotee, with flowers delicately edged with pink. If I was asked to name the best plant for mid-

summer bloom I would answer: "Zinnias, and then—more zinnias."

Another plant, rather old in cultivation, but new to most Florida gardens, is the Watsonia. This, grown from corms, is as easily handled as the gladioli, and is a gem for Florida conditions. The flowers come in white and two shades of pink. Plant bulbs or corms from September to November in Central and South Florida and expect bloom from late February to May.

The yellow calla (*Elliottiana*) is a splendid thing for winter and spring flowers. Grown from tubers, planted as soon as procurable—usually November. Requires a moist soil and partial shade for best results. As we cannot have the daffodils in our gardens this calla is an acceptable substitute.

All know the gladioli, but are you acquainted with the new *Primulinus* hybrids? With more slender, graceful stems, soft pastel colors and beautiful hooded flowers, this new race is, for decorative purposes, 'way ahead of the older types. I had a bed of about 1,000 plants this season, no two plants with flowers alike, that was the feature of my garden from February to the middle of April. For shipping it is not as useful as the older varieties. Bulbs planted, a few each

month, from October to February, will give you a long period of bloom.

We must not overlook the cannas, which add a tropical touch and a mass of bloom to our grounds for at least eight months of the year. By elimination we have reduced the long list of varieties to the following, which we believe the best: The President, bright scarlet, green foliage; King Humbert, red, purple foliage; Yellow King Humbert, yellow, green foliage; City of Portland, bright pink, green foliage; Eureka, white, green foliage; Wyoming, extra fine, orange, purple foliage; Uncle Sam, red, green foliage, the best for centers of beds, because of its height.

I give a further list of such herbaceous plants as seem adapted to and happy under Florida conditions. As a list for Florida gardens this is probably incomplete. Each one of you will probably think of some favorite that I have omitted. If so, perhaps you will mention it in the discussion that I hope will follow this brief talk.

Ageratum, the best variety is the new Fraserii; Alternanthera, Sweet Alyssum, Amaryllis, Antirrhinum or snap-dragon, Baby's Breath (annual Gypsophilla), Bachelor's Button (*Cenaura cyanus*), Balsams, which includes Impatiens; Begonia, Caladiums, the fancy-leaved varieties are especially fine; Calendulas, Callas (*Richardia*), Calliopsis, Candytuft, Cockscomb (*Celosia*), Chrysanthemums, English Daisies (*Bellis*), Daisies (marguerites or chrysanthemum frutescens), Shasta Daisies (*leucanthemum*), Coleus, Annual Delphinium or Larkspur, Dianthus (this includes all the so-called pinks),

Dimorphoteca, Eupatorium, Euphorbia, Forget-me-not (*Myosotis*—these require a moist shady location), Four-O'clock (*Mirabilis*), Freesias—both white and in colors, Funkia, Gaillardia-annual, Transvaal Daisy (*Gerbera*), Globe Amaranth (*Gomphrena*), Sunflowers (*Helianthus*), Strawflower (*Helichrysum*), Lantana, Lilliums, several varieties; Lupins, Marigold (*Tagetes*), Mourning Bride (*Scabiosa*), Pansy, Sweet Peas—the winter-flowering varieties are the only ones of value to us; Petunia, Phlox-annual, Poppy, Salpiglossis, Salvia, Stocks, Tuberose, Verbena, Vinca.

Fletcher: (Paper) If I have missed any plants I would like for you to call them to my attention.

Mr. Whitman: Did you mention the nasturtium?

Fletcher: Yes.

Mrs. Whitman: Hibiscus?

Fletcher: Yes.

_____: Did you mention sweet peas and violets?

Fletcher: I think I had that down here.

_____: What are the requirements for growing the larger varieties of chrysanthemum?

Fletcher: I would say the first requisite would be a glass house. I have tried for several years to grow them and I had nice stems and nice bulbs, but about time they start to open we get a shower and that turns the flowers black.

_____: Do you grow any asters?

Fletcher: No. I understand they do well on the East Coast.

Park: The hemorcallas, an old-fashioned flower, are all excellent as they will stand the wet weather and the dry weather. Did you mention that?

Fletcher: That is my own fault and they do beautifully in Florida. They are a first-class plant.

Park: Another good flower is the buttercup.

Fletcher: I have not tried that.

_____ : How about the geranium?

Fletcher: I think the northern part of the State will grow them. I have not seen any around this part of the State that looked happy. They do not do well south of Gainesville or Palatka. I think south of there we would have trouble in the middle of the summer.

Yards and Lawns

Wm. Gomme, Bartow

The subject assigned to the Committee on Yards and Lawns, covers such a large area, that it is impossible to touch on every phase, therefore these remarks will be confined to the suburban yard, which usually is limited in space to one or two lots.

Very often when purchasing a ready-built house or a lot upon which to build, the thought usually comes to the would-be purchaser, "Can I have a pretty front yard?" Sometimes the property has remnants of a by-gone grove, other times large trees are dotted here and there making other plant life almost impossible. Then again, this same property may be entirely devoid of all vegetation, so making formulative plans for a pretty yard somewhat easier, but not always as attractive. A few properly placed shade trees are essential and attractive, their shade gives a pleasing and cooling effect which is so desirable in this southern climate.

The yard having the remnant of a citrus grove can be made beautiful as well as profitable. The trees should be well pruned and those overhanging the house, if there be one, should be trimmed to allow plenty of light and air. Very often one finds overshadowing trees on all sides of a residence, which gives the place a

gloomy appearance, shuts out the light, making the interior damp, etc. Trees fronting directly on the house should be removed to another location, or far enough away so that a lawn and a few suitable flowers can be planted. To have a place entirely taken up with one kind of tree or plant, does not make that place attractive or profitable. One tires of seeing the same old landscape, day in and day out. Few shade trees for the place is desirable. They soften the hard lines, and produce a cooling and pleasing atmosphere. They shut off unsightly buildings, and generally add considerable intrinsic value to the property. Their one drawback, especially oaks, is that if too large and too numerous, their feeding roots penetrate other portions of the yard, sometimes making other vegetation impossible. The only solution to this, is to keep them within due bounds, by root and top pruning, but not to such an extent as to make them unsightly. The yard devoid of vegetation of any kind with a house in the middle, is indeed, in one sense of the word a problem. To insure the best results is to fix in one's mind a plan of landscaping to the best advantage. Draw a plan of the place, pick out your favorite annuals, shrubs and vines, make a place for everything according to its habit, study local

catalogues, work to your plan and keep it.

The vacant lot with no vegetation except weeds is an easier problem, as one does not have to consider the interference of trees, etc. To obtain the best results, it is desirable to have the lot graded from the street to the center, so giving a gentle slope from the house to the pavement, being careful to deposit all sub-soil where the house is going to stand. Depositing sub-soil around the yard where plants or lawns are to be maintained, usually leads to disappointment. Be sure to preserve the top soil for planting as much as possible. A yard properly graded and finished off, affords the drainage which is so often so essential.

Place and face the house according to the coolest location, try not to have the rising and setting sun beating on the windows. After grading, put in the water system, which should enable all parts of the yard to get water. To try to raise a lawn or grow plants without water is almost impossible. Having graded, secured water, and drainage, make the plan of the yard as to the planting of the trees, shrubs, etc. Make the plan conform to the lines of the house. Make each plant account for itself by some meaning. Promiscuous planting here and there, with no plan or purpose, leads to a jumbled mass.

The plan is a picture, the central idea is the residence with a warm green sward in front of it. The trees and bushes are massed into a frame-work to give effectiveness to the picture of home and comfort. This style of planting makes the landscape, even though the area is no

larger than a parlor. Reduced to a single expression, all this means that the greatest artistic value in shrubbery lies in the effect of the mass, and not in the individual shrub. A mass has a greater value, because it presents a much greater range and variety of forms, color, shades and textures, because it has sufficient extent or dimensions to add structural character to a place, and because its features are so continuous and so well blended that the mind is not distracted by incidental and irrelevant ideas. There can be no rules for landscape gardening any more than there can be for painting or sculpture.

In home grounds the central feature is the house. To scatter trees and bushes over the area, defeats the fundamental purpose of the place. The purpose is to make every part of the grounds, lead up to the home and to accentuate its homeliness. Keep the center of the place open, plant the borders, avoid all disconnected, cheap, patchy and curious effects. It is not enough that the bushes be planted in masses, they must be kept in masses by letting them grow freely in a natural manner. The use of flowers and bright foliage and striking forms of vegetation is not to be discouraged, but these things are never primary considerations in a good place. The structural elements of a place are designed first, the flanking and bordering masses are then planted, finally the flowers and accessories are put in, just the same way that a house is painted after it is built. Flowers appear to the best advantage when seen against a back ground of foliage and they are then also an integral part of the picture. The flow-

er garden, as such, should be at the rear or side of the place, the same as all other strictly personal appurtenances are; but the flowers and bright leaves may be freely scattered along the borders and near the foliage masses. What kind of shrubs and flowers should be planted is wholly a secondary and largely personal consideration. Be sure that the main plantings are made up of hearty and vigorous trees and have lots of them, then get the things liked best. There is endless merit in the choice of species, but the point to emphasize is that the arrangements or distribution of the plant is far more important.

If one has no area which he can make into a lawn and upon which he can plant green masses, what then may he do? Even then there may be an opportunity for a little neat and artistic planting. Even if one lives on a rented farm, he may bring in a bush and herb from the woods and paint a picture with it. Plant it in the corner by the steps in front of the porch, at the corner of the house, almost anywhere but in the center of the lawn. Make the ground rich, secure a strong root and plant it with care, then wait. The little clump will not only have a beauty and interest of its own, but will add immensely to the furniture of the yard. About its base one may plant stray plants and these may be followed by pansies, phlox, petunias and other simple assets. Very soon one finds himself deeply interested in these random and detached pictures, and almost before he is aware, he finds that he has rounded off the corners of the house, made snug little arbors of wild grapes, covered the rear fence and

the outhouses with trumpet vine or yellow jasmine, all growing wild in our Florida woods. He soon comes to feel that flowers are most expressive of the best emotions when they are daintily dropped in here and there against a background of foliage. One's place grows to be a reflection of himself, changing as he changes, and expressing his life and sympathy to the last. It is this partnership of nature which makes the farmers' children in after years always think of the old place as "Home, sweet home."

In planting flower beds around the house it is essential that perfect drainage be afforded, therefore for the best results, have troughs put on the eaves of the house with downward outlets to carry off the water from the roof. Many beautiful flower beds are ruined by the drip from the eaves in heavy rains. In planting the lawn, care should be taken as to the preparation of the soil. Use well decomposed stable fertilizer well incorporated. The use of muck is not advised, as when incorporated with sand and other soils, it loses its fertility, so making it practically useless. There have been many flower beds and lawns rendered unfit by the use of it. The lawn should be as level as possible before planting and when ready, roots of the desired variety, such as Bermuda, St. Augustine, etc., can be planted in checks 2 inches square, or in drills 12 inches apart, with tufts 6 inches apart. The latter method allows cultivation to keep down the weeds.

In planting flower beds well decomposed stable fertilizer should be freely used, well incorporated and buried period-

ically. A list of ornamentals suitable for different plantings can be obtained from some local nursery catalogue.

Before closing, the following suggestion might be in order. Be careful about obtaining rooted plants from your neighbor. Many yards have plants that are infested with root knot, and other diseases. I have seen beautiful yards practically

ruined because some kind friend, apparently in ignorance, had exchanged or given a plant heavily infested with some disease or other. The State Board law, requires all herbaceous material inspected before its removal. It is for your protection not only in the case of root knot, but in other disease, which may be conveyed to your yard by some non-inspected plant.

A Brief History of the Black Fly in Cuba, Its Distribution and Latest Developments

Reginald Hart, Gainesville

I have selected as the title of the paper I am about to read you today, "A Brief History of the Black Fly in Cuba—Its Distribution and Latest Developments." There can be no question that this subject is one of vital importance to all Florida fruit growers, since all control measures have been abandoned in Cuba, and also on account of its proximity. In the Bahamas it has completely wiped out the citrus industry. In Cuba it is gradually spreading and will in time doubtless involve the entire island.

The Black Fly (*Aleurocanthus woglumi* Ashby) was first discovered in Cuba in August of 1915 in a farm near Guantanamo. Specimens were sent by the owner of the property, Sr. Manuel Bertran, to the Agricultural Experiment Station at Santiago de las Vegas and were there determined by the entomologist, Patricio Cardin. In April, 1916, Mr. Cardin and the pathologist of the Experiment Station, Dr. John R. Johnston, were engaged in making a survey of the citrus groves and plantations of the island for citrus canker. While in Guantanamo they made observations as to black fly conditions and were able to appreciate the intensity of the infestation and the neces-

sity for taking immediate measures to control it. In view of the fact that Johnston and Cardin found the black fly only at Guantanamo and considering the economic importance of the insect, since it not only attacks the plants of the genus citrus, but also the coffee, mango, guava, sapota, sapodilla, star apple, pomegranate and many other plants, the Honorable Secretary of Agriculture, Sr. Emilio Nunez, solicited and obtained a credit of \$10,000. A Presidential Decree, No. 838, July 3, 1916, created a Commission of Plant Sanitation, with the object that this commission should try to combat the plague of the black fly until it was completely extirpated. The commission was also to try to prevent in the future introductions of other pests injurious to agriculture and to organize a system of nursery inspection. Under the direction of the commission, during the summer and fall of 1916, a careful inspection of the vicinity of Guantanamo was made. This inspection included yards, gardens, farms and neighboring towns. In fact, every place where there might be citrus was inspected in order to determine the extent of the infestation.

Since the black fly had been found only

in Guantanamo and a few of the nearest towns, such as Jamaica, Carrera Larga and Ermita, it was clearly evident that its spread to the coffee plantations in this mountainous region should be prevented. Also it was perfectly obvious that efforts should be made to prevent the spread and propagation of the black fly in the orange districts, of which there are many in Cuba.

DESCRIPTION

The black fly is a bit difficult to describe, but we may begin by saying that it is not a fly but a sucking bug, of the family Aleyrodidae. In its adult stage, or the insect completely developed, it looks very much like a small fly, a trifle larger than the well known gnats, and in its form and manner of moving around, like the drain fly of the family Psychodidae, so that the name "Black Fly" is the most descriptive we can find. The color of the adult insect is slaty gray, more or less blackish or bluish, according to the length of time out of the pupal shell and this is the color of the four little wings which it carries almost vertically over the body. Each of the anterior wings bears two whitish spots on the front border. The color of the body is reddish, the eyes are very prominent, and the antennae of good size with relation to the body. The adult black fly prefers the young and tender shoots of the orange trees where they congregate to deposit their eggs. These eggs appear as tiny points placed in the form of a spiral, always on the under side of the leaf. I have seen these insects fly in clouds from one tree to another, and without doubt they may fly and be carried by

the wind for long distances. A period of ten days or two weeks passes before the larvae emerge from the eggs and these then crawl about over the under surface of the leaf seeking a place to begin operations. Once settled they thrust their tiny beaks into the leaf and begin to extract the plant juices. In heavily infested districts, the under sides of the leaves of all citrus and other orchard trees will be found to be completely black and but little time elapses before the trees begin to lose their leaves, which curl, wither and finally fall. The fruit itself loses flavor and sweetness. Trees attacked by the black fly and which lose their leaves soon die as though hit by a blast.

The intermediate stage between the larval and adult stage of the black fly, called the pupal stage, lasts but few weeks. The black fly in this stage is nearly as large as the head of a pin, looks like a glossy black scale and is covered with tiny spines. To these the insect owes its name of "Spiny Citrus White Fly." The black fly, so-called, is a true white fly, of the same group with which the Florida growers are so familiar, but is the most dangerous and most difficult to control of all the white flies.

The most efficient method of controlling this pest is by the fumigation of the plant with hydrocyanic acid gas, but this method is very costly and requires a special apparatus, canvas tents, etc., for its use, and is very dangerous to use except by those thoroughly familiar with this method of control. Climatic conditions in Cuba and Florida are not favorable to fumigation. Another method is the use

of oil emulsion sprays. These are efficient if properly made and applied. The object of emulsions is to cover the body of the insect and kill it by asphyxiation. The emulsion should be thoroughly applied with special nozzles in order to reach the under sides of the leaves and so cover the insects entirely. Neither of these measures is anything more than a partial control measure and both are costly. The spraying must be repeated at frequent intervals and must be continued.

Much has been said, in Florida, as to the dangers confronting the Florida producer through the presence of the black fly in Cuba, the Bahamas and elsewhere. These dangers are real and the measures to prevent entry of this pest should by all means be continued, and doubled and redoubled. It will be readily understood that if the black fly gains entry into Florida another heavy and continuous burden of expense will be imposed upon the grower, already carrying a heavy production cost.

I am now ready to tell you how the black fly was combated in Cuba. During the year 1917, spraying operations were carried on using whale oil soap almost entirely. Inspection work in Havana Province during the year showed that the black fly was confined to a five-mile zone with the Botanical Gardens at Havana as a center. About this time the work which had been started at Guantanamo with good prospect of being successful was abandoned and as a result the black fly is now firmly established in Oriente Province. Early in 1918, the State Plant Board of Florida, at the request of the Cuban Gov-

ernment, detailed temporarily several of its experienced inspectors to assist and advise the Cuban Bureau of Plant Sanitation. A campaign based upon the experience gained in citrus canker eradication in Florida was inaugurated. Field inspection on a large scale was begun and spraying operations, together with severe pruning, were undertaken. A nursery inspection system in conjunction with the effort to eradicate black fly was organized. Plenty of money was available and conditions at that time were most favorable for eradicating the pest. Work was continued vigorously for a time and progress was made. This effort was unfortunately only sporadic. The system inaugurated promised to accomplish the result aimed at—eradication—and no doubt would have done so, had it not been for a change in administration in the Department. From then on the work was not followed as suggested by the Plant Board, and now we find the black fly situation in Cuba hopeless so far as eradication is concerned. Illegal movement of nursery stock has caused the spread of the black fly to as many as five or six new centers in different parts of the island. When the work on the black fly was first started a decree was published prohibiting the movement of all plants of the genus citrus, also guavas, mango, coffee, sapodilla, pomegranate, star-apple and red mammee, or other host plants of the black fly. Later the black fly was found in many of the patios and yards and gardens of houses in the Vedado, a residential district of Havana, and the decree was made to require the inspection and certification of all

plants to be moved from the infested district. Owing to the small number of inspectors at this time, a strict surveillance over the illegal movement of plants could not be maintained. Prominent individuals moved infested plants from their palatial residences in the Vedado to their no less pretentious country homes. In this way the black fly reached Alquizar, about fifty miles southwest of Habana. Control operations were always started in the center of infestation and not on the outskirts. Thus, while a fair attempt at spray control was being made by the authorities in the heavily infested districts of Habana, by the time they thought they had the situation fairly under control it had gotten out of hand and the outlying districts were becoming infested. I am not pretending to follow a strict chronological order but I am picking out the salient features of the black fly campaign *as it was conducted in Cuba.*

Provincial inspectors were appointed to make inspections that came their way and to make periodical reports to the head office in Habana. I am going to cite only one instance of the efficiency of these Provincial inspectors. Cienfuegos is about the fourth or fifth largest city in the island, located in Santa Clara Province, very important as a seaport on the southern coast. The inspector for this province was supposed to make an inspection every six months of all the nurseries in the province, especially those around Cienfuegos, of which there were some four or five large and important ones. His reports were always the same, that is, to the effect that he could never find the black

fly in any of the gardens and nurseries inspected and that he would recommend the garden for certification without the slightest delay, as the gardeners and nurserymen were moving plants every day. Then one day two of the nurserymen wrote in to the Havana office and asked when we were to make the next inspection. They stated that the Provincial inspector had not been around as was his custom every six months and that they wished their certificates. One of them sent a few grapefruit leaves along in his letter and asked what was the bug attacking his citrus and what he should do to control it. It was the black fly. Charles Ballou, an American attached to the Bureau, was sent down to Cienfuegos to look into the matter and came back with the astounding report that all of the nurseries were full of the black fly and that plants had been freely offered for sale with the black fly on them. It happened that this Provincial inspector was a mulatto chiropodist and that his appointment as inspector had been made as a political reward. Whether he was removed from office I cannot say, but as election time was drawing near and his services were needed in the coming campaign he was doubtless allowed to continue drawing his pay, but further inspections were made by inspectors from the head office.

Another heavy infestation was found in the very geographical center of the island at Macagua in the grove of a Mr. Hodges. This infestation is not far from Ceballos, which is a citrus growing center operated largely by Americans. Most of the fruit grown here goes north by way of Nuevi-

tas to New York and so does not pass through Florida. Another slight infestation was found at Antilla on the north coast, east of Nuevitas and La Gloria. We have had no further reports on this infestation. The latest infestation reported to the Havana office is at Cupey, in Oriente, several miles north of Manzanillo on the south coast. The black fly is also at the Experiment Station at Santiago de las Vegas, about fifteen miles south of Habana. It had evidently been planted there with malicious intent and was not discovered until too late to take measures for complete control. Immediately upon the discovery of this infested center the Chief ordered the cutting down of all the citrus in the vicinity of the center of infestation. In this center were several immense old seedling mango trees about fifty feet high and a number of fine varieties of citrus used in experiments and propagation. The citrus trees were cut down, but the old mango trees were left standing. They are still there, black with the pest.

For all practical purposes we may as well consider Cuba as one hundred per cent infested with the black fly. All spraying, pruning and other control operations have been abandoned for several months on account of the lack of funds. An efficient campaign and plenty of funds to draw on in an emergency would have controlled the black fly in Cuba and today we would not be faced by the menace of having the pest in our own groves.

In any discussion of the black fly consideration must be given to the efforts being made to prevent introduction of the

pest into the United States from the infested countries. The protective measures are both state and federal quarantines. Here in Florida they are administered by inspectors of the State Plant Board stationed at the ports of entry. Materials which may be dangerous are inspected and fumigated. The Federal Government considered imposing a quarantine which would have almost amounted to an embargo on certain Cuban shipments. On the grounds of certain pledges made by the Cuban Government and to avoid serious interruption of trade and traffic, the proposed measure was somewhat modified. The Cuban authorities have not lived up to the promises made at the hearing by the Federal Horticultural Board at Washington in December of 1920, when the quarantine question was under consideration. They agreed to maintain a zone 200 feet on each side of the principal railroad lines throughout Habana Province which was to be free from all black fly host plants. An attempt to do this was immediately made, but where influential property owners refused to allow the Bureau of Plant Sanitation to cut and prune their trees the host plants were allowed to remain as before. Freight shipments coming through these infested localities are subject to infestation and the black fly has every chance in the world of being brought to Florida if it were not for the efficient work done by the quarantine inspectors of the State Plant Board. Their fumigation work at Florida ports of entry has doubtless destroyed the black fly in all its stages many times and has repaid a hundred times the sums outlaid in the es-

tablishment of fumigation houses and maintenance of quarantine inspection.

We cannot hope that Cuba will be able to control the black fly. Such a thing is absolutely impossible. They had their chance to do a wonderful piece of work and lost it. I do not wish to place any dis-

credit on the men who were in charge of this control work in Cuba. They had the interest and earnest desire to eradicate the black fly, but they never had the full authority to go ahead and take the stringent measures which were so needed.

What the Quarantine Department of the State Plant Board is Doing

A. C. Brown, Gainesville

At the last few meetings of the Horticultural Society, you listened to talks on the work of the Quarantine Department of the State Plant Board, and have had the work of the department explained to you. However, as some of you may be from Missouri, we are going to show you tonight, with the aid of lantern slides, just how Florida is exposed to invasion by insect pests and plant diseases from other states and countries, the establishment of any of which in this State would cause enormous losses to the horticultural and agricultural interests of the State.

Judging from the number of interceptions of major pests made by inspectors of the State Plant Board since the work was started in 1916, it is safe to assume that had this system of port and mail inspection been in effect several years ago, many of the pests now with us would be still knocking at the door. We do not claim that all of the pests now established would have been prevented entry, but we do claim that their advent into the State would have been delayed for several years. The payment of insurance premiums does not prevent death or fires, but we feel that when the premiums are paid up regularly, we have done as much as we can to pre-

vent disaster when either occurs. So it is with the Quarantine Department. We hope, but do not claim, that we will prevent the entry of dreaded pests into the State; we know that some of them would now no doubt be established if it had not been for the untiring work of the men stationed at the ports. The pests mentioned later are all causing huge losses wherever they are established, and most of them have been intercepted at one time or another by our inspectors.

In the New England States the gipsy moth has for years caused great destruction to the agricultural and horticultural interests of that section. In 1917, the State of Massachusetts paid out the sum of three hundred thousand dollars for arsenate of lead alone. This sum was not the total appropriation, nor does it represent the cost of spraying, inspecting, etc. It merely represents the amount paid out for one item of the work. No attempt was made at eradication, for through the short-sightedness of a Legislature, who decided that because the moth was decreasing through the efforts of eradication there was no use of spending more money to finish the work, the eradication work was dropped many years ago. As a re-

sult, the moth "came back" stronger than before, and when the public was aroused to the real seriousness of the situation, eradication was impossible, and control was the only hope. Consider this item of three hundred thousand dollars for arsenate of lead to be used for spraying for one year, and then consider the appropriation of three hundred thousand dollars, which was granted to the Plant Board by the 1921 Legislature, only after one of the hardest fights in the memory of its members. This money was to carry on the entire work of the different branches of the State Plant Board for two years; forty thousand per year for the Quarantine Department, whose duty it is to keep out the very pests that are costing other states and countries millions of dollars a year.

To return to the gipsy moth: Many people wonder why the Plant Board will not allow blocks of granite, tombstones, birch hoops for orange wraps, fence posts, etc., to come into the State from New England, unless they have been inspected and certified by the Federal Horticultural Board. The reason is this: The female moth lays her eggs on all forest products; she also lays them on slabs of granite, stone, and other quarry products as well as nursery stock. There is a Federal ruling that such material cannot be shipped out of the infested areas until after it has been inspected and passed by an inspector of the Federal Horticultural Board. We have boats arriving daily from this section of the country, and hardly a boat docks without some such material on board. Every year carload after carload of birch hoops arrive from Maine, and as any of the

hoops may have egg masses of the moth on them, it is necessary to inspect the entire lot. If any of you can imagine a more pleasant way of spending a hot afternoon than inspecting a carload of birch hoops in a close warehouse, I would like to hear of it. Just such an inspection prevented the possible introduction of this pest in Manatee county. One of our inspectors intercepted an egg mass on some hoops consigned to a crate mill at Bradenton several years ago. As this insect will devour every known useful plant, grass, flower, shrub, vine, garden or field crop in New England, you can imagine the damage resulting through its establishment in this State, where there is bound to be a greater number of broods than occurs in the New England States.

In addition to the gipsy moth, there is also established in the New England section the European corn borer, and the Japanese beetle, both pests of recent introduction. Since the introduction of the corn borer, it has spread into parts of Pennsylvania, Ohio and Michigan, where it promises to become one of the major pests of corn, and will cause enormous losses to the farmers of those sections. Not only is corn attacked, but almost all of the vegetables are hosts of this pest. Many of the flowers are subject to attack. Right here is where we got in bad with many people by prohibiting the entry into Florida from the infested areas of asters, chrysanthemums, gladiolas, dahlia and sunflower plants in addition to corn and its products (except clean, dry, shelled corn), hay, straw, etc., and all succulent plants, all of which are likely to carry in-

festation. Many people will say that we do not grow enough corn in this State to worry about what will happen to the crop if this pest is introduced. Do you realize that the corn crop ranks next to the citrus crop in Florida? In 1920 it was valued at ten and one-half million dollars. What do you think will happen to the great celery fields near Sanford and Bradenton if this pest is established? Celery is one of the favorite hosts of the corn borer. It bores directly into the heart of the plant, and has caused great losses to the celery growers in Massachusetts. Another pest of the eastern United States is the Japanese beetle, which attacks all the nursery and greenhouse plants in the sections in which it is established, making it necessary to prohibit shipments of nursery stock from Burlington county, New Jersey, and to regulate shipments from adjoining parts of New Jersey and Pennsylvania.

We do not have to go to the northeastern part of the United States to find destructive pests. Recently an outbreak of the Mexican bean beetle was discovered in Birmingham, Alabama, where all of the beans in the gardens were destroyed. This beetle is a member of the lady-bird beetle family, and is one of the very few which is injurious to crops. From the small infested area in Alabama, the beetle has spread to six states: North Carolina, South Carolina, Georgia, Alabama, Tennessee and Kentucky. In Thomasville, Georgia, every property was found to be infested. All varieties of beans are severely attacked, the beetle skeletonizing the leaves. Next to the beans, beggar-

weed is the favorite food of the pest. We all know that beggar-weed is one of the mainstays of the citrus growers, who use it for a cover crop. When this pest is established, for there is no way under the sun to keep it out of the State, the entire cover cropping system of Florida will have to be changed. In addition, cowpeas and velvet beans are hosts of the beetle. This pest was no doubt introduced into the southeastern part of the United States on shipments of alfalfa hay from the Western States, where it has been established for years. Like the boll weevil, the pink boll worm, and several other destructive insects, this one was introduced into the United States from Mexico. Due to the tender foliage of the hosts of this insect, spraying has not been effective as a means of control. An expedition has been sent into Mexico to find parasites, which will in a measure keep the beetle under control.

Further west we have a pair of pests that should be kept out of the State at any cost. They are the Argentine ant and the Japanese camphor scale. This last pest was just recently introduced into the United States. The Argentine ant was introduced into New Orleans about twenty-five years ago by a ship from the tropics. It has spread throughout the State, as well as into adjoining states, until now about one-fourth of the orange groves in Louisiana are infested. That is where the shoe pinches: We may get used to finding the ant in our house, in the sugar, bread, etc. We might also get used to its attacking young children at night, but when it gets in the orange groves, right

away we are going to get mad. In California, where the ant is established, great damage is caused by its habit of protecting soft scales and aphids. Near Los Angeles, the mealy bugs have greatly increased since the advent of the ant. You will be interested to know that recently the assistant quarantine inspector at Pensacola intercepted a shipment of lettuce from New Orleans, infested with this pest. The lettuce was, of course, destroyed.

The camphor scale was smuggled into New Orleans by one of a ship's crew in 1919 or 20. It became established in one commercial nursery and from there scattered throughout the town. Sprays do not seem to check the insect, and as a result most of the host plants have been cut back. While camphor is the favorite host, there are about one hundred other plants subject to attack. Citrus, pecans and oaks are in this list. If this scale ever obtains a foot-hold in Florida, it may be impossible to control it. Particularly is this true, if it becomes established in the huge oaks in the hammocks. The same inspector who made the interception of the Argentine ant at Pensacola, intercepted a shipment of plant material from New Orleans to the Reasoner Brothers' Nursery at Oneco. The material was heavily infested with the camphor scale. This interception stands out as one of the most important in the records of the State Plant Board.

Of particular interest to the citrus growers are the fruit flies, which by some miracle, have not become established in Florida. The papaya fruit fly is the one exception; this fly is at present at work on

the papayas on the lower East coast. The damage is done by the larvae, or maggots, which hatch out from the eggs deposited by the female in the fruit. After emerging from the egg, the maggots tunnel throughout the flesh of the fruit, rendering it worthless. Right at our doors is the West Indian Fruit Fly. This pest is established in Cuba, Porto Rico, Central and South America. In Cuba, mangoes are the favorite hosts, although guavas and plums are also attacked. In the Argentine Republic peaches are also included in the list of hosts. Citrus is not known to be infested in Cuba, but in South America the fly takes to the citrus after the more favorite fruits are gone, and causes great losses to the citrus growers. Citrus seems to withstand the attacks of this pest better than the other fruits. It may be explained by the fact that the oil cells in the rind are punctured when the female lays the eggs, and the oil kills some of them. Many may hatch out, but starve to death before they can work their way through the thick rind to the flesh of the fruits. Even though no damage is caused by the maggots, the puncture in the rind leaves an opening for many fungi to become established and cause great losses to the fruit grower. The Plant Board passed a rule prohibiting the importation of guavas, plums, mangoes and surinam cherry from Cuba. This immediately raised a storm of protest from the Cuban authorities, business men and fruit growers, who carried the fight to the State Department at Washington. Their contention was that while the mango was a host, the "manga," known in this State

as the "apple mango," was not known to be infested, and it should be permitted entry. In order to know what a "manga" really was, the assistant quarantine inspector at Key West sent an apparently uninfested manga to the office at Gainesville, where it was put into a jar of preservative to keep as an exhibit. Several days later a larva of a fruit fly was noticed half emerged from the "manga" driven out, no doubt, by the preservative penetrating the tunnels made by it. This, of course, made the Plant Board all the more determined that the fruit should be prohibited entry, no matter by what name it was disguised. As mangoes are almost staple articles of diet with the Cubans and natives of the West Indies, there is not a day that passes that they are not taken from passengers at Key West, Port Tampa and Miami. The interception of mangoes infested with the fruit fly has been so numerous that the men on duty are taking it as a matter of course. This does not mean that they are not taking the same pains to intercept such importations; on the other hand, a mango means a fruit fly to them, and it is disposed of with the greatest speed possible. Quite recently another possible manner of this fly becoming established in Florida has been discovered. An enterprising fruit company has put on several refrigerator ships to carry cargoes of fruit from the Argentine, where the fly is causing enormous losses, to New York. Here the fruit is shipped by express to all parts of the United States. A short time ago the inspectors at Jacksonville intercepted such a shipment of fresh peaches consigned to a deal-

er in Florida. There is always the possibility of the fly becoming established through a similar shipment getting by our men. Cold storage will not kill the larva of the fruit fly; it merely checks development, and when the fruit is removed from the refrigerator, the maggot is all ready to start development. A crate of peaches was en route from Cape Colony, South Africa, to New Zealand for four weeks. Upon arrival at destination, it was found to be heavily infested with larvae of the fruit fly, all of which were in the best of health.

In certain parts of Mexico, Tampico is one of them, the production of oranges has been abandoned, and the mango crop has been reduced to one-fifth of the normal by the attacks of the Mexican Orange Maggot, another of the dreaded fruit fly family. In addition this insect attacks many vegetables, one of which is the tomato. Tampico seems a long way off, but there is not a week that passes without several oil tankers docking at Florida piers. As the crews of these ships are given the best to eat, it is not unfrequent that interceptions of fruit from Mexico are found on board the ship.

Last of the fruit flies, but not least by any means, is the Mediterranean fruit fly. If this insect becomes established in Florida, we may as well lock up the packing houses and quit trying to raise fruit and vegetables. This pest has caused the peach-growing industry near Barcelona, Spain, to be abandoned; it has checked fruit-growing in South Africa, and in parts of Australia the peach groves have been cut down on account of the attacks

of this fly. In Brazil the commercial fruit-growing has been at a standstill for twenty years due to the activities of this insect. You may form an idea of the destructiveness of this fruit fly, when you learn that in Honolulu there are seventy-two fruits and vegetables attacked by this pest, and their production is possible only under cover. The banana and pineapple are the only fruits grown on the islands that are not subject to attacks by it. Fortunately for Florida, the fly is not established very close to her shores. The Bermuda Islands and Brazil are the nearest points from which infestation is likely to be carried into this State. There is but very little communication between these two places and Florida. Nevertheless, it behooves the people of this State to be on guard every minute against this pest.

At present the pineapple industry of the East Coast is making a determined effort to regain the ground lost during the past few years, and to again bring thousands and thousands of dollars into the State through the sale of pineapples. It has been determined that through proper cultivation and a system of rotation, just as large crops can be made now as were made when the industry was flourishing many years ago. To prevent the ruination of this budding industry, the Plant Board has prohibited the importation of pineapples, fruit and plants from Jamaica, on account of the danger of introducing the pineapple black weevil, a pest that has caused the destruction in some years of fifty per cent of the crop in that island. The weevil is not known to be present in any other part of the West Indies, but you

may rest assured that just as soon as its presence is known on any others of the group, a quarantine will be immediately slapped on importations of material likely to bring in the insect.

Perhaps the most interesting pest to the growers present here tonight is the black fly, which has caused quite a bit of damage in Cuba and the Bahama Islands. In the latter group, the damage resulting from the attacks of this pest has almost wiped out the citrus industry on some of the islands, particularly New Providence. All the citrus trees have been cut down on this island in an effort to check the spread of the fly. Unfortunately, in addition to the citrus, there are almost one hundred other hosts attacked including the mango and avocado. In Cuba the black fly has caused as much, if not more, loss than occasioned in New Providence. Some of the groves have not borne a normal crop of fruit since the fly first became established. The fruit is dry and pithy, with no juice at all. Spraying does not seem to have any effect on this insect. In the Vedado section there is a lemon tree which has been sprayed repeatedly for months, but the leaves and twigs still show heavy infestation. In 1916 the State Plant Board sent two men to Cuba to assist in the eradication of the fly. The work was carried on in true Latin-American style, and while at first eradication seemed possible, the work was carried on in such a manner that the infested areas gradually increased, until now there is no hope of eradication, and, with the way the Cubans are letting the work slide, very little expectation of control. For this reason the

Plant Board has prohibited the entry of plants and fruit with leaves, twigs and other litter in the crates. There is not a month that passes without the inspectors at Port Tampa, Key West and Miami making an interception of infested material, any one of which, if permitted to land in Florida, might mean the establishment of the black fly within her boundaries. The grave situation at Key West lies in the fact that there are three ferry boats arriving daily from Cuba loaded with freight cars, both full and empty. These cars pass through the heart of the infested area in Cuba, and at times stand on side tracks for days, and are then loaded onto the ferries for shipment to Key West. There is always the possibility of adult flies being in either the empty freight cars, and when the ferries are docked at Key West, flying to the light, and of course, ashore. It has been stated that the Florida quarantine inspection service has every crack in the jug stopped up so tight that nothing can get in, while the whole bottom of the jug, meaning Key West, is wide open. There is only one way to plug this open bottom: A fumigation house large enough to fumigate the entire ferry load of freight cars at one time. Such houses are operated by the government on the Mexican border, where there is great danger of the pink boll worm gaining a new foothold in Texas in freight cars from Mexico. These houses give excellent results. Some day, maybe, there will be enough interest taken by the people of Florida to see that such a plant is established at Key West. Quite recently the inspectors at Port Tampa intercepted

a passenger from Cuba with four small avocado trees in his possession. The trees bore a certificate issued by the Cuban inspectors to the effect that they were apparently free from injurious insect pests and plant diseases. An examination of the trees, however, showed that they were infested with the black fly eggs. Here is the interesting point about this shipment: The trees were to be planted out near Ft. Myers. Can you imagine what would have been the result if this material had not been intercepted, and had been set out as planned right in the edge of the citrus section? There were enough eggs on the leaves of the trees to insure the establishment of the black fly in that section, with the probable spread north to the entire citrus growing section. Needless to say, these trees were destroyed, and the owner arrested for violating one of the Plant Board rules.

"For ways that are dark and tricks that are vain, the heathen Chinee" is a saint when compared to the insect pest that is trying to gain a foothold in a new country. The Mediterranean fruit fly became established in the Bermudas when a ship loaded with infested fruit was washed ashore near St. George during a storm. Quite recently the California quarantine inspectors found two innocent-looking pieces of bamboo in the baggage of a passenger from Japan. As the quarantine inspectors are inquisitive chaps, they immediately connected the bamboo with a bug in some manner or form. A plug was discovered in the ends of the bamboo, which when removed, discovered a hollow chamber filled with citrus bud wood. The

bud wood was infected with citrus canker. The Mediterranean fruit fly was spread to a new section of Australia by passengers throwing infested fruit out of the windows of the train. It is a wonder that some pest has not been introduced into the lower East Coast and the Keys by just such a method. For years the Cubans have been coming to the States by the thousands. Many of them are high livers, and charter Pullmans to take them from Key West to New York, bringing large quantities of fruits and other provisions with them to eat en route. The most natural thing in the world to do when one has bitten into a fruit and found that it had been claimed first by a lot of fat worms is to throw it away. Such fruit thrown out of a car window is more than likely to fall near a grove where the maggot, after completing its cycle, finds close to hand plenty of its favorite hosts in which the eggs are deposited. An infestation so started could exist in some sections for years before becoming noticed, and by that time the pest would be so firmly established that eradication would be impossible, and control a mere make-shift.

In addition to these ways of obtaining a foothold, the pests find lots of people ready and eager to help them locate new fields to work in. There is hardly a person in this audience who has not, at one time or another, violated some rule of the Plant Board prohibiting the movement of plants. Most of the violations have been unintentional. It seems perfectly legal, when one has a very fine plant or tree and wants to give it to a friend, to dig it up and carry it in an automobile or train to

the place where it is to be set out. Others think that the regulations of the Nursery Department are entirely too strict, and should not be enforced. You will be interested to know that the nursery inspection system as worked out by the nursery inspector has attracted the notice of all the inspection and quarantine officials in the country, and several of the states are reorganizing their forces in an effort to get the same results as are secured by the Plant Board. How the Plant Board has to fight against the introduction of pests by short-sighted people who live in the State, the following letter will serve as an illustration. The man who wrote the letter lives in one of the most highly developed sections of the State, and a section in which a great interest is being taken in avocado growing. In addition to this letter, another one along the same lines was written to a nurseryman in Cuba:

_____, Florida, Oct. 20, 1917.
To the Leading Fruit Dealer, Brownsville,
Texas.

Dear Sir: I want to buy hundreds of thousands of seeds of avocados, I will pay \$25.00 a 1,000-seed barrel up, F. O. B. on railroad at Brownsville.

Are there any avocado seeds sold in the town across the river? Why can't you pay small boys 10 cents a 1,000 to slip the seeds over to Texas?

There is a rule to prohibit bringing in the fruit or seed, but it seems to me that small boys could get the seed over in small lots. Why is it not easy also to hide small sacks, say of a peck, in the middle of

sacks of some sort of produce and ship those produce to Brownsville from down in Mexico?

Write me what is the chance to get large lots of seed in Mexico.

Yours truly,

I will say that the seed of the avocado is prohibited from Mexico and Central America on account of the presence in that section of the avocado weevil, a pest, which, if introduced into Florida might mean the ruination of the great avocado plantings now being established in this State.

How in the world can we hope to keep uninformed foreigners from bringing in destructive pests, when people in our own State, who know that material is prohibited, and who know that it is likely to bring in some dangerous insect, try to smuggle plants or seeds in in such a manner? We are facing a similar situation in North Florida in regard to the Satsuma orange. The interest being taken in this fruit is intense, and the nurseries are swamped with orders for Satsumas, and have to turn down many requests. A few short-sighted people say that they can't see why they cannot get all the Satsuma trees they want from Georgia and Alabama, when they cannot get them in Florida, and some of them are making efforts to secure Satsuma trees from Georgia and Alabama. The mere fact that they will more than likely bring in citrus canker with the trees does not worry them a bit. So you see that the only hope of the Plant Board to keep out destructive pests, or to delay

their entry into the State, is by the hearty and complete co-operation of you folks whose living is tied up in the horticultural, agricultural and industrial development of the State.

Mr. Newell: You have seen from Mr. Brown's lecture some of the difficulties connected with the enormous task of protecting Florida against these many enemies. You also know, those of you who have thought about it, that the State of Florida cannot carry this load alone. We must have the help and backing of Uncle Sam. We must have his moral and legal backing and his financial assistance. We have had the help of the Horticultural Board for several years and perhaps the most important quarantine rule of the Federal Horticultural Board, to us, is "Quarantine No. 37," which prohibits the wholesale and unlimited importation from foreign countries of trees and plants. This is the quarantine rule that has stopped the steady influx of pests into this country. An attack on this rule is going to be made at a hearing in Washington on May 15th. Its continued enforcement is going to be opposed by certain brokers and dealers who want to profit on imported material and care nothing for the future of our industries. Quarantine No. 37 is a protection to every orchard and farm in the State of Florida and if this society wants to insure this protection being continued it should so express itself—perhaps in the form of a resolution to the Federal Horticultural Board, before its hearing on the 15th instant.

Pruning Young Trees

H. E. Cornell, Winter Haven

This address will be confined to a discussion of the pruning of young trees before planting and for a period of three or four years after.

Whether you plant just a few trees for home use or a large number for commercial marketing, you are naturally desirous that they shall be successful. A correct start is most important. Given this, your trees will avoid a set-back at the beginning, avoid subsequent slow growth and diseases, and instead grow vigorously and quickly reach a productive size.

In considering trees to be planted we will have in mind the ordinary sizes of citrus trees from the nursery, from one-half inch to one inch in diameter.

The first thing to decide is how the trees shall be cut back for transplanting. It used to be general practice to plant branched trees—that is, trees cut back, leaving the main branches six to ten inches in length. The new top of the trees was then formed from buds growing from these branches, and every sprout below on the trunk not allowed to grow at all. This is not the best way to prune for planting. The shoots growing from the branched tree are apt to develop into drooping branches, grow toward the ground and be anything but vigorous.

The sap flow has had to become established throughout the entire length of the trunk to reach this top. Often before this is accomplished, the bark has become somewhat hardened and dried out, and though the tree may live, the growth is weak and reluctant. Later, much frenching will occur and for years it will be necessary to keep pruning out hard and withertip branches.

Unless trees are extra large in size, over three years of age and caliper three inches or more, the best way to prune back for planting is to cut off the entire top, leaving a stub of a trunk twelve to twenty-four inches in height. Within these limits, the larger the tree, the longer the stub. For the average one-year-old bud on four-year-old root system which we are considering, caliper three-quarters of an inch, sixteen inches is about right.

The trees should be dug with a liberal root system. This root system has to absorb water from the soil to replenish that evaporated from the trunk and keep it from becoming hard and bark-bound until the tree gets started. It will readily be seen that it is best to have this absorbing, pumping, root area, large, and the exposed trunk subject to drying out relatively small.

The trees should be set slightly higher than they stood in the ground before removal. Subsequent cultivation will work the soil up to them somewhat and if set too low might cover the union of bud and stock.

Cut back to a stub, when the tree starts to grow it will put out shoots from all or most of the buds on the trunk. These buds are larger, more fully developed and put out much more vigorous shoots than those on the branches of a branched tree. They are, as it were right on the main line and near the source of supply. The common method once was to assiduously rub off as soon as they started, everyone of these tiny branches except a few near the top which were intended to become the permanent head. It was thought that all growth which went into branches not to be left, was wasted. This is a serious mistake. Don't rub any of them off. Leave them strictly alone to grow at will. These little sprouts all up and down the trunk will not of course all be left as permanent branches, but they serve a very useful purpose. They are of great use in helping the tree get started. They shade the trunk and prevent the bark from becoming hard or burned by the sun. They act as tiny pumps, transpiring moisture and helping to get the flow of sap freely established.

For the entire growing season keep right on letting the trees strictly alone. Pursue the usual practices of watering, cultivation and fertilization, but do no pruning. Of course if on an occasional tree a sprout from the root-stock below the bud appears, this should be cut off.

After the tree has been growing a year,

it will be found that nature has practically selected the permanent head without any assistance or interference. Most of the little branches which shoved out when the tree first started will have made the one growth and no more. But nature will have selected several as the easiest and most natural sap channels and these branches will have put out several vigorous upward growths and developed into sturdy thrifty limbs. This is the permanent head of the tree. Take the shears and prune out the small twigs. The original trunk may have died back or become hard down from the top a few inches. Cut this off down to the topmost thrifty branch. You now have a clean tree, branching strongly upward and growing from the ground instead of lopping, weak growth downward toward it. The tree established in this manner will be free growing and lusty and given good care in other ways, will not be subject to frenching and withertip.

Having followed this method, your pruning for the second year and every year up to the bearing age, will be extremely light. All sprouts which appear below the main branches should be removed promptly. It is well to keep the center of the tree from becoming congested. Keep all sprouts off the main branches up to a height of from two to three feet. This with the occasional cutting out of a water sprout, a sprout below the bud or a broken branch should constitute all the pruning necessary.

You may wonder why all nurseries do not send out trees cut back to stubs instead of at times shipping branched trees. The

nurseryman may know that this is the best method and wish to do so in order that his customer may get best results. Unless he can explain it thoroughly, he is sometimes reluctant to do so for this reason. The planter, particularly if new in the business, associates in his mind, "trees and branches." When he gets a shipment of branched trees; planted, and looks down the row it appears to him that he has a grove "right now." But if he receives trees cut back to stubs, he may look over the planting and wonder what's missing and if a mistake has been made. He may not know that at the end of a year he will have a much finer headed tree, a thriftier, and a better tree for its entire life. So, instruct your nurseryman to prune for planting—sixteen-inch tops.

The conclusions outlined are the result of the observation of not a few or a few hundred, but literally of hundreds of thousands of trees pruned for planting and treated in every conceivable manner. As is often the case, we work from the complex to the simple and you will find that this simple method of pruning young trees before and after planting will produce the best results.

_____: In my grove, in January, I rubbed off branches on young trees. Should I have let them grow?

Cornell: Let them grow until the next December and then follow the method I have suggested. On young fruit trees generally cut them to six or eight inches length and that helps the trees get started. I would not remove them.

Hart: That meets my approval thoroughly. I might suggest, in setting the trees that the roots be pruned smoothly, it is well to cut from the underside. That has a tendency to send the roots down.

About fertilizing the ground before the trees are planted, if the tree is planted in the winter, do not fertilize it at time of planting. When spring comes top dress with one-half pound to the tree. If planted after February 1st, the fertilizer should be put on at time of planting. Where top dressed, put in or mix with the soil.

Lord: The number of branches is an important factor in the foundation of the trees.

Cornell: With the trees as I have described, at the end of growing season, there will not be five branches but mostly four or three branches. The question is if you want to head your trees with three, four or five branches.

Pruning Bearing Citrus Trees

A. M. Tilden, Winter Haven

The subject assigned to me is one of absorbing interest and I believe, of far greater importance than the average grower thinks. It is one to which I have devoted a great deal of thought and time and yet I have probably never done a satisfactory job of pruning.

One would be adventurous indeed to stand up in front of you and attempt to lay down definite rules and regulations in pruning, for there are probably as many different opinions about pruning as there are about the prohibition question. And so, with your permission, I will merely attempt to outline in a broad way, my own general ideas.

While we always speak of the citrus tree as a tree, it is nevertheless, I think, somewhat of a bush. It should be grown and pruned with that in mind. We are not trying to grow a tree with a tall trunk and large branches that may later be cut into framing timber, but rather we are trying to grow a great number of small branches and twigs that may bear fruit and offer us as large a bearing surface as possible. My ideal tree is one that is headed low, that spreads out instead of going up in the air and that has a surface of bearing wood from the ground all around up to the top; one on which the picker starts work upon his knees and fin-

ishes on the top of his ladder. A tree shaped and grown in this way presents the maximum bearing surface and certainly, all other things being equal, the number of boxes of fruit is in direct ratio to the amount of bearing surface.

On the inside of the tree, that is infrequently pruned, we find a large accumulation of dead branches and in addition to that, we find insect life very numerous and the combination of small dead wood and insects generally result in the smothering out and killing of all the inside wood of the tree. And so, when we come to prune, we are compelled to remove everything from the inside of the tree, leaving no fruiting wood but just an empty shell. On such a tree fruit may only occur upon the thin surface of twigs and leaves around the outside.

But, if light and frequent prunings are given and the accumulation of dead wood prevented, then there may be grown a limited amount of inside wood which will bear fruit and increase both the bearing surface and capacity of the tree.

These frequent light prunings are, I think, no more expensive than infrequent heavy prunings and they will gradually result in a material increase in the bearing surface of the tree.

In groves that are closely planted and in which the branches of one tree interlock with the branches of those surrounding it, it is not possible to obtain the kind of shaped tree of which I have spoken. In such groves, the lower branches are smothered out and umbrella-shaped trees result. The bearing surface of these trees must of necessity be only in the tops, but the same kind of pruning will, even in these trees, result in some inside bearing wood.

Then, the accumulation of undesirable water sprouts, and water sprouts are never desirable, should be prevented and will be prevented by frequent prunings. Water sprouts left undestroyed for any great length of time will often destroy the limb from which they spring and I think most growers will agree with me that a tree composed largely of water sprouts is not very desirable. To keep a tree in good and proper condition, requires, I feel confident, the kind of pruning which never gives the tree a severe shock nor allows the accumulation of undesirable wood and which allows the tree to shape itself naturally.

As a rule, we all prune when we can and that is generally when the shipping season is over and labor is available. But a light pruning just before the bloom, is a desirable factor in the making of the next crop. The slight shock imparted causes a more general setting of the bloom and gives a tendency to the trees to hold their newly set fruit.

When it becomes necessary to cut off large branches leaving scars of better than an inch in diameter, a trimming of the

edges with a sharp knife and the painting with any good preservative is of importance. The cuts will then callus over before the exposed wood rots.

In general I would say that trees should be pruned in such a fashion that pruning may never become a pressing necessity.

_____: I would like to ask what time is most favorable for pruning?

Tilden: We never have enough people in Florida to do the work and in the harvesting we have to depend on outside labor. Pruning is done when we can get to it, which is generally in the summer. I rather like fall and winter pruning.

Hart: I would like to know your opinion in regard to the pruning of old trees. I have a great many letters from people who have old groves and they speak of pruning them and I would like to know what your experiences have been, if any, in regard to cutting the tops out of old trees, and how about cutting off one-third of the top of the tree?

Tilden: I have not had any experience nor have I seen it done.

Skinner: As to that question about cutting the top of the tree out, I have had experience in that. Wherever that was done the tree is likely to send up water shoots in the center. The sap has to go somewhere. This type of pruning is not advisable unless the tree is dying at the top. Where young trees are cut off at the top that is a mistake.

Thompson: I think the question of dead wood is the most important.

Tilden: I let that go as part of the undesirable wood. It all is undesirable wood.

Hart: I was glad that Skinner said what he did as it meets somewhat with my experience. If Mr. Brown is in the room I would like to hear from him as to painting after pruning. That is good and will help. If the wound is covered with something to keep life in the stock, it will heal over.

I have had some experience in the cutting back of trees that were getting pretty well along in years, 25 years old, and I hardly believe in removing the lower branches in cutting back. I have removed the entire top and not removed the lower branches and those trees have come back and are producing crops of fruit now. You only lose one crop but now an important point in the cutting back is that it should be done by the middle of March, or preferably February. If you wait until March the sun is rather hot. It is a good plan, where the tree has its bearing capacity reduced. It is a good thing in a grove like ours, to lose a crop for one year and cut it back for 15 feet.

Skinner: You have been over on the

other side where they have reduced it to a science. Tell us about that, Mr. Hume?

Hume: Their methods differ as to those outlined by Mr. Tilden. You never see any wood that has been smothered out. Trees for the most part are kept open in the center. Now, I have never seen such a thing as dieback in the Spanish grove, or any of those relating troubles. The trees look as though almost every twig has been handled. They have groves which are from 100 to 150 years old, which are wonders.

Waite: Mr. President, in regard to cutting back trees. I have cut back trees a good many times and afterwards had to remove those trees. I have always found where the tree was cut back to form a new head, it would send out good shoots through the summer and would make a good tree that later would die. In removing that tree I discovered what was the cause. In taking off the top I had forgotten to root prune and consequently the tree would invariably die and all the fibrous roots would die.

Dieback, Ammoniation, and Frenching

R. E. Lenfest, Winter Park

It is not the purpose of this paper to give any technical discussion of the above tree conditions but to give some observations concerning these conditions and some of the factors influencing them. The first of the subjects really covers those following, but each will be taken up separately with reference to its relationship to the others.

Described in every-day terms, dieback is a sort of malnutrition or indigestion of the tree. It is a name applied to a condition of the tree and is not a very accurate name. It should not be confused with the effect and appearance of withertip. Dieback may be divided into two types, acute and chronic. Ammoniation is the effect of the disease as shown by the fruit. Frenching is one serious phase of the disease and when this stage is reached it may be said that the trouble has become chronic.

Dieback seems to be brought on by a number of conditions or combination of conditions. Giving the trees an unbalanced feed does its share in causing the trouble. This may be done in several different ways. Overfeeding trees will give an unbalanced ration and may be done by using too large amounts of fertilizer or too high an analysis of ammonia or both. This is very apt to bring on dieback con-

dition, especially if most or all the ammonia is derived from inorganic sources. Some organic sources of ammonia if used in excess will probably produce dieback and ammoniation but generally in a lesser degree and taking longer to do the harm. This is not meant to condemn the use of inorganic sources of ammonia as they are very important in the satisfactory growing of citrus trees and fruit, but to call attention to the fact they should be used carefully and understandingly, and when thus used the results are quite sure to be good. Another way in which overfeeding may be done is putting fertilizer too close to the trees and in too narrow a band —fertilizer should be spread each time just a little farther than the roots extend until the roots and fertilized areas meet. It should then be scattered broadcast and evenly. A great many growers do not realize how far out the roots extend. The only safe way to make sure of this is to dig near a number of average sized trees and find the average distance to which the roots extend and whether or not they meet in the middles.

One reason why many growers overfeed orange trees is because they have orange, grapefruit and tangerine trees of the same age and have overlooked the fact that orange trees cannot handle as much

food as grapefruit and tangerine trees of the same age and size. Then some varieties of oranges may require different methods of feeding.

It may be interesting to mention most of the symptoms and indications of die-back—bark excrescence; gum pockets; stained terminal branches and twigs; staining of the leaf, petiole and midrib; "S"-shaped and droopy terminal growth; deep green color and large coarse leaves; frenched, pointed leaves—these are often fleshy and brittle; bunchy growth—a tendency toward multiple buds; wood flexible—too easily bent or twisted; fruit coarse; fruit scarred with ammoniation markings; fruit too hard and too firm—lacking in resiliency; wood too angular and not well filled out; stubby growth—especially if bunchy and possibly frenched; malformed, crinkled leaves—not caused by wind or mechanical injury; the wood may be dark and hardened.

There are several other conditions that will induce many of the above symptoms of dieback. Poor drainage will bring on a dieback condition. In this connection it might be well to mention the effect of clay or some other impervious layer being close to the surface even though the soil seems to be perfectly drained because it is on high land and often well above the lakes that may be near. The result of this layer being close to the surface is that the trees get all the food that is put on the ground as the only leaching that can take place is laterally and often this is not very rapid. This, when not taken into consideration, will bring about a condition of overfeeding.

Another condition that often exists in old seedling groves and in some of the older budded groves is that the trees are set very close together. When this is the case the trees are so crowded that by the time they are mature the actual leaf surface or top of the tree is much smaller than a tree of the same age having room enough to expand and make a growth on the sides of the tree. When this is not taken into account the close set trees are often given the same amount of fertilizer a normal shaped tree would get. The result is that the close set trees are often over-fed and the fruit coarse and ammoniated.

Deep plowing and excessive and deep cultivation will tend to cause dieback and especially a frenched condition as will be mentioned later.

Having trees set too deep will cause trouble. The crown roots should be at ground surface as is brought out in another paper on the program.

Ammoniation is the effect of the die-back condition of the tree as shown by the fruit. The markings are very characteristic yet when not very severe some have trouble distinguishing it from Melanose. A simple comparison of the two may be helpful. The Melanose markings affect the surface and the dark scab-like spots may be lifted up disclosing tissue of fairly normal color underneath. The ammoniation markings cannot be so easily lifted off and the tissue underneath has a stained and often brownish appearance. Another method of distinguishing them is to cut a small wedge-shaped piece out of the rind through the spots in question and note the color of the underlying tissues. Badly

ammoniated fruit in addition to having the characteristic surface markings and splitting will often have a gummy deposit in the segment angles in the center of the fruit.

Frenching is a term applied to a peculiar yellowing of the leaves. It is quite characteristic in that the leaves remain green along the midrib and lateral veins and become yellow in the fleshy part between the midrib and veins. Another condition that is often confused with frenching is where the leaves show lack of food or a starved condition. The difference in appearance is that the pattern is exactly opposite. The leaves showing hunger are yellow along the midrib and veins and green in the fleshy part of the leaf. Also the hunger leaves can often be brought back to good color but very little change can be produced in frenched leaves. The change in appearance of the tree must come from normal growth being produced. It is especially important to notice these differences as the frenched trees should not receive the same treatment as those showing lack of food. The frenched trees are unhealthy while those showing hunger may be healthy yet underfed. Frenching may result from most any of the causes of dieback. Of these it is most often caused by deep plowing and deep cultivation or both —where many of the crown roots and main feeder roots are repeatedly being disturbed, especially if fertilizer of high ammonia content derived entirely from inorganic sources has been used continuously. The use of lime in various forms on light sandy soil has brought on many serious cases of frenching.

So far no suggestions have been made which might help overcome these conditions of the trees. In closing an attempt will be made to do this briefly.

If it is a matter of drainage, make ditches deep and large enough to carry off excess water. Where trees are planted on ridges the furrows or ditches between should be as deep as possible and the beds as high and wide as can be made so that the trees will at all times have plenty of good normal roots above the line of water-soaked soil. Trees with crown roots too deep should be raised or have soil removed to proper level by cultural methods.

When non-bearing trees and even young bearing trees are very badly affected with dieback showing deep green color, multiple buds, gum pockets, bark excretion, flexible wood, but with little or no frenching, discontinue fertilizer for one application or even for a whole year if observation of color and condition from time to time shows this to be advisable. The use of bluestone will help to hasten recovery. Keep cultivation shallow and minimum in amount. When fertilizing use fair amount of potash, low ammonia content and at least half of this from slow acting sources.

In handling older dieback trees it is not advisable to discontinue fertilizer for so long a period. Reduce amounts and use low ammonia analysis or make a greater reduction of a higher analysis if this is desired. Have about half the ammonia from slow acting sources. Maintain a good amount of phosphoric acid and also potash. The use of bluestone is also advisable in amounts varying with the size

of the trees. Bone is a very safe source of slow ammonia. Be sure that fertilizer and bluestone are scattered out evenly as far as the roots extend. Broadcast if roots meet in the middles. Remember that fertilizer can be added much easier than it can be taken away or the effect of an overdose counteracted.

When trees are frenched deep plowing or deep cultivation should be discontinued; in fact, deep plowing or deep cultivation should never be included in grove practice. Any unfavorable condition of drainage or setting should be remedied. The fertilizer should have a low ammonia analysis of which half or more should be from slow acting sources such as bone. Quite liberal applications of good stable manure will be beneficial. Bluestone should also be used. If the frenching is a result of lime injury the recovery of the trees will probably be slow and the use of stable manure will be found to be especially helpful. Just what the effect of spreading sulphur around the trees will have has not been definitely settled yet.

In conclusion, it might be said that a great deal of worry, expense, loss of tree growth and fruit might be saved by familiarizing growers with the various symptoms of dieback and the methods of handling so that they can check the trouble before much harm is done.

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_____: Have you ever tried sulphate of iron in checking the frenching?

Lenfest: At present I do not know the effect of it. That is one thing that I don't know anything about at all. Lots of different conditions can cause frenching.

The cause of the trouble should be found if possible and removed. If it is a grove practice, discontinue that practice.

Skinner: From your observation in organic ammoniation, is there any difference in the ability of sources to give this die-back condition?

Lenfest: I cannot say about the nitrate of potash which has been in use for several years. I have made this statement to a number of growers. I told them to run a race with me to produce dieback and I would take nitrate of soda to bring it on.

Skinner: Have you ever had any experience in grapefruit where the leaf turned badly frenched and dropped off? Have you any idea what causes it?

Lenfest: I have seen that condition but I don't know what it is. It may be something in the fertilizer or Mr. Cline may have some recent information on that.

Cline: We are in somewhat the same fix that you are. We know that borax will produce it.

_____: I want to give one instance of organic ammonia. Some years ago I was feeding cattle. I put them in stalls and saved all the fertilizer and on an old seedling grove I hauled out 200 one-horse wagon loads. On top of that I put an application of commercial fertilizer. I never found a bit of dieback from it. I did find a very much increased growth of fruit.

_____: Can dieback be caused by hardwood ashes?

Lenfest: I don't know. It is valuable as a source of potash, but what its further action is, I don't know.

_____: I would not use lime in any other way.

_____: If you want to grow good trees you must know your trees. I remember one time a man told me to use cotton seed meal on my grove and I did. I had to go to work and cut a year's growth down. It would not work, the tips turned down and I had to go to work and get someone that understood tree growth better than I did and he told me of a good grade of fertilizer to use on them, and I did.

_____: How much bluestone do you recommend for two-year-old trees?

Lenfest: I would say from $\frac{1}{4}$ to $\frac{1}{2}$ pound in two or three different applications from three to four weeks apart. I divide it up that way to protect myself. If the trees were my own I would put on $\frac{1}{2}$ to $\frac{3}{4}$ pound, but I don't when it is going to rain. I have seen six and seven-year-old trees killed outright by the use of $\frac{1}{4}$ to $\frac{1}{2}$ pound. One man I remember put it on during Saturday afternoon and he wanted to go to town that night. He had a can containing $\frac{1}{2}$ pound and he went up to the tree and threw it on. He told a man of it that night, who told him to go home and take it off. He lost quite a number

of trees. That was caused because he did not put it on right. Those trees, if they had been in a dieback condition, would have stood 2 pounds at least, if put on carefully.

_____: Is bluestone ever to be used for anything else but dieback and frenching?

Lenfest: I don't know. It is used for lots of different ailments.

Dade: I have heard of it being used for fertilizer!!!

Heimberger: I heartily agree with regard to nitrate of soda. Nitrate of soda had been abused. Where used intelligently on frenched trees at $\frac{1}{2}$ pound application it is all right. I never would apply nitrate of soda at the rate of 4 pounds to the tree. If nitrate is used in sane amounts and if used intelligently, it is good.

_____: Do you think the bluestone produces physical action or a chemical action on the tree?

Lenfest: I don't know. If I could stand up here and answer all the questions absolutely correctly I would not worry about what I was going to do the rest of my life.

The Co-ordination of Citrus Grove Practices

Lindley Heimberger, Lakeland

The up-to-the-minute citrus fruit grower of today in Florida is vastly a different mortal as compared to his forebear of even twenty-five years ago; guess-work has been reduced to an absolute minimum and modern citriculture has been raised to the plane of almost an exact science.

In the building up and in the proper maintenance of a profitable commercial citrus grove we have a number of fundamental factors that must be given very careful consideration, which may be grouped under the following heads: Problems of fertilizing, cultivation, spraying and pruning, and it is only by the intelligent and proper co-ordination of these basal factors that full commercial success can be expected in Florida citriculture.

Using a decimal scale of one hundred points in gauging the relative importance of the above mentioned members in an arch representing the successful growing of citrus fruits in our State, we will have to grant not less than fifty of the one hundred points total to the *fertilizing problems* which is the keystone of this arch and divide the remaining fifty points between the other three members, about as follows: Thirty points to the right hand footing member of the arch, *cultivation problems*; fifteen points to the left hand footing member, *spraying problems*, and

the five points still remaining to the fourth fundamental member of this arch, i. e., *pruning problems*.

FERTILIZING PROBLEMS

The main reason why I give such great stress to fertilizing in the proper care of the grove is the fact which must be conceded by all experienced growers in our State, that it is a physical and chemical impossibility to make practically any kind of a commercial grove on *the average Florida citrus soil* without the use of *artificial plant food* in some form, no matter how well and intelligently the grower cultivates, sprays and prunes his grove.

In fertilizing we must constantly observe certain plant physiological principles, especially the facts that we must use complete fertilizers showing proper balance of essential elements of plant food and that this plant food should be in readily available and soluble form, this latter applying to the phosphoric acid content as well as to the nitrogen and potash constituents. Be liberal and generous in the feeding of the trees; time the distributions so that there will not be starved tree conditions occurring in the distribution intervals and distribute your fertilizers widely and as far away from the tree as the root system justifies.

It is probably true that many of our groves throughout the State are even now in a *potash* starved condition, even with potash prices down to almost a pre-war state. In fact many of our younger groves, including those just coming into full bearing, have been grown under potash famine and starved conditions.

Another point, but few citrus growers really appreciate the fact that *nitrogen* is the dominating element of plant food and many groves testify to the fact that poorly balanced, low nitrogen fertilizer formulas are being used; remember, though, that excessive nitrogen fertilizing is bad and should never be allowed. Use high grade fertilizers without filler, as they are always the cheapest and best in the long run. The use of low grade fertilizers as a source of soil humus is a poor and uneconomical policy. Practice summer leguminous cover-cropping and use well rotted stable manure instead.

CULTIVATION PROBLEMS

The drought we have been experiencing is very unusual in its intensity and has clearly demonstrated the great importance of practicing solid, level and shallow grove cultivation at short intervals during periods of rainfall shortage. This establishes and constantly mainstays a perfect dust mulch, completely breaking up the surface soil capillary attraction and hence conserving the much needed soil moisture for the use of the trees.

Here is where the modern tractor demonstrates its great usefulness in efficiently cultivating unit grove areas in a minimum of time at low initial cost, saving much

time and worry. In the highlands using a special 14-foot tractor acme pulled by a 15-27 tractor we have covered as much as seventy acres in one working day, doing work showing at least double the efficiency in quality as compared to light mule operated acmes so commonly used in our groves. The day of the tractor has arrived in Florida, though the mule will never be entirely replaced in the care of our groves. Thus does modern horticulture advance. The importance and practical value of summer tree-row cultivation during the summer rainy season months with the practice of leguminous cover-cropping during this same period in the middles, cannot be given too much stress as a means of keeping the grove in a healthy growing condition, and maintaining and increasing the soil humus and the fixation of free atmospheric nitrogen (thereby saving on the future fertilizer bills). Many of us turn our groves loose in the summer months entirely too soon and at too early an age; tree-row cultivation, my experience shows, is not only cheaper in the long run but is far more efficient in keeping a grove up during the summer months as compared to the makeshift of hoeing, say a couple of times. Remember that it is during the summer rainy season months with its longest days and the maximum of sunshine that our groves are expected to put forth their greatest seasonal effort in growth, and instead of falling down on our job at this critical time, we should put forth every effort to encourage nature to make the best possible showing during the summer months of ideal growing season.

SPRAYING PROBLEMS

It is absolutely false economy and a great waste to pour expensive fertilizer and cultivation into grove parasites whether they be either of animal or vegetable nature (insect, spider, fungus or bacterium). Therefore to get maximum returns on the use of fertilizer, careful cultivation and cover-cropping, we must give special care and attention to the spraying and pruning work in the proper handling of our grove. There is no doubt that far greater importance is to be paid in the future to the economical importance of *melanose* and *withertip* action in our groves and the control of these two very important diseases and their other named manifestations on the fruit of citrus (anthracnose, melanose, rusting and stem-end rot), by depending on Bordeaux oil spraying supplemented by pruning out of the dead wood. Bordeaux is always to be considered as the ideal fungicide and far superior to lime-sulphur in any form or strength. Though lime-sulphur gives good control of citrus scab, in every case Bordeaux is far more effective in the complete control of this fungus parasite; at the same time, however, Bordeaux is equally effective against our many parasitic fungus friends that prey on white fly and scales. Still it is doubtful if a mixed spraying schedule is as effective and practical under average seasonal conditions as compared to a complete spraying schedule being adapted including Bordeaux oil, lime-sulphur oil emulsion paste, lime-sulphur and oil emulsion and the use of nicotine sulphate when required.

PRUNING PROBLEMS

Though pruning does not bear the major importance in citriculture as compared to fertilizing, cultivation and spraying, its intelligent practice is indispensable in the care of commercial groves.

I always believe in a low headed tree; it saves steps in the picking ladder, shades the ground well and protects the tree trunk against possible cold. No limbs should actually sweep the ground.

Dead wood should be kept out of the trees at all times as far as possible, though I do not consider that "pin feather pruning" is necessary if Bordeaux-oil spraying is practiced, it being only on the dead wood that melanose and withertip produce spores.

All sucker growth below and above the bud should be kept down.

I believe that it is best to keep down and cut out interior badly shaded twig growth in the heart of the tree, thus eliminating shady harboring places for light objecting citrus insects (scales and white flies) and greatly increasing the efficiency of thoroughly applying sprays in our groves.

Broken and crossed limbs should be removed where possible and practical. Pruning citrus trees can be practiced at all seasons of the year when it does not greatly interfere with the crop of fruit.

With a new set tree let nature put forth every effort to restore the top and thereby eliminate a great shock by letting all growth remain above the bud for the first year, or at most only remove growth very close to the ground above the bud.

Pecans, an Important Florida Crop

C. A. Simpson, Monticello

Some thirty to fifty years ago, a great many pecan nuts were planted in yards and small orchards, all over the northern part of Florida. At that time it was thought if you planted a large fine quality nut, it would reproduce the same large fine quality pecan. This, however, did not prove to be true, as most of the trees are now bearing a rather small nut, although some are of fair size, and most of them of fine quality. But the planting of these nuts at this time was the beginning of the pecan industry in Florida. Today many fine majestic shade trees make the home surroundings beautiful, and in some cases one pecan tree more than pays the annual taxes of the home. Some of these seedlings were so promising, that a name was given, and nurserymen secured propagating wood from them.

The pecan was first propagated in a small way in the early nineties, but not till between 1905 and 1910 was it propagated on a large scale. Since then, except for the years of real depression, the supply of pecan trees has barely kept pace with the demand. This next season it is expected there will be at least 300,000 trees shipped out of Monticello alone.

Since 1906 thousands of acres have been planted in the cotton states of the South, sometimes from one to five thou-

sand acres being planted by one organization. In our own State there are a good many orchards of 100 to 500 acres, a few of 1,000 acres, and one was planted some few years ago of 4,600 acres.

The orchards that were planted ten and fifteen years ago, and properly taken care of, are now producing for their owners very satisfactory returns. In fact, the returns have been so satisfactory that the real cotton farmer now realizes he should have planted 10 to 100 acres long ago and is correcting his mistake by planting now for the future.

I know of one farmer in Georgia who rented a farm a few years ago for a cash rent of \$900.00. That year happened to be a poor year for farming and low prices for farm products, and he failed to sell his farm crops for enough to pay his rent. It so happened this farm had a frontage on a main highway, and along this roadside and along a short lane leading to the farm house, were planted 65 pecan trees, then eleven years old. The nuts gathered from those 65 trees, which is the equivalent of 3 1-5 acres, sold for \$1,050.00. This enabled him to pay his \$900.00 cash rent and \$150.00 over. Farmers in Florida should take this incident to heart and plant all their road frontage to pecan trees, wherever they will do well. Just think

of the beautiful driveways we would then have, which in itself would cause tourists to drive miles to enjoy, and also think of the large revenue such plantings would bring to the roadside farmers.

In Jefferson county, Florida, there are many fine pecan trees in yards from 25 to 35 years old, that have borne all the way up to 90 pounds to a tree. The pecan is the most beautiful shade tree, that will not only keep you cool in the summer time, but will also keep you warm in the winter time with its richest of foods. About 6,000 acres has been planted in this county, of the better varieties, and these orchards are now of all ages up to 17 years old. The better trees in these orchards have borne as much as 200 pounds of pecans, for which the consumer pays from 60 cents to \$1.50 per pound, depending on the variety. One grove of ten acres this past season earned for its owner 8% on a valuation of \$3,000.00 per acre, and the nuts were sold at wholesale prices. Last season Jefferson county shipped about 100,000 pounds of cultivated pecans and about 200,000 pounds of seedlings, valued at about \$75,000.00 and the industry is hardly started there.

At present there are 15 to 20 nurserymen in Florida propagating pecan trees, who have furnished trees for the planting of at least 30,000 acres in Florida, of the better varieties, and the acreage is being increased very considerably each year. In fact within the past few years there has been a wide awakening to the great possibilities of the pecan industry. It is very probable that last year our State gathered 500,000 pounds of the cultivated pecan,

and probably 1,500,000 pounds of seedling nuts. I tried to get definite data on the yield by writing to each county agent, but I did not receive enough replies to make an accurate statement, but believe my estimate is conservative. For the 1920 season the Florida Department of Agriculture made a report showing that there were then in Florida 65,000 bearing pecan trees and 200,000 non-bearing trees and which produced 1,680,000 pounds of pecans valued at \$415,000.00. This report checks up very closely with my estimate for this year.

The pecan is not limited to the northern counties of the State. While it has not yet been tested on a commercial scale much below Marion county, yet it is quite likely it will be found they will do well, under proper conditions as far south as Polk county. I had a letter just recently from a man in Sarasota, stating he knew of some pecan trees there eight years old that were bearing very satisfactorily. Last summer I saw a few small orchards at St. Petersburg, that were ten to fourteen years old, that contained fine pecan trees, and I was told by people there that they bore well. I saw some good trees planted on the streets of St. Petersburg, too. I have seen young plantings in Polk county, and one six-acre orchard at West Palm Beach of four-year-old trees, and all seemed to be doing well. However, until the districts below Marion county have been thoroughly tested, it probably would not be wise to make any extensive plantings in such districts.

For an orchard, the pecan trees in Florida should not be planted closer than 50

feet each way, or 17 to the acre. The pecan does not have to be gathered within a short period like some perishable fruits. The gathering season extends from the first of October to well in January, although it is advisable to have them on the market before the holidays. The nuts are thrashed off the trees by means of long bamboo poles and then picked up from the ground, or from canvas spread under the trees. They are then graded according to diameter, and packed in strong tight boxes or barrels.

The pecan is a very valuable food product, being the richest of all nuts. One pound of pecan meats is equivalent, in calories, to 2.3 pounds of smoked ham, 2.3 pounds of flour bread, 2.4 pounds of dried beans, 3.7 pounds of porterhouse steak, 12.3 pounds of Irish potatoes, 10 $\frac{1}{4}$ pounds of apples, 15 pounds of oranges. And the different elements of food in the pecan is in such proportion that it makes a balanced ration.

The pecan tree is one of the longest lived of any orchard tree. It is expected that an orchard well cared for will bear crops for at least 100 years, and possibly 300 to 400 years. This expectation is based on the age of the pecan trees found in the forests, many of them being much over 100 years old and some even 400. Therefore when you plant a pecan orchard you not only plant for yourself and children but several generations.

Under proper conditions and treatment a pecan tree will bear a few nuts the third or fourth year after planting, some excep-

tional trees bearing as much as 30 pounds the sixth year, but in general you cannot expect a commercial crop before the eighth to tenth year from planting. Other things being equal, the richer the soil, the better the cultivation, and with proper fertilization, the sooner you will get a commercial crop.

In planting pecan trees there are a few things to consider in order to produce a successful orchard: (1) Select your best and well drained land. With us in the northern counties it is necessary to have a good clay sub-soil within ten to fifteen inches, but there are successful orchards on lands without clay sub-soils, where the water table is within a few feet of the surface of the ground. (2) Select first-class nursery stock from a reliable nurseryman or his agent, and of the proper varieties for your locality. For best results the trees planted should not be less than four feet high. The Moore and Moneymaker are probably the best commercial varieties adapted to Florida conditions, although Curtis, Pabst, Success and Stuart are also good. (3) Give your trees good care and plenty of fertilization.

If you follow these instructions, you will get results. If you buy cheap trees, set them on poor land, and neglect them, you will get no results.

I think the day is coming, and not many years hence, when the pecan will be the best and most valuable cash crop of the cotton states of the South, and of the northern part of Florida.

Grape Growing in Florida

Chas Dearing, U. S. D. A., Washington, D. C.

Mr. President, Ladies and Gentlemen:

I am enjoying the privilege of meeting with you again as a representative of the U. S. Department of Agriculture. Two years ago at your Ocala meeting it was my privilege to present to you a report of the Department's work in relation to Muscadine grape growing in the Southeast, and to suggest to you the advisability of developing Muscadine grape industry in that part of Florida, north of the main citrus section. I have been pleased to note the manner in which that suggestion is being acted upon and encouraged to make additional suggestions along this line. In the home demonstration work the club girls and women have progressed with their program of planting the best varieties of Muscadines in their perennial gardens and making home products. A goodly number of farm vineyards have been started, if I may judge from our correspondence. The commercial nurserymen have co-operated to the extent of propagating vines in quantity to meet the needs of your State and other southeastern states as well; and at present, at least one company is organized for Muscadine grape growing on an extensive commercial scale and is engaged in the development of vineyards on an 8,000-acre tract of North Florida land with a view to the

commercial production of Muscadine grape juice, jellies, and other products, standardized by the Department.

In my present paper, I shall, as requested, devote myself to a consideration of the general grape growing situation in Florida. In doing so I shall speak without prejudice but with a view to giving you a clear statement of the Department's viewpoint. This viewpoint is the result of observations and experimental investigations by various specialists extending over a period of many years; back, in fact, to the time when fruit investigations were first inaugurated by the Department. I am not attempting to give you my personal opinion, but a summary of the conclusions of the best authorities of the past and present day. I know that some of the leading horticulturists of Florida hold similar views. I ask that you bear this in mind if I may seem to present matters too pessimistically or optimistically.

American viticulture is of three types based upon the kind of grape used as the basis of the industry and all of these types are represented in the history of Florida grape growing. On the Pacific coast a great viticultural industry is based on the growing of the European type of grape. In the Central and Northeastern United States we have another type of grape in-

dustry, based upon the growing of native American "bunch grape" varieties, derived by breeding and selection from the native grape species of that region. In the Southeastern United States, the Muscadine grape industry has developed from the selection and breeding of good varieties from the native Muscadine grapes. We may gain in the study of Florida grape growing by noting briefly the history of these three grape growing districts, the Pacific coast district, the Central and Northeastern district, and the Southeastern district.

The European grape is the more highly developed type having been selected and bred since the earliest days of history. It was brought to this country apparently by all the pioneer expeditions. The Spanish Mission fathers carried it into Southern California from Mexico and because of the climatic and soil adaptability of that section the European grape succeeded on the Pacific coast, but it failed utterly when the Pilgrim fathers and other emigrants to the Northwestern States endeavored to establish it in their section, where the climate was not congenial. In the grapes of New York by Hedrick you may find the record of these sad failures and the gradual turning to the native bunch grapes of the region with the resulting development of such varieties as the Concord, Niagara and Catawba from the wild "Fox grapes" which are the basis of Northeastern grape industry.

In the Southeast the early emigrants, as in the Northeast, brought the European grapes to America, and after failing with them they naturally sought to grow the

native grapes developed further North, but these Fox grape varieties, the Concord, Niagara, etc., though quite successful in the North, were as foreign to conditions found in the Southeast, almost, as the European grape; and they have *not* succeeded (except in the higher elevations such as Western North Carolina, where climatic conditions are much as they are further North.) Then the Southern horticulturist began selecting and growing the native Muscadine grapes. This has proven profitable as the growing of the native grapes proved profitable in the North.

Now let us note the grape history of Florida. Today all three types of grapes are represented, and judging by my correspondence and the statements I note in the horticultural and daily news press of the State, there is some confusion and misunderstanding among the general public.

When the early Spanish settlers came to Florida they brought with them the European grapes and planted these along the eastern coast of the State and on the Florida Keys. Only one representative of this planting has survived the climatic and soil conditions and even this one, known as the Key Grape, is considered somewhat a curiosity. It has been maintained in the plant gardens of horticultural enthusiasts, but it cannot be considered as ever having *thrived* in Florida. Later as emigrants came to Florida from the North and Central West they introduced the best grapes of those regions and while these grapes did better than the European grapes, they certainly did not thrive and it was the fail-

ure of these grape plantings that caused the first investigations of Florida grape growing by the U. S. Department of Agriculture. The investigator sent into the field then, was none other than Dr. Wm. A. Taylor, now chief of the Bureau of Plant Industry. This was approximately thirty years ago and since that time the Department has kept a continuous eye on the grape situation in Florida. In addition to the work of the offices of Fruit Transportation and Storage Investigations, Insect and Disease Investigations, etc., it has maintained a grape specialist rather continuously in the field. In order to test the different types of grape growing for Florida the Department undertook the establishment of an experimental vineyard at Earldon, Fla., (near Waldo) on the estate of Baron von Lutischaw. Here a large collection of European, native bunch grapes and Muscadines were tested. The results certainly did not warrant the recommendation of either the European or bunch grape type as a reliable basis for extensive commercial industry. The Department then turned its attention to the development of the Muscadine grape as the basis of profitable grape growing not only for Florida, but for the entire Southeast. This work of developing the native Muscadine grape began in a vineyard at the Ronnoc grove, New Smyrna, Florida, and has continued steadily for about 18 years. That we are working on the right line we have no doubt. The developing of the native species has in the case of the grape proven advisable and the only means of success in the Northeast, in Missouri, in Texas, in the Southeast, in

Europe and in the tropics. The Department's efforts have brought results of importance already.

In Florida today it is generally recognized, I believe, that the European grape has a place only in the gardens of plant collectors, where vines may be maintained as botanical specimens by giving them special care.

With the so-called bunch grapes, on the other hand, although the records of the State for the past three decades is one of failure due to the vines not being able to thrive under the climatic and other conditions, there has been a great deal of interest manifest in the last few years. I feel it my duty, therefore, as the Department's representative, to sound a word of caution before this society and to point out the probable limitations of bunch grape growing in the State.

It is my opinion that under Florida conditions the making of extensive plantings of the bunch grapes as a class or the too extensive encouragement of small plantings with a view to securing commercial profits will result in disappointment. On the other hand let me say that if production is kept limited to relatively few individuals serving respectively the various cities of the State, these individuals may secure profit from their undertaking. To do so, however, the individual must first know how to grow grapes, he must then enter the business on a basis of renewing or replacing his vineyard approximately every five to six bearing years. During the entire life of the vineyard he must fight to control insect and disease enemies. If he prunes severely to produce

handsome market fruit, the life of the vineyard will be reduced, and if he fails to prune, he will increase the costs of thinning, harvesting, and other vineyard operations and the vines will tend to overbear and produce inferior fruit and eventually die out anyway.

The idea has been advanced that certain varieties of the type of the Carman which T. V. Munson of Texas produced and introduced as being adapted to Texas conditions might succeed in Florida, but are the climatic and soil conditions of Florida more like Texas than they are like Ohio let us say? No true Floridian would ever admit that! I have also noticed in the State press reference to certain hybrids of promise, but I have not been able to secure authentic information regarding them. A *hybrid* is an individual resulting from a cross between varieties representing two distinct species. The cross to be authentic should be secured under isolated conditions. It will require one year to make the cross, one year to propagate the seedling, three and probably four more years to bring it to fruitfulness. It should then be kept under observation for at least three years (better six if one wishes to be sure of its merit) and it must then be multiplied before it may be sold. To our knowledge no one was doing such work for Florida ten years ago and accordingly no one can present such a variety to the trade today with any *positive* assurance as to its *special adaptability* for Florida. There is, however, an excellent chance to produce good grapes eventually by careful breeding and selection with the wild bunch grapes of the State, but the outlook is not

altogether promising as these native grapes do not show so much merit in the wild as do the wild Muscadines. The Muscadines have already proven in the Government's investigations and that of the Southeastern State Experiment Stations to be the more amenable or the more subject to amelioration by breeding and selection. Moreover, the Muscadine type is more productive. It does not require spraying to control disease and insect enemies. It is the more resistant to frost and freezes, and to our damp, rainy summer conditions. It is the distinctive type which does not succeed in the North or West. It produces distinctive fruit products of character. These are commercial assets of great importance. Certainly it seems to be the commercial grape for North Florida.

The bunch grapes and European grapes have from time to time been planted here and there throughout the State, but can any one point out plantings of them today which to any degree approximate in age the arbors of Muscadines at St. Augustine, which in their productive and vigorous old age stand as fitting symbols of the ancient city itself? Not only do these arbors of Muscadines exist at St. Augustine, but you may find them scattered over most of North Florida and here and there small vineyards have existed for years and they have proven profitable. I recall one of them out from Lake City which I visited some years ago and found most productive. There was another near Orlando whose owner refused an offer from me of \$2.00 per bushel for the crop, to use in the Government's grape utilization investiga-

tions. I afterwards learned of him selling his fruit at \$4.50 per bushel in peach crates. The vines were over 25 years old and had never been sprayed or systematically pruned.

In all, there is abundant evidence of the practical adaptability of the Muscadine type of grape to North Florida conditions while the evidence as to the lack of adaptability of the bunch grape type is equally authenticated by the past and it would appear that it is now time for the horticulturist of Florida to recognize what the past has taught, and center efforts on the production and commercialization of the type that succeeds.

I would not for a minute discourage the maintenance of the European grapes in plant collections or the tender care of such a variety about a Florida home in order that the home might have a few clusters of this most highly developed type of fruit, but such grape growing is not likely to show a profit if practiced on a commercial scale. The native American bunch grapes, especially those derived from the Southern Aestivales, Linsicumen or Berquiniana species, will do better than the European varieties and may be justly planted about the homes to provide fruit for home consumption in advance of the Muscadine grape season, if one desires. Occasionally some individual who has had grape growing experience elsewhere may handle an acre or two with more or less profit from the sale of fruit, but he is likely to be deceived, for under Florida conditions, while the vines may seemingly show high quality fruit and no disease at first, the diseases will rapidly multiply—

even when faithfully combatted with spraying; and the vines will, as they bear successive crops, lose their vitality and sooner or later become unprofitable even under the care of the best viticulturists. The grower without large capital would under such conditions find it necessary to start over again, but with his invested capital lost with the failure of his grape vines. Contrast with this another individual who chose the Muscadine grapes as his viticultural venture. He will plant only once and if he gives the vines care within reason, his children will receive the vineyard along with other legacies. So far as past experience shows us, he need not spray for either insect or disease enemies. Since the vines are more productive, he will harvest larger crops. Because the Muscadine grape in its territory is, perhaps the most reliable annual cropper, he may feel relatively immune to crop failures. (In the 15 years of its existence there has never been a crop failure in the Government's Muscadine Grape Experiment Vineyard at Willard, N. C. We have had drought, rainy seasons, hail, wind, frost and late freezes, exceptionally cold winters and hot summers, but no crop failure.) I have seen $2\frac{1}{2}$ tons of fruit per acre picked from a commercial vineyard in North Carolina 77 years old, and a ton of grapes and bale of cotton secured from an acre of 4-year-old vines a mile away in the same season. If the Florida grower of Muscadines neglects his vineyard he will still be more favored than he deserves, while neglect for the "bunch grape" grower in Florida will mean certain loss. As to the market, no one can predict the future, but our experi-

ence in introducing Muscadine grape products indicates an abundant and lucrative market for fresh fruit, unfermented grape juice, jelly and perhaps other products.

In summary I would advise against general commercial grape growing of any description in South Florida. In North Florida I can recommend the Muscadine grapes as a promising basis of commercial grape growing. Certain well informed growers not *solely* dependent on the investment might find it profitable to grow a limited acreage of bunch grapes, but such grape culture does not seem to possess those attributes of stability to warrant large investment or recommend it as the sole reliance of individuals without surplus capital. All kinds of grapes may be grown in North Florida for home use if one desires and is willing to go to the necessary trouble and expense, but certainly the Muscadines will prove the more satisfactory if a choice must be made between types. They will produce more fruit, yield more crops, and do it with less effort and cost. Their vines will make the more attractive arbors and their fruit will prove equally satisfying as fresh fruit and adaptable for the production of delicious home jellies, jams, sauces and fruit juices.

It is not my purpose to discourage those who are at present engaged in bunch grape ventures in the State, but to caution against the general undertaking of such ventures without due consideration of the risks involved and the nature of the investment.

_____: I would like to ask Mr. Dearing what effect does a type of soil have on

a variety of grape and does a variety differ under high and low soils?

Dearing: The type of soil affects the behavior of a variety decidedly. One of the most fundamental principles of successful grape growing is that one should maintain a balance between wood and fruit production. The nature of a soil will affect the grape variety by either increasing or decreasing the vigor of growth. Low heavy soils will cause more growth on the vine than would be secured by placing the same variety on high sandy land. Other means of regulating this balance of wood and fruit production are pruning, training, the use of commercial fertilizer, etc. If a vine is placed on the fan system of training its fruiting arms are vertically placed and this tends to stimulate wood growth. It is better for weak growing varieties that tend to set an overload of fruit. The horizontal arm system on vertical trellis or on an overhead system is better for the variety that is very vigorous. Such a variety is made more fruitful by placing the fruiting arms in horizontal position. Severe pruning stimulates wood growth and by heavy application of nitrogenous fertilizer a vine may be thrown into vigorous wood growth at the expense of fruitfulness.

C. A. Curry: I would like to ask what effect the rainy season has on the harvesting grapes. I understand in California that is their greatest trouble.

Zimmerman: We have not been troubled with rain at all. Sometimes within one hour we have packed grapes and have not had any bad results.

Grape Varieties

E. L. Lord, College of Agriculture, Gainesville

The subject of grape varieties for Florida conditions is an important one, as the history of American viticulture has been dotted with failures because of the lack of proper appreciation of this vital point. With the single exception of California, it has been impossible to develop a commercial grape industry in any part of North America, without using the blood of species that are native to the region. Florida is no exception, and in order to establish a flourishing grape industry in this State it will be necessary to use the native grapes freely in breeding. We are fortunate that we have such a wealth of species from which to choose, for Florida has within her boundaries at least eight wild species of grapes, or one-fourth of all grape species native to North Florida. Of these native species, only two have been used to any extent, the Muscadine or *tundifolia* grape and the *aestivalis* or summer grape.

It is unnecessary for me to discuss at length the Muscadine grape, as Mr. Dearing has already pointed out to you its value. While it is the most vigorous and disease resistant of North American grapes, it is also the hardest to ameliorate. Mr. Dearing's achievement with this grape is without contradiction the most notable work in grape breeding within a

generation. Unfortunately no commercial table grape has yet been produced from this species, and its season when grown for domestic use is comparatively short.

Before I discuss the *aestivalis* or summer grape I should like to recall to you some facts from the history of grape growing in Eastern North America. When the earlier settlers came to North America their first interest was to duplicate the wine industry, and they had no doubt that it was possible, for were there not wild grapes everywhere? But all of the European grapes planted died of phylloxera and mildew, and only by planting wildings of the native fox grape or *labrusca*, were they able to grow grapes in the North.

Early in the last century, E. S. Rogers, of Salem, Mass., the pioneer grape breeder of North America, hybridized the fox grape with the European grape in order to obtain the fruit of the wine grape on the disease resistant vine of the native grape. While he produced many hybrids, none of them have become commercially valuable; probably because first generation crosses do not appear to blend these characters sufficiently. Commercial vineyards in the North are confined almost entirely to four varieties: Catawba, Con-

cord, both wild fox grape seedlings, the Worden and Niagara, both seedlings of Concord.

The first organized attempt at grape breeding in the South was made by T. V. Munson of Denison, Texas. All types of grapes, both pure seedlings and varieties, that he could obtain, were planted out by him in Texas. Most of them succumbed to the trying climate of that region; in fact, Munson found that the Northern varieties such as Concord and Niagara, had little more disease resistance than the European grape, when planted in the South. However, a variety of the *aestivalis* or summer grape is native to that region, and this variety, the post oak grape, was used by Munson as a parent. This species is very vigorous and has a high resistance to disease and to heat. The type form of this grape grows wild throughout North Florida, and another variety, Simpson's grape, grows throughout South Florida. By crossing selected seedlings of this grape with grapes such as the Lindley, the Triumph, the Herbeumont and others which were high in quality, he was able to develop hundreds of grape varieties, which ripened throughout a long season, which are strictly Southern grapes, and by proper selection of varieties can be grown throughout the Gulf States. In the discussion of the *aestivalis* hybrids I wish to call to your attention several characteristics of this species that have been transmitted in a greater or less extent to its offspring. First, it is the most adaptable species of grape found in North America, ranging from New York and Michigan to Florida and Texas. In

Florida it grows luxuriantly, the type form in Northern Florida, and the variant described as Simpson's grape throughout South Florida. Like almost all native grapes, it is intolerant of an excess of lime; where the wine grape can endure soils analyzing 40% lime, the summer grape will chlorose badly when the soil contains 15%. While it makes a good union when used as a stock for other grape varieties, in fact, several varieties of it have been used as stocks in California, it is quite hard to root from cuttings.

It is highly resistant to Phylloxera, black rot and mildews, although many of its hybrids are more or less susceptible, due to the presence of *vinifera* or *labrusca* blood. It is a vigorous grower, reaching 50 feet. It is an upland grape and flourishes where there is good drainage and abundant humus.

At the present time the Ives grape is being grown to some extent in North Florida as a market table grape. This variety is a *labrusca-aestivalis* hybrid, very vigorous and disease resistant, and also very poor in quality. It contains no blood of the European grape, which accounts for its quality. It may be valuable as a breeding parent for better varieties.

The Carman is a cross made by Munson between the Premier, a selected wild *aestivalis* grape, and the Triumph. The Triumph is a cross between the Concord and Muscat. The Concord is pure *labrusca*, and the Muscat pure *vinifera*. The Muscat is probably one of the greatest commercial grapes of the *vinifera* group. The good characters of the Carman come from the blending of the blood of these

two great commercial grapes with the vigor of the wild *aestivalis*.

Another of Munson's hybrids, the R. W. Munson, is one of the most vigorous and healthy of all grapes in vine and fruit. The fruit is of good quality and stands shipping well. Unfortunately, however, the vine is self-sterile, and will not bear unless pollinated by other varieties blooming at the same time.

An especially interesting hybrid containing *aestivalis* blood is the Delaware, which is very good in quality, but lacks the resistance to disease that a grape should have. It is probably a natural hybrid between *aestivalis* and *vinifera*. It is a very weak grower, and the fruit is small in size, but it is the standard in quality among the native grapes. It was used by Munson in breeding, and several grapes containing Delaware blood are being grown in Florida.

One of these, the Brilliant, is a cross between Lindley and Delaware, and consequently half *vinifera*, $\frac{1}{4}$ *aestivalis* and $\frac{1}{4}$ *labrusca*. It is a very early grape, and is being grown for home use from Florida to New York and Texas. Another, the Headlight, is a cross between Moyer and Brilliant. Moyer is half Delaware, and Headlight is very much like Delaware in fruit, while the vine is quite vigorous and free from disease. It is the earliest good American grape, grows well in Florida, and is fine for home use. It ripens in Florida in May, making the grape season here a long one, and starting that long succession of home varieties which ends with the Muscadine in late August.

Another variety of Munson's introduc-

tion is the Ellen Scott, sometimes called the Florida Tokay. The late E. P. Powell, a horticulturist well known to many of you, and a grape grower of much experience, grew this grape for years at Sorrento, Florida. He pronounced this grape the best in quality of any grape, and he was without doubt correct, as those of you who have had an opportunity to sample it know. It is a cross between two *aestivalis-vinifera* hybrids, Armlong and Herbemont.

The Armlong mentioned above was also crossed with Malaga. Several grapes resulted from this cross, the Armalaga, Ronaldo, and Edna. These are all fine white grapes of excellent quality, with fair disease-resistance. It appears to be difficult to obtain a high disease-resistance and still keep high proportions of European blood.

In closing this discussion of varieties, may I suggest that no variety yet produced, not even the Thomas, is perfectly adapted to Florida conditions. This is naturally so, as none of them were produced here. Without doubt some of the varieties discarded by Munson, or killed by that intemperate climate, would have been perfectly suited to Florida. At least one variety produced by Munson was killed by the cold. This variety was called the DeSoto, and was a cross between the Muscadine grape of the Gulf States, and the Everbearing or Bird grape of South Florida. Who can doubt that it would grow throughout Florida?

There are only two ways in which new varieties may be produced, by chance seedlings, and bud variations (happy accidents), and by purposeful plant breeding

projects, either public or private. In times past the growing of large numbers of plants from seeds over large areas by many individuals produced many varieties from which the best could be selected for perpetuation. The result of educating the grower in the use of vegetative means of propagation has been of great advantage, but we have lost the opportunity of acquiring many new useful varieties.

It seems to me that the State should,

as soon as possible, undertake the work of breeding and testing new varieties suited to the various climatic sections of the State. Several experiment stations have already undertaken this work, and the results have been of great worth to their state. Certainly Florida, with her unique climates, and isolated position, has a greater need than any other state. It cannot and should not be trusted to individual initiative.

Can Grapes be Successfully Grown in Florida?

H. T. Fisher, Eustis

Can grapes be successfully grown in Florida? This question continues to lie across the threshold of the grape industry and is waiting for a convincing affirmative answer before the industry can enter upon the large development of which the climate, the soil, the seasons, and other natural conditions peculiar to Florida give such abundant assurance and which is believed to be already answered by the unfailing success of hundreds of growers in different parts of the State, and particularly in the portion of which Lakeland may be regarded as the center.

It seems not to be generally known that in the past five or six years a new era in grape growing has quietly come to Florida, and is vindicating its right to live and develop by every test and demonstration that the most exacting specialist might require except, possibly, in the single factor of time, but even as to this, the age to which these vineyards may survive and yield their fruit, there should be no hesitancy because there are many individual instances wherein substantially the same methods of propagation and cultivation that characterize the larger development of grapes today, have been practiced for years, and which are and have been in a highly productive state continuously from the beginning. An example of this kind

is found in my own town of Eustis, where an English gardener named Masters, some twenty years ago, pollinated a wild grape with Concord pollen, and produced a very choice bunch grape. About twelve years ago, Mr. Frank W. Savage, the superintendent of the Government Station at Eustis, in crop physiology and breeding investigations, grafted a cutting from this vine on a rooted growing cutting of a wild grape, and in about eighteen months thereafter he sold a hundred pounds of choice fruit from this single vine, in the local market. This vine has yielded a full crop every year since and has never been fertilized nor sprayed, nor received any attention except close pruning during the dormant season, and is growing in the upland, yellow sandy soil common about Eustis. Many vines have been grown by neighbors from the Savage vine with like success and fruitage.

The analogy to the genesis of the adapted grape which we are exclusively planting in our vineyards today is obvious because these new grapes also are builded on the sure foundation of one or another of the several species of wild grapes which have grown everywhere in Florida time without mind, and, like the Masters and Savage grape, are hybrids, obtained by pollinating a domestic bunch grape on a

suitable wild grape. This practice is carried forward to cross pollination, and to pollinating one hybrid or another until several crosses have been made, and so on, ad infinitum. Some grafting on this resistant stock also is practiced, but first and above all other considerations is the presence of the blood of the original or native vine with its inherent resistance to diseases which commonly afflict grapes in practically all climes, at home and abroad, and whereby such diseases are reduced to the minimum, if not entirely avoided. But the time limit for this paper forbids further discussion of this phase of the subject, and I may only add that the wild grapes of Florida are known to be immune to Phylloxera, the deadly enemy of European grapes and also of Northern grapes planted in the South, and that the hybrids we are planting today are commonly immune to this enemy, so far as we know and believe.

In this connection, I want to quote from an editorial in the Florida Grower, of July 19th, 1919, which speaks with evident knowledge and authority and which brings out my further thought in a very interesting comparison of the old and the new eras of the grape industry. It says: "So far as the writer knows, there has not been a single failure in acreages of hybrid grapes in this State, and there have been quite a number of acres planted with the most gratifying successes made. Not simply hundreds, but thousands of people of the North, Europe and California have tried out raising grapes in Florida, and without exception have failed, most of them in the first year or two and the re-

mainder after several years trial. Until hybrid grapes were introduced it could be said without successful contradiction that there had not been developed a single successful vineyard along the entire Gulf coast region of the United States. This is not individual opinion, but is the result of years of accumulation of data by the United States government. Those who are still attempting to upbuild the grape industry all deserve the highest praise, but it would be foolish not to attempt to benefit by the experience of thousands who have lost fortunes in attempting to develop grape growing in Florida, and it would also be foolish not to try to derive benefit from the experience of those who are successfully developing the grape industry in Florida. It is not a mere assertion, but a fact demonstrated thousands of times that only those grapes, whether California, Northern or European, combined with the native wild grape of the Gulf coast region have proven successful against downy mildew, phylloxera and black rot in Florida. These are the three great enemies of grape growing and of these downy mildew is the worst enemy. It is true that this disease has been successfully combatted in the vineyards of California, Europe, and the Northern States but nowhere is it so destructive to vineyards as in the Gulf state region. Only grapes of the hybrid varieties have successfully combatted these diseases in the Gulf coast country. Others have apparently proven successful for a year or two and sometimes for four or five years, but the fact that there is not a single successful vineyard of California, Northern

or European grapes in Florida after more than a half century of efforts on the part of thousands of people who have been successful grape growers elsewhere, is in itself ample demonstration of the verity of the statements herein made. Never was there so much interest as now in grape growing in Florida. The reason is because there has been substantial success in the development of this industry in the past several years, due to the planting and proper care of grape vines adapted to Florida soil and climatic conditions. Wild grapes grow in all parts of Florida. Why not others? It has been amply demonstrated that only those grapes combined with the native wild grapes will permanently continue to do well in this State. The scuppernong is no exception, that also being a hybrid grape. Some of the hybrid grapes have been growing successfully in Florida for the past twenty-five years. That is ample demonstration of their staying qualities. There is no part of Florida where they will not do well. During the

next grape planting season it is certain that the number of acres of hybrid grapes planted in Florida will be limited only by the supply of the vines, and this will be true for years to come. This year there will be upwards of 15,000 carloads of California grapes sold in the markets of the United States and every California grape will be marketed weeks after the Florida grapes are gone. This gives some idea of the possibilities of the development of grape growing.

"There is much to be learned by the individual grower as to planting, care and marketing of the fruit, but enough progress has been made along these lines in the past few years to demonstrate that this new Florida industry is bound to prove a tremendous success, in time rivaling the great grape production industry of California and European countries."

Finally and as a conclusion I offer this sentiment. Florida, the discovered natural home of the grape.

Citrus Root Stocks

W. E. Evans, Leesburg

Citrus trees for planting are usually budded on sour orange, rough lemon and other seedling stocks. The problem of selecting the best stock is of great importance, for in case an unsuitable stock is used the value of the grove may be permanently impaired. Sweet orange seedling stocks were formerly used very extensively, but as they have been found very susceptible to foot-rot they are now seldom used.

The sour orange, a hardy species of citrus, which is frequently found growing wild in Florida forests, is the leading stock in Florida as well as in California and most of the citrus growing regions of the world. It is vigorous and resistant, if not altogether immune, to foot-rot, and the trees produce thin-skinned fruit of fine quality which holds on the branches late in the season. In Florida sour orange seedlings are the favorite seedlings for the hammocks and flatwoods soil as well as the best grade pine land. Most growers prefer sour orange stock wherever soil conditions permit its use.

On light, dry, sandy soils in Southern Florida where sour orange stock lacks thrift, rough lemon stock, a vigorous growing species of citrus related to the common lemon of commerce, is used. Trees on rough lemon stock make a very

vigorous growth and on very light soils are easier to care for and require less fertilizer than trees on sour orange roots. Rough lemon stocks are tender and not sufficiently hardy for Gulf state sections and colder parts of southern and central Florida. Under favorable conditions trees on rough lemon stock usually are vigorous and productive but it is claimed by many growers that the life of such trees is shorter than on some other stocks.

The fruit produced by trees on rough lemon stock, while often good in dessert quality, is inferior to that grown on sour orange, and it cannot be held on the tree so late in the season. The Parson variety of orange is seldom successfully grown on rough lemon stock.

Grapefruit seedlings have been used as stocks to a limited extent in southern Florida. They are too tender for the colder sections of the State. This stock is more vigorous in growth than the sour orange, but less vigorous than the rough lemon. It is best adapted to moist soils well supplied with humus, as grapefruit seedlings are less hardy and less resistant to disease than sour orange.

Mr. Frank W. Savage, plant breeder at Government Test Grounds at Eustis, Florida, prefers the grapefruit stock to all others, if soil conditions are at all suit-

able. The first prize grapefruit at Tampa Fair for three years was on grapefruit stock.

The trifoliate orange is the hardiest stock for citrus fruits in common use. It is deciduous, shedding its leaves, and has a distinct dormant season in the winter. This dormancy has the effect of checking the winter wood growth of varieties budded to it, causing them to be less susceptible to low temperatures. For this reason trifoliate orange seedlings are much used as stocks in the colder sections of the Gulf states. They are rarely desirable as stocks in southern and central Florida and have given unsatisfactory results in the Rio Grande Valley section of Texas.

The trifoliate orange stock is best adapted to rich moist soils and is unsuited to light dry soils. It is particularly well adapted to sandy loam soils with a clay sub-soil. On the proper soils it produces thin-skinned fruit of high dessert quality. It has a tendency to dwarf the growth of the tree budded on it. In the lower Mississippi delta, Washington Navel oranges are frequently budded on trifoliate orange stock, and while the growth is less vigorous in that locality, they are more prolific than when budded on sour orange stock.

Ever-bearing lemon and lime seedlings are occasionally used as citrus stock, but are too tender for general planting. Bitter-sweet and Cleopatra mandarin have also been used on a small scale; the latter has not been used long enough in various locations on the various types of soil to warrant its general use, although indications are promising.

SOUR ORANGE VS. ROUGH LEMON

Figures published by the Plant Board show that ending April, 1921, 3,294,558 rough lemon seedlings were planted and only 774,330 sour orange seedlings and 77,004 other seedling stocks, mostly grapefruit.

I believe that any one having Florida's horticultural interest at heart cannot but feel alarmed at the tremendous planting on rough lemon. It is a fact though that the high pine ridge lands are as a rule deficient in humus and moisture and rough lemon stock seems capable of overcoming these soil difficulties to a large degree, while the sour orange and grapefruit stocks apparently do not, but I believe there are many groves on rough lemon that would have been more profitable in the end if they had been on sour or grapefruit stock.

There are sections in South Dade county, for instance, where you can see trees actually dying from the drought where propagated on grapefruit and sour orange stock and groves immediately across the road in excellent condition, showing no signs of distress, said to have received the same care, attention, fertilization, etc. The only difference being they are on rough lemon stock.

You will see trees on rough lemon growing in a grove with a number of trees on sour stock and be informed that the trees on rough lemon stock were put in by mistake and the trees on rough lemon have twice the bearing capacity as trees on sour orange and are said to produce three or four times as much fruit, yet the

grower will say they expect to lose about 2% of their trees every year after the trees are ten years old on rough lemon and none on sour orange.

The fruit grown on rough lemon is undeniably coarser of skin, has less character and dries out quicker than fruit grown under same condition on sour orange stock. The advocates of rough lemon admit this to be the case while trees are young, but claim the trees overcome it in later years, but this isn't borne out in Lake county, or any other sour orange section, where the tree fails to improve with age.

Comparison of groves in Grand Island section of Lake county budded on sour orange and rough lemon is very striking. Valencia Late oranges on lemon stock during late April were beginning to dry out and were poorly colored, while same age trees in same grove under same cultural conditions on sour orange were in prime condition.

One reason why so many trees on lemon stock have been sold and planted is because the nurseryman wanted the planter to use lemon stock, as the nurseryman can produce the same trees on lemon stock in one-half the time and at one-half the cost of production. It is easier to produce the rough lemon seedlings, it is easier to get a larger per cent of buds to take and it is easier to get them to start off, and easier to get a salable tree than on sour orange or grapefruit.

It is the perfect root stock from the nurseryman's standpoint. The sour orange and grapefruit seedling is a slower grower, requires longer time in the seed-

bed and nursery row before it can be budded, and it is impossible to get a perfect stand of buds, whereas the lemon can be budded at almost any time of growing season by the most novice of budders with almost a perfect stand. The big development companies prefer lemon stock, for they can produce a fine looking grove in a much shorter time. But no one disputes the fact that the lemon is more subject to disease and cold, produces poorer quality fruit, has less color and is shorter lived than the sour.

The high pine ridge lemon men will say that they are too far south to be damaged by the cold, but we must remember that the bulk of lemon stock groves have been put out since we had a disastrous freeze. What would happen if we had a bad freeze?

We have had more frost injury in late years as far south as Fort Myers than we have had in Lake, Orange or Marion counties. Suppose California groves had been on lemon stock, what would have been the result this past winter. Wouldn't it be better to build more permanent groves, produce better, juicier fruit, instead of trying to get too quick results.

Mr. H. B. Stevens of DeLand, sums it up—at least from the viewpoint of the sour orange growers—when he says, "The only advantage I can see for the rough lemon is it will grow faster and make a grove to sell quicker to some tenderfoot."

I have been informed by the manager of the Florida Citrus Sub-Exchange that the Government during April sent a man into the Winter Haven section to investi-

gate the cause of so much fruit arriving in soft and dried out condition from Polk county. They were sure we must have had a freeze some time or other. This soft fruit was from a lemon stock section.

The time is coming when fruit grown on sour orange stock will be so stenciled on the box and command a better price, especially on late shipments of Valencias. Careful study of the prices received for fruits from different sections of the State, will show which sections top the market.

Nursery Inspector F. M. O'Byrne sent out a questionnaire on citrus root stock and the following is a summary:

In Coconut Grove section the preference is on lemon root, it bears earlier but is not so long lived and fruit is not so good as sour orange or grapefruit.

Around Fort Myers about half the trees are on sour orange, next preference is grapefruit and rough lemon.

"Lemon can be used on lighter drier types of soil, is a rapid grower, but short lived and subject to foot rot.

"Advantages of sour orange: Good on low heavy soil; stands moist conditions, immune from foot-rot. Grapefruit has same advantages as lemon and similar disadvantages."

DeLand section is partial to sour, with grapefruit and lemon used only in limited quantities.

In Fort Pierce section about 60% is planted on sour orange, 30% in lemon and 5% on grapefruit. "Use sour when soil is suitable, as fruit is superior on sour."

"Lemon will grow well on soil too poor to grow sour, but on sour, fruit is better, more resistant to cold and longer lived."

Dade county: "Use grapefruit on high and sour on low land. Lemon makes a good showing earlier in life, has no tap root and fruit dries out."

"Grapefruit has fine root system, best of all. Sour orange produces most permanent grove."

Around Arcadia almost 50% of groves are on sour. Writer says, "Sour every time."

From Bartow 75% of trees are on lemon; 20% are on sour and 5% on grapefruit.

The writer says: "Lemon stands dry weather on poor soil better, makes a quicker growth in nursery, responds to fertilizer, scabs worse, easily affected to foot-rot and gummosis, produces coarse fruit under abnormal conditions.

"Sour orange stock in the end produces better fruit and longer lived tree. The texture of the fruit is considerably better, finer in quality, is practically immune from foot-rot, and does best in heavy soils, but does not produce thrifty trees on high rolling sandy soil. Requires more fertilizer than lemon, inclined to die-back and frenching.

"The advantages of grapefruit are that although the tree is somewhat dwarfed, it produces an excellent, bright, thinner skinned fruit; the first prize grapefruit at Tampa Fair for three years was on grapefruit stock.

"The grapefruit likes a low soil and appears to do well where land is under-

drained. The chief disadvantage seems to be the smallness of the tree, and in some cases I have noticed that the fruit is small, and does not seem to hold on as well. I have in no case noticed a bad case of foot-rot."

SUMMARY

Sour orange stock leads the list, if we take into consideration the hardiness of the tree and the quality of the fruit produced.

Grapefruit stock comes second, especially in some localities.

On high pine ridge soils too deficient in humus to produce trees on the other stocks, the rough lemon must be used.

The lemon is most profitable to grow from the nurseryman's standpoint, but what will be the result when these $3\frac{1}{2}$ million lemon stocks are budded and come into bearing?

Everyone admits they will produce poorer quality fruit. The sour orange and grapefruit seedling stock groves will surely be in a better position to get that extra "50 cents" we have been hearing so much about.

Take as a little illustration the display of fruit in the lobby of the hotel. Compare the Blue Goose Brands on exhibition, all produced on sour stock, with the other fruit, produced on rough lemon—which would get that extra "50 cents?"

Adaptability of Various Stocks Modified from Table of Josiah Varn, of Bradenton, Fla.

	Lemon	Grapefruit	Sour	Trifoliata
Rapidity of growth -----	I	2	3	4
Texture and quality of fruit -----	4	3	1	2
Prolificness -----	I	2	3	4
Retention of fruit and juice -----	3	2	1	--
Resistance of cold -----	4	3	2	I
Resistance of foot-rot -----	4	3	2	I
Resistance of fungus diseases -----	3	2	1	--
Adaptability to thirsty light soils -----	I	2	3	--
Adaptability to heavy hammock and reclaimed land with clay sub-soil -----	3	2	I	--

Bitter-Sweet
first

The Progeny Grove as a Basis for Citrus Fruit Improvement

T. Ralph Robinson, Bureau of Plant Industry, Washington, D. C.

It is not my intention to review in detail the investigational work which has demonstrated the feasibility and value of establishing actual pedigreed strains of standard citrus varieties. The use of tree-performance records has been fully explained in a number of publications easily available, and in talks to this society and elsewhere, Mr. L. B. Scott, of the Department of Agriculture, has explained the workings of the system as successfully carried out in California under the leadership of Mr. Shamel and Mr. Scott.

I do, however, want to quote a paragraph from Mr. A. D. Shamel's bulletin on "Citrus Fruit Improvement," to indicate the basic reasons for undertaking the bud-selection project. He says: "The established and proved citrus varieties are the most valuable possession of the citrus industry. The conservation, standardization and stabilization of these varieties should receive most careful consideration by citrus propagators and growers.

"The deterioration or 'running out' of these varieties through unintentional propagation of undesirable strains is responsible for a large proportion of the low yields of inferior fruits in many citrus orchards. The introduction of new varieties to take

the place of those that have become unprofitable by reason of the use of careless methods of propagation is usually a matter of experiment. The establishment of new varieties requires long periods of time to prove their value to the grower and to introduce them to the markets."

In the fall of 1920 I spent a few weeks in the citrus sections of California and had the opportunity to inspect with Mr. Shamel some of the young bearing groves propagated from bearing fruiting branches of selected parent trees, the selection in each case being based on actual records of tree yields covering periods of five years or more.

The uniformity shown in these groves (which we are calling "progeny groves"), together with the early and heavy fruiting habit, was most striking and convincing. Even if there were not present in our citrus groves any appreciable percentage of unproductive or off-type trees, the raising of the average in quality and quantity would fully justify the work of establishing these truly pedigreed strains. The word "pedigree" is often abused when used in connection with tree propagation. In animal breeding a pedigree means something quite definite—it is backed by

authenticated figures of production or breeding, or both—until we insist on the same rigid requirements for a plant pedigree we are not apt to make much advance toward variety improvement.

The behavior of some of these progeny orchards in California has introduced some new ideas and practices into the methods of bud selection and propagation. It has become apparent that it is not sufficient that the parent tree from which budwood is secured should be a good producer. It must also be in a state of equilibrium, so to speak. That is, not given to producing occasional fruits of an undesirable type. The final proof of this stability in the parent is the behavior of the progeny and a truly stabilized or pedigreed strain cannot be said to have become established until a progeny from a single selected tree has come into bearing and the fruit has proven uniformly good and true to type. Progeny groves of this sort then become a most valuable source of budwood, but any sporting tendency appearing in a progeny-planting, from a single parent, renders all the trees in that progeny undesirable for further use in propagation. To illustrate: Some years ago Mr. Shamel started a small progeny orchard from a selected lemon tree in California to test out what could be expected from certain types of budwood. The selected parent tree was a good producer, but had one small branch which produced elongated ridged fruits—quite worthless from a commercial viewpoint. Ten trees were top-worked, using budwood from this sporting branch, and one hundred similar trees were top-worked at the same

time, using budwood from the portion of the tree producing fruit true to type. Last year these top-worked trees came into fruiting. As was to have been expected, the ten trees from the sporting branch produced fruit of much the same character as the parent branch, generally undesirable. The one hundred trees from normal budwood also produced on a considerable number of branches fruits in varying degrees resembling the ridged elongated fruit on the sporting branch of the parent tree. In other words, the tendency to variability was "in the blood," and it was not sufficient in choosing budwood to avoid the branch showing the off-type fruit. The whole tree in such cases must be discarded as a source of propagating material. This demonstration, together with similar cases coming under observation, has led to the idea of establishing *progeny groves* where parentage lines can be tested out before they are accepted for wide use in propagation.

The keeping of tree performance records is going to prove just as important in the progeny groves as in the original groves from which the parent trees are selected. Naturally, all possible care should be taken in selecting parent trees free from pronounced variability, a point that has been given special attention in recent selections. When it comes to cutting budwood in commercial quantities, however, it is not always feasible or economical to give the minute inspection necessary to each parent tree, and it is here that the progeny grove of proven uniformity of type promises to greatly simplify the whole problem of bud selection.

The principle involved in the progeny grove applies not only to citrus varieties but undoubtedly to all bud-propagated plants—a fact that is being gradually realized.

A recent publication issued by the Canadian Society of Technical Agriculture (Sci. Agri. Dec. 1921 p. 120) contains an account of an experiment in bud heredity with the Wealthy apple. The progenies from high and low yielding parent trees grown side by side have given high and low yields corresponding to their parents. Records were kept on these progenies consisting of seventeen grafted trees covering nine years of production, the progeny from the heaviest yielding parent tree having given 62% more crop on the average than the progeny from the poorest yielding tree. To check against any possible differences due to the vigor of individual stocks, scions from the best and poorest yielding apple trees were top-grafted on large bearing trees, each such tree carrying both high and low yielding scions. Here again the total crops for a five-year period corresponded to the yield of the respective parent trees, the difference in production being even more pronounced than when propagated on separate stocks.

Such results as these all lead to the conclusion that there do exist inherent differences in bud strains that can be isolated and perpetuated by the selection of and propagation from superior individuals. There is no doubt in my mind that differences of commercial or economic importance often exist when they are not discernible without the aid of carefully kept

tree records—a point that has been the subject of much speculation and some argument among Florida growers for a number of years. Recently I have had the opportunity to go over the actual tree picking records from several Florida groves of good average production, and where the trees appear at a casual inspection to be quite uniformly vigorous and productive.

It is no uncommon thing in computing the individual tree yields to find certain individuals that have produced over a six or seven-year period two to four times the average amount of fruit yielded by other trees in the same grove. While the number of actual "drones" or non-producers is very small, yet such trees have been found to exist; furthermore, there are numerous low-yielding trees that fall considerably below the general average—trees that to all appearances have every advantage that their neighbors enjoy. Such trees come dangerously near the point of being maintained at a loss—especially in periods of low prices. While the elimination of these low producers is important, for the future of fruit production the discovery of the unusually prolific trees for propagation is even more important and justifies the work necessary to locate them, even though no drones or unprofitable trees be found in the course of the investigation. We are familiar with the efficiency methods that have revolutionized modern factory method and practice—it is an accepted fact that competition has forced the adoption of such methods—and the man or plant that fails to fall in line is soon hopelessly involved. Is it

too much to say that we are approaching the same point in horticulture, where the profit will go to that man and only to that man who produces a high acre yield of high quality fruit without increasing his expense for production and overhead in a disproportionate amount?

Now the question becomes a pertinent one—What is being done at the present time to bring about modern efficiency in citrus propagation? The demonstrations carried on in California during the last decade were so convincing to the citrus growers of that state that in May, 1917, the Fruit Growers' Exchange established a Bud Supply Company as a branch of their Growers' Supply Company. This company furnishes at cost to all nurserymen and growers buds of all the standard commercial citrus varieties secured from superior parent trees. The use of such selected buds has become well nigh universal so that the young citrus groves of the near future are going to be true progeny groves, capable of having their lineage traced back to certain superior parents.

The deciduous nurserymen of California have made a beginning along this line, starting a system of record keeping in selected groves under Mr. L. B. Scott's direction during the year of 1920.

In Alabama the Satsuma nurserymen, co-operating with the State Board of Horticulture and the Bureau of Plant Industry, are already securing practically all their budwood from selected trees, the yield of which is being recorded from year to year, some of these trees already having a three-year performance record back of them. This system is destined to mean

much to the Satsuma industry of the Gulf states, being inaugurated at a time when the industry is still in its infancy. It cannot fail to give this industry an almost unique position in the horticultural field, which will doubtless be reflected in the market returns for a long time to come.

In Florida the opportunity was offered during the last year to undertake systematic bud selection work by the acquiring of a Branch Experiment Station in the heart of the great citrus region surrounding Lake Alfred. The Florida Experiment Station in co-operation with the Bureau of Plant Industry has undertaken as one of the first and leading projects on this new station to establish a progeny grove such as we have previously discussed. The first step in carrying out this project is naturally the selection of superior parent trees from which to start progenies. Fortunately, several co-operators of the Bureau of Plant Industry in bud selection work located in the immediate vicinity of the Lake Alfred Branch Station have been keeping tree records, covering six or more years. By an examination of these carefully kept records and by close inspection of the trees themselves when fruit was hanging and mature, it has been possible to secure what promises to be a superior lot of budwood representing the principal standard varieties. In the case of such varieties as the Pineapple and Parson Brown of Florida origin, it has been thought advisable to also secure budwood from the old groves where these varieties were first propagated, at Citra and Lake Weir respectively. In such cases where actual record of the tree yields

are lacking, the trees selected have been marked and the record of yield from each will be secured during the five or six years that the progeny buds are being fruited out—a sort of "ex-post facto" performance record. In all cases, however, the selected trees have shown evidence of being at least above the average in vigor, production and quality of fruit. The orange varieties which will be represented by progenies at the Lake Alfred Station are those selected as standard by a committee of representative Florida growers at the Citrus Seminar in 1916. The record of this committee was unanimously adopted by the growers attending that Seminar. These varieties in order of their season of maturity are—Parson Brown, Homosassa, Pineapple, Valencia and Lue Gim Gong.

In addition, of course, a number of grapefruit progenies will be included, especial attention being given to the Marsh Seedless, owing to the importance this variety has assumed in recent new plantings.

With the orange varieties of leading commercial importance such as the Pineapple and Valencia varieties, at least ten selected parent trees will be represented by a progeny of twelve budded trees each. These progenies will be carefully studied and compared as they come into fruiting

to select from them one or more strains of pre-eminent vigor and fruit quality for further propagation.

The plan contemplates expanding the progeny planting as the demand for budwood may warrant by propagation on a larger scale from those progenies that give evidence of being superior in production and quality of fruit. The Florida Agricultural Experiment Station will have exclusive control of the disposition of the budwood produced, which, however, it is expected will be offered to growers and nurserymen on a non-profit basis, as a public service proposition. No budwood, however, will be available until the progenies have been brought into fruiting sufficiently to prove out their inherent value for further dissemination.

The carrying out of the whole plan is of course contingent on the interest and support given to the station by the growers and those in a position to see that land and facilities are made available as needed.

If real bud selection appeals to you individually or as a society as a project that marks an advance in the efficiency of the citrus industry in Florida you have an opportunity to help your own interests by seeing that your Branch Experiment Station is given adequate support.

Citrus Varieties

F. M. O'Byrne, State Nursery Inspector, Gainesville

At the joint meeting of the American Pomological Society and the Florida State Horticultural Society, held in Ocala February 20, 1889, four of the largest citrus exhibitors had on display from thirty to fifty varieties of oranges alone. From this high water mark the pendulum swung in the other direction until 1915, when the number of varieties of round oranges planted commercially was practically reduced to four, the Parson Brown, Homosassa, Pineapple and Valencia. But two varieties of kid glove orange were extensively planted, the Dancy tangerine and the King, while probably ninety per cent of the grapefruit plantings consisted of Marsh seedless and Duncan.

The pendulum is now swinging back again. We have on the market or in prospect in the near future the following fourteen varieties of oranges and one new variety of grapefruit.

THE TEMPLE ORANGE

The tree from which the Temple orange has been propagated stands in the grove of L. A. Hakes at Winter Park. The fruit, foliage and habit of growth all lend color to the theory that it is a cross between a kid glove and a round orange. The average size is about 150. The color,

when fully matured, is deep orange red. The rind is thin, smooth and satiny. Its season is from the middle of January to the first of April, though some fruit has been held on the tree till May without detriment, as members attending the Orlando meeting will recall. The parent tree is said to be very prolific and the reproductions have been distinguished by their tendency to early bearing. As to its ability to withstand extremes of drought and cold, I have no information, though have heard it said that the parent trees went through the 1917 freeze exceptionally well. The American Pomological Society last year awarded the Wilder medal to the Temple orange.

The advantages claimed for the Temple are its splendid color, smooth satiny rind, easy peeling quality and splendid flavor. It will sell the first time, it is claimed, on its appearance and afterward primarily on its flavor. A pretty Temple is as far ahead of the average California orange in appearance as the average California orange is ahead of the average Florida orange. Coming in at the end of the tangerine season, the Temple can be sold either as a tangerine or a round orange.

The oldest reproduction of which I have personal knowledge is at Winter Park on sour orange stock and is nine years old.

It produces fruit indistinguishable from the parent tree. A reproduction of seven years on rough lemon at Winter Haven is bearing good crops, but as yet the fruit on this tree has not equaled in appearance that produced on the parent.

As I have observed it, this tree's fruit is quite susceptible to blemishes, such as wind scarring, rust mite and scab. Possibly this is peculiar to fruit on young trees. Just at present, you hear considerable criticism about the fruit on young Temples drying out. It must be remembered that most trees of this variety are on rough lemon and that the early crops on rough lemon stock always are rough, coarse and have a tendency to be insipid and to dry out early. It is too soon yet to tell, I believe, whether the Temple will reproduce satisfactorily on rough lemon or not. The name "Temple" is copyrighted and trees are sold only under contract, preventing its propagation for sale by any one other than the introducers or their permittees.

THE GOLDEN RING ORANGE

The four original Golden Ring orange trees were found in a grove at Eloise by Mr. L. P. Kirkland. Its origin is obscure. It gets its name from a characteristic ring about the blossom end.

The fruit which I have seen runs small in size, about 225's, though it is said that when properly fertilized and cared for the fruit will run larger. The rind is medium in thickness and inclined to be brittle. It is a deep orange red and a little coarse or pebbly. It starts to color in October and is fully ripened and colored by November

10th. Nothing is known as to its hardiness. A number of trees have been top-worked with this variety on both sour orange and rough lemon and all are said to have reproduced fruit of the same quality as the four parent trees. I have not seen any of these reproductions. As the parent trees were on rough lemon and on high sandy soil, the chances of its reproducing satisfactorily on rough lemon should be very good.

The advantages claimed for it are its early date of maturity, its deep color and good flavor. It, also, is expected to sell the first time on its appearance and after that largely on its flavor. The name "Golden Ring" is copyrighted and trees are sold only under contract.

THE AVON EVERBEAR

The Avon Everbear orange originated at Avon Park. Its history is unknown. It is a real everbearing orange which ripens the main portion of the crop, I am told, in the summer.

The fruit averages from 150's to 250's. Its shape is a little longer than the Valencia. The rind in thickness, color and texture is about the same as a very smooth Valencia. Its season is the year around, with probably the main crop in summer.

So far as I know, we have no data on its hardiness or its ability to reproduce properly. The parent tree is said to be very productive and had a good crop of fruit of all sizes when I saw it.

The advantage claimed for it is that it will keep money coming in the year around. The main crop of fruit is said to carry well into July without drying out,

and another picking, so they say, may be made in October before other Florida fruit starts to move. From the looks of the tree I should judge that other pickings, besides these two, would have to be made. The name is copyrighted and the trees are to be sold under contract.

ELOPINE

The original Elopine tree is a seedling which stands in a grove at Bartow and is being tested out by a nurseryman at Eagle Lake who plans to copyright the name and sell the trees under contract if it reproduces properly.

The fruit of the parent tree, averages 176 or less to the box and is perfectly round. The rind is medium in thickness and texture. It is said to be a much deeper orange color than the usual Florida orange. It is a mid-season fruit and the flavor is said to be splendid. Those acquainted with the fruit are loud in its praises. Little can be learned of this variety except that it is being propagated and watched by the nurseryman mentioned.

MOONSHINE

The Moonshine orange originated at Parrish, Florida. It is a late orange, to be marketed from May to July and is said to have a splendid flavor with very few seeds to none at all. It is under investigation and reproduction by a large nursery.

LONG'S EVERBEARING

Long's Everbearing orange is not new, as it originated at Lake Helen some thirty years ago. The recent interest in ever-

bearing oranges has again brought this variety to the front. It is a true everbearing orange which has never won a very large place for itself in the Florida growers' esteem.

There are also several other everbearing oranges being planted locally in various sections, one in Ft. Myers, one at Eden and probably others of which I know nothing.

CLUSTER ORANGE

The Cluster orange originated at Sebring. It looks as if it might be a cross between an orange and a grapefruit. It is a mid-season fruit and grows in a cluster. (Specimens may be seen in the fruit exhibit at the Thelma Hotel.) It is being watched and propagated and may be placed on the market some day.

WARD'S EARLY

This is an early orange reported to be superior to the Parson Brown in appearance, early coloring and flavor. I know nothing of it personally and have been unable to secure more information. It originated at Orlando.

A nurseryman at Avon Park has two new varieties which he plans to soon put on the market, I am told.

One is an early orange averaging about 176 in size, which ripens and colors by the first of October. There are peculiar ridges or creases running toward the stem end. The flesh is quite yellow and the flavor good for an early orange. There are not many seeds. The skin is medium in thickness and a little coarse in texture. I

do not know the name which will be given this new fruit.

The other variety is a mid-season seedless orange which looks much like a large seedling. It will probably average about 126 to 150 in size and is of very fair quality, though it cannot equal the pineapple in flavor or color or texture.

THANKSGIVING ORANGE

The Thanksgiving orange originated at Mt. Dora from the seed of the "Clementine," a member of the tangerine family which the Federal Government imported from Algeria in Africa.

The fruit averages a little smaller than a tangerine and the rind is not quite as deep a red but is very thin. The tree is said to be a little hardier as regards cold and drought than the round orange. It is said to be prolific and the fruit is reported, by disinterested parties, to be delicious.

The Thanksgiving orange is ripe and perfectly colored by November 1st and will hang on, it is claimed, till February. It is in perfect shape for the Thanksgiving market; hence the name.

It is being propagated at present, but I do not know if the name is to be copyrighted. None are as yet on the market.

Another kid glove orange will be ready for the market in a few years. A name has not yet been decided upon. When one is selected it is to be copyrighted and the trees will be sold under contract.

It is a seedling grown from a fruit sent over from China in 1892 to a nurseryman at Interlachen. The fruit would pack about 85 to 90 to the strap. The rind is a deep rich yellow, somewhat thicker than

that of the Dancy tangerine and is puffy like the Oneco tangerine. The meat is quite juicy, with little rag and has a splendid flavor. It is a mid-season fruit which will hang to the first of February. It has not been tested in various sections of the State or on different stocks. Some tests are now being made.

GRAPEFRUIT

A new late grapefruit is now under observation and is being propagated with a view to placing it in the market as a new variety, should its performance justify. It was tentatively called the "Dorothy Summer Seedless," but this name will probably be replaced by a shorter one.

It is a seedling grapefruit which was started in a tub in Indiana and brought to Winter Haven a number of years ago. The fruit is practically seedless and will hang on quite late and is said to be superior to the Marsh.

CONCLUSION

In years past, L. B. Scott, pomologist for the United States Department of Agriculture, has presented to the Horticultural Society the advantages of the smallest possible number of varieties to cover the season, and has shown clearly the handicap under which Florida, with many varieties of oranges, labored when competing with California, which has but two. As a result, a committee of growers at the 1915 Citrus Seminar recommended that commercial plantings of round oranges be restricted to Parson Brown, Homosassa, Pineapple and Valencia with the under-

standing that Lue Gim Gong would be marketed as a late Valencia. How far we have departed from this recommendation my review of impending varieties indicates.

Under what circumstances should a new variety be brought out? Clearly, only when it fills a vacancy in our sequence or is distinctly superior to a fruit already established in our schedule. The citrus fruits produced by Florida growers can be divided roughly into three classes; namely, standard fruits, including round oranges and grapefruit; fancy fruits, including kid glove oranges; and novelties, such as tangeloes, tangeloloes, limequats, etc.

Before a round orange, for example, is brought out it should be shown that it fills a distinct niche either by coming on the market between Valencias and Parson Browns or by being admittedly superior to one of the fruits now in the schedule, replacing it entirely. The same reasoning applies to the introduction of new fancy fruits. The Temple's place in the schedule, as I see it, is as a fancy fruit to follow the tangerine, filling the vacancy between the tangerine and the king. It, of course, has the advantage that it can be handled and eaten as a round orange, but its particular niche is in the fancy fruit column.

Moreover, a fruit should be recommended for general planting only when it will make good on all soils and on all stocks. For example, the ruby blood orange is splendid on sour orange stock in the northern part of the citrus belt, but it is a failure in the sand hill sections on rough lemon. Some oranges are splendid

in certain localities, but prove failures anywhere else, as for example, Drake's Star, which does splendidly in the vicinity of Yalaha.

Like the old Dutchman, I believe in only telling stories that have moral teachings. The moral of my story is this: "We have too many varieties coming on the market now." We must never, of course, take the position that our varieties are perfect and that no new varieties can be introduced. We must always leave the door ajar so that a really good variety can get in. I propose, therefore, a permanent committee of the Horticultural Society on "Citrus Varieties," to be composed of five prominent growers who have no interest in a nursery, one each from northern peninsular Florida, the Indian river section, Dade county, the Ridge section, and Southwest Florida; this committee to inform itself concerning the value of a proposed new variety by each member watching its performance in his particular section. The growers of the State should then do their part toward standardization by planting only such varieties as have been recommended for general planting by this committee.

Sadler: I commenced 35 years ago to get information on the best oranges grown in Florida, and I got information from the American Agriculture report and when I got through I had two groves of 20 acres of this kind and when they came to bear I found the cluster orange was the best bearing. When I came to test them, I might say they were like two drops of vinegar in a quart of water. I was thank-

ful that I got rid of them. Another thing I might mention is my experience with the blood orange. He said they would not do well on lemon stock. My groves are budded on lemon stock and I find only once in a while that I make a mistake. My groves bear when healthy. Next thing in regard to Mrs. Moorhead, she is working to allow us to sell more fruit. When a witness is called he is pledged to tell nothing but the truth. In this case I want to suggest that you men tell the whole truth and nothing but the truth. You all know the sentiment expressed years ago. The best way to eat an orange is to drink the juice; it is the nicest and cleanest way and you do not squirt it in your eyes. Let me tell you, this fall I did not want to eat oranges with a spoon so I commenced to drink my glass of orange juice. I can realize how some men were without their glass of beer for breakfast. I have gotten so I don't want to eat breakfast without my glass of orange juice. I want everybody here and in the State of Florida to say that the only way to eat an orange is to drink the juice. I am telling the whole truth. That is also the best way to eat a grapefruit. You do not get the bitter. You can also eat two, or possibly three, grapefruit instead of a half of a one. In five years we will have many grapefruit and we have got to teach that the only way to eat an orange or grapefruit is to drink the juice.

Skinner: Any further questions?

King: I notice those who spoke of the citrus root stock mentioned lemon, rough lemon, sour orange and grapefruit and I

wish to ask if they have had any experience with the bitter-sweet.

_____: It is used to a very limited extent. It is quite promising.

_____: There are some groves on Merritt's Island that have bitter-sweet stock.

_____: Do they do well on pine lands?

_____: I don't think they have been tried out there.

Skinner: I have a grove at Sutherland in which 500 trees are inarched. Some are inarched with sour stock and others with lemon. The lemon stock is absolutely no good and sour oranges are all right.

Gill, of Maitland: Can you tell how long after the little seedling is planted that you can inarch?

Skinner: Immediately.

McKay: I wish to state an experience of mine in inarching. I did not find it very successful. In the first place the trees have a very poor foundation to rest on. I could never get them to support the tree, but maybe I did not do it right.

Skinner: I don't think you should bend it. Of course if you have a bend it will try to sprout a bud every time. The rough lemon has no tap root. Should that statement be allowed to go unchallenged?

Waite: In the last four or five years I have transplanted old trees on low hammock land and wherever I found one without a tap root it was rough lemon. The grapefruit had much tap root.

_____: I have planted orange trees ever since I was three knees high, bud-

ded all kinds of them and on all kinds of stock and made all sorts of experiments, and I have experimented with the sour orange a great deal. I have found that the sour orange succeeds well on low hammock but I have found that nothing compares with the rough lemon on high sandy lands. I can show any man trees budded on rough lemon stock 25 or 30 years old today, that are as fine as any in the State of Florida on the highest hills and they bear good crops that look perfectly healthy and they have never been irrigated. I think the rough lemon is far preferable and will state right here I am making experiments with a new stock. It originated in South Florida and is very promising because of its hardiness and its growth. It stays dormant all winter. I am banking on it as much as any I have made and I have made eight or ten and they have all been a failure.

Skinner: I have a grove of ten acres on lemon root from which I have taken off in one season 16,000 boxes. I think it is wonderful if the sour orange can match it.

Bouis: I have been most deeply interested in a search for a root stock that would meet the ideals of these stocks. In consultation with a number of very well informed and experienced gentlemen, I have had my attention drawn to the Cleopatra stock. I would like to ask Mr. Evans, who referred to it in his remarks, if he can give more detailed information and what experience he has had with that root stock. I would like to get some information.

O'Byrne: Very little so far is known of the Cleopatra as a root stock and I be-

lieve as in the case of varieties that the matter of root stock should be thoroughly tested in all sections of the State before any general recommendations are made. However, we have present Mr. E. N. Reasoner, who can probably tell us something about that.

Mr. Reasoner: Bouis and I have gone over that matter and we found that the Cleopatra stocks which I had budded a good many years ago with Oneco, Mandarin, Homosassa orange and grapefruit, and located on high very well drained land, were the best trees in this ten-acre grove. The Cleopatra turned out to be the best stock and it is the finest I know. Some of the people have some of our stock on Cleopatra and don't know it. I would like to know of any one that has any trees on Cleopatra stock and how they are doing. They are very resistant stock to cold and drought. Cleopatra growing under the same conditions as rough lemon and sour orange is better in these days of drought. They bear more fruit, the quality is finest in the world, absolutely the best. They hold juice to the end of the season. I don't know whether you know it or not, but I think my brother was the first man to use rough lemon stock in Florida. I think after the rough lemon has been used that we ought to see whether there is any better. I just want to see what is to be done about it.

Bouis: I am interested in both rough lemon and sour orange for stock. They are both good in their places. I would not have either one in the other's place. I find, however, that there are limitations in both of these root stocks. Mr. Reason-

er is the first man to have such a stock. I want right here to pay tribute to the un-commercial spirit which he has shown in these matters. He seems to disregard all thought of business when he can discuss anything of general benefit to the interest of the grower. The fruit that was grown on the Cleopatra stock was in better condition, more full of juice and finer than that grown on sour stock. The trees were about the same size. No nursery has been using that as a root stock. In the County Fair at St. Augustine I found a half box of Cleopatra without the exhibitor's name and no one knew about it

or where it came from. I tried to purchase the box and I found the man incorruptible. I hung around there for three days and tried to get that box and failed. On the last day he weakened. Some one had purchased the entire exhibit and this gentleman did not appear and finally I paid for this box. I have planted my Cleopatra in three counties, DeSoto, Polk and Lake, but it will be a year or two or three before that stock can ever be budded and I am particularly desirous and I think it is a matter of general interest if we could find what that has been used for and identify it.

The Citrus Experiment Station at Lake Alfred

Wilmon Newell, Director, Florida Agricultural Experiment Station,
Gainesville

Inasmuch as a brief history of the inception and establishment of the Branch Experiment Station for Citrus Investigations was presented before this society at its meeting at Miami last year, it would seem that a report at this time should be little more than a report of progress—or lack of it—as the case may be. Perhaps the fact that this meeting is being held in the county where the station is located and that you will all have the opportunity to visit and inspect the station tomorrow, gives the subject more interest than would otherwise be the case.

Before we proceed with a report on the station for the past twelve months, I would beg your indulgence while we review very briefly its history. Establishment of the Citrus Station was authorized by Act of the 1917 session of the Legislature and was conditioned upon interests in Polk county donating lands, money, etc., to the value of not less than \$10,000.00. Subscriptions aggregating this amount were secured by the summer of 1919, by a committee consisting of Messrs. S. F. Poole, J. A. Snively, J. H. Ross, H. W. Snell, L. L. Davis, A. M. Tilden, C H. Thompson and W. L. Drew. In July, 1919, the site for the station was decided upon by the Board of Control.

The 84 acres of land occupied by the station was donated by the Florida Fruitlands Company, and the Board of Control refunded to the Fruitlands Company the actual cost of 14½ acres of citrus then on the property.

At the Miami meeting we reported that the total donations had amounted to \$13,-782.15. They have not been added to since that time.

As the donated fund constituted the sole resources of the station, all maintenance and operating expenses to June 30, 1921, had to be defrayed from this source. As a matter of record, we would like to report here how the total sum of \$13,-782.15 was expended:

Reimbursement of Fla. Fruitlands Co., for cost of 14½ acres of citrus on property--	\$5,900.00
Care and supervision of property, to June 30, 1921-----	4,183.81
Superintendent's cottage* -----	3,153.00
Tool and fertilizer shed -----	351.74
Fencing -----	79.25
Nursery stock and seeds -----	17.09
Water supply* -----	15.50

*Balance of cost defrayed out of appropriation for main Station at Gainesville, for year beginning July 1, 1921.

Traveling expenses -----	61.55
Miscellaneous -----	18.00
Postage -----	2.21
Total -----	\$13,782.15

During the past year a house has been constructed for the superintendent at a total cost of \$3,739.23, and a well has been drilled, a water tank erected and a small pumping outfit installed, at a cost of \$761.81. The cleared land has been improved in condition and 773 additional trees planted out in connection with the experiments hereinafter mentioned.

A substantial quarantine cage 30x48 feet, 10 feet high, has been constructed on the property by the State Plant Board. In this cage will be planted citrus trees which it is found advisable to bring in from outside the State and here they will be grown for at least one year while being kept under observation to determine their freedom from diseases and insects.

No specific appropriation for the support of the Citrus Station was made by the last Legislature, but the appropriation bill specified that the Citrus Experiment Station should be taken care of out of the appropriation made for the main station at Gainesville. Out of the latter appropriation the Board of Control set aside \$5,690.00 for the fiscal year beginning July 1, 1921, and this constitutes the total resources of the Citrus Station at present, with the exception of \$364.65 (gross) received this year from the sale of fruit.

EXPERIMENTS

We are doing as much experimental work at the Citrus Station as the amount

of cleared land and the available funds will permit.

Dr. R. W. Ruprecht, physiological chemist of the Gainesville Station, is carrying on a study of the physiological causes of dieback, using the young 10-acre grove for his field experiments. In the bearing grove he is also carrying on fertilizer experiments to determine the relative effects of high and low percentages of potash; also a comparison between ammonia derived from nitrate of lime and ammonia derived from nitrate of soda. Other fertilizer experiments, involving the use of phosphoric acid, are being carried on in commercial groves near at hand.

A modest experiment in comparing rough lemon, sour orange and grapefruit stocks has also been started. In this experiment nine varieties of grapefruit and three varieties of orange, each on rough lemon, sour orange and grapefruit stocks, have been planted. The effect of the stock on these varieties, under these particular soil conditions, will be noted and the varieties in this planting will also be useful as a source of material for instructional and experimental purposes. This experiment is not as comprehensive as it should be and we should perhaps explain that it would probably not have been started at all were it not for the fact that we had most of these trees at Gainesville, where they had been used in scab-control experiments under nursery conditions, and we did not wish to waste them.

PROGENY ORCHARD

What is considered by far the most important line of experimental work under-

taken is that of making bud selection studies and establishing a bud supply orchard of the best strains of standard Florida varieties.

A co-operative agreement was entered into on October 26, 1921, between the Bureau of Plant Industry, U. S. Department of Agriculture, and the Experiment Station, whereby the bureau is to furnish stocks and buds from selected bearing trees in Florida and supervise the work of propagation, record-keeping, etc., while the Experiment Station is to furnish the land, fertilizer and cultivation. Five hundred rough lemon stocks have been planted in grove formation and these will be budded shortly with buds from the best typed and producing trees of Parson Brown, Homosassa, Pineapple, Valencia and Lue Gim Gong varieties. In fact, Mr. T. Ralph Robinson of the bureau has spent a large part of his time during the past crop season in locating the best trees of these varieties in Florida and in securing the budwood from them. We will, therefore, have under observation approximately fifty progenies of ten trees each: that is, ten trees propagated from each of fifty of the best trees that can be found in the State. In addition to securing data on the behavior of these trees we hope to make this the beginning of what will eventually be a progeny bud-supply orchard, an orchard from which we can supply to growers for top-working and to nurserymen for commercial propagation

budwood of the best strains of the standard varieties.

Probably no line of experimental work is so promising of financial returns to the citrus industry of Florida. Increased acre-production, a better and more uniform type of fruit of each standard variety and a general standardization of the Florida citrus product are all benefits which may be expected to follow the steady prosecution of this work upon a sufficiently ample scale.

Our co-operative agreement with the Bureau of Plant Industry also calls for the establishment of a demonstration orchard of different strains selected from commercial citrus—to show the results obtained by proper bud selection—and plantings devoted to the testing of new citrus varieties and hybrids, as well as a collection of wild citrus plants and relatives of citrus as material for study and experimentation. However, these plantings cannot be made until we clear more land and this we cannot do until we secure an appropriation for this station.

The citrus industry of Florida has been builded, for the most part, upon the trials, mistakes and losses of individual growers. The fact that it has succeeded is but ample evidence that with the benefit and guidance of scientific data upon its most essential problems it will become a far greater and far more profitable industry than it is today.

Citrus Fruits in the Home

Caroline Moorhead, Florida Citrus Exchange, Tampa

Since the subject before us is so broad, covering years of research and experimental work on the part of many scientists, I shall only attempt to add a few thoughts as reminders of the many practical uses of citrus fruits as food, beverages and confections, as well as their already acknowledged value in medical science.

In the capacity of my services, it has been my privilege to carry the story of Florida fruit into the domestic science departments of many of our best schools, colleges, women's clubs and various organizations, and in some of the most noted cooking schools of the New England and Northern states.

It has been most gratifying in each instance to note the interest and enthusiasm shown in regard to a further knowledge of the uses of Florida fruit.

The housewife of today, if she be a successful manager in the art of home-making, must not only be a student in domestic science and its relation to the family diet, but she must be a practitioner, as well.

The real home-maker, especially if she be a mother, realizes that she not only creates the home, but through her efforts in selection, preparation and careful planning of well-balanced meals of nutritive

value, she is directing the body-building for better citizenship.

A wise mother will place at the very *top* of her order sheet those fruits and vegetables which are so important in the daily diet. She will also train her children from early infancy to acquire a taste for citrus fruits, because of their health-giving qualities.

Dr. Roger H. Dennet, of New York, says bottle babies who have not received orange juice cannot compare very favorably in color, volume of flesh, body development, strength, and often in *avoirdupois*, with those babies who have received orange juice at six weeks or two months of age.

Strained orange juice is especially valuable to the child under one year of age, whose diet consists of pasteurized milk, says Dr. Harvey W. Wiley, of Washington, D. C.

The following figures from the Bureau of Vital Statistics, State Board of Health, under head of Infant Mortality Due to Disease Caused by Error in Feeding in United States, is as follows:

In 1911 death rate of infants up to five years of age, was 77.5 per thousand; in 1919, death rate was reduced to 44.2, showing gradual but decided decrease due

to educational advancement both in medical and domestic science.

From a popular Florida booklet we read, "The high food and energy value of citrus fruits has been conclusively demonstrated by investigation of the United States Department of Agriculture, in bulletins No. 28, office of Experiment Station, The Chemical Composition of American Food Materials, and Farmers' Bulletin No. 142, The Principles of Nutrition and Nutritive Value of Food." The result of these investigations are given in detail, "It is clear from the findings which are summarized in these bulletins, that oranges have a higher food value than beef juice, buttermilk, oatmeal gruel, or oysters, and that citrus fruits far exceed in units of food and energy value to the pound a number of commonly used vegetables."

At the time this little treatise appeared, that king of Florida fruits, the grapefruit, had not been so thoroughly studied, hence it was not included in the above chart.

Being a strong advocate of the grapefruit, with firm faith in its wonderful possibilities, I have left no stone unturned in my efforts to secure proof of its worthiness.

The food and energy value of grapefruit is considered to be 5 per cent. It averages 45 calories for every hundred gram weight. Half of a small grapefruit would give 35 calories. A medium size grapefruit (one-half) would give 75 calories. These figures are taken from Lock and from Dr. White, of Boston, Mass., and are considered trustworthy.

When we consider that the average

weight of a small grapefruit is $15\frac{1}{2}$ ounces and a medium size grapefruit averages $22\frac{1}{2}$ ounces, making a difference of 7 odd units of food and energy value, there is a reason for preferring the larger grapefruit.

Since the system of arranging diet is based on such products as contain the proper units of energy and food value, known as calories, the above information is of special interest.

Recent experience has proven beyond the slightest doubt the anxiety on the part of the consumer for greater information in regard to citrus fruits and their various uses.

For an example of interest shown, one simple formula of Florida punch, created at the South Florida Fair during time of a citrus display, has been copied from blackboards in more than a hundred schools and colleges, being taken down in note books of at least twenty-five thousand girls and women.

This formula is composed of grapefruit and orange juice, no sugar or water. The grapefruit juice serving as base and thirst-quenching qualities, while the orange furnishes the sugar.

A prominent woman of the state of Maine, who spends her winters in Florida, expressed regret that she had not known while in Florida some of the very simple things worth knowing in regard to grapefruit.

One highly important fact to remember in connection with grapefruit is that the use of salt brings out the refreshing sweetness of the fruit, while the sugar has a tendency to bring out the bitter flavor.

Sugar is, of course, by no means, objectionable, and those who prefer the bitter taste of grapefruit should use it, but those who have not tried it with salt have a treat in store.

A thought worth while to the home-maker is that with the peel of oranges and grapefruit a variety of decorative containers may be made, which add to the attractiveness of the table.

True, the decorative touch does not come under the head of necessities, from the standpoint of food value, nor is it measured by units of calories or included in the much discussed list of vitamines, but the art of table decoration goes hand in hand with thoughtfully planned meals, having a value all of its own.

Best results are obtained when meals are prepared with consideration for the mental as well as the physical taste.

It is the birthright of womanhood that she be encouraged in the artistic side of home-making.

Just wherein citrus fruits may be considered of material interest in the home is not only borne out in some of the former medical uses of these fruit juices for infants and children, but has been thoroughly demonstrated as a health-giving food and beverage for adults as well.

An interesting feature in regard to the adult is the fact that men and women who have been advised against the use of grapefruit because of its acids not seeming to agree with them, have in many cases found that with the use of salt in place of sugar, they now enjoy their grapefruit and have no bad effects.

Statistics obtained from a recent Cali-

fornia booklet tell us that of 107 physicians who were asked what fruit they would recommend for children, ninety-three of that number answered, oranges.

Oranges and grapefruit are easily digested, their salts and acids forming a natural mild laxative, also preventing children's disorders due to sterile or deficient food, and being a necessary element to growth.

Recognizing the fact that America's youth is the nation's greatest wealth, is it not well that we pay more attention to its proper nourishment? And on whom does the mantle of responsibility fall more heavily in this great work than on motherhood.

Until recent years the matter of correct diet was a subject little thought of, or left for the physicians and nurses to discuss. Now, through the various channels of domestic science, it is a study within the reach of all who wish to avail themselves of the opportunity, and rightfully belongs in every home.

The various uses and preparations of Florida citrus fruits are recognized as a valuable unit in domestic science problems wherever introduced.

A broader knowledge and more general use of citrus fruits would mean more universal health, and health as the crowning jewel of life demands it.

Aside from the health-giving qualities, which add to their value of course, there are other ways in which to use citrus fruits. An unlimited array of dishes may be prepared of them.

The Ohio State Journal of Columbus, Ohio, on making an interesting compari-

son, states, "that two Florida oranges will fill an ordinary tumbler full of juice, while it takes from four to seven oranges of another state to accomplish the same feat."

An item worthy of keeping uppermost in our minds is that Florida's greatest asset, aside from climate, is its citrus industry.

The various citrus by-products are producers of wealth, if properly handled. Its jellies and marmalades of the higher grade, are comparatively unknown in many states.

Candy made of our citrus fruits is considered of the very best wherever known.

The tons of citrus fruits allowed to waste annually would mean a wonderful source of revenue to the State of Florida, if cared for.

In many of our stores, especially those of the rural district of Florida, is the very popular cold drink department, where men, women and children deposit dimes that count into many thousands of dollars during a season.

And what do they get in return? Very seldom a thirst-quenching beverage, but something quite sweet and highly colored, the best feature being possibly its coolness. Now the makers of these various concoctions are not to be blamed, for cool drinks are demanded by the general public, and someone must supply that demand. But why not agitate the establishing of a citrus juice extractor along with the drink department, and give to the public nature's best and most refreshing beverage, which not only is refreshing but contains therapeutic value.

Crystallized citrus fruits cannot be surpassed for fruit cake; it is much less expensive and far better flavor than the citron that is shipped into our State, and very much sought for.

Every man and woman who plants a tree or shrub for the beautification and value of our State is a Florida booster, and those who add to the citrus groves are stockholders in Florida's acres of gold.

Fruit and Vegetable Conservation in the Home

Estelle Bozeman, Tallahassee

Work with women in conservation of fruits and vegetables in the home is divided into three parts, namely: the problems, method and goal. Since in this meeting interest is primarily in the goal, it is necessary here to but briefly state the problems. They are:

1. Conservation to prevent waste.
2. Conservation to adequately supply the home table with Florida foods at a minimum cost. In considering this second problem the needs of the family are determined and the food value of the conserved fruits and vegetables taught. Each family of five is urged to conserve at least one quart of fruit and one quart of vegetables for each day. Proportional reduction based on the amount of fresh fruit and vegetables provided is advised.
3. Conservation through the manufacture of new products from Florida fruits and vegetables.
4. The increase of the income of women and girls by making a standard product. The methods used for conservation of the fruits and vegetables are canning, brining, drying, pickling and crystallization.

Where individuals are interested in developing a commercial proposition, they are taught to standardize their products. To encourage the development of this project, women and girls were asked to send to the State and South Florida Fairs two

samples of each of the products which they wished to put on the market. There were fifty-nine entries made, which showed fourteen varieties of products. These products were judged by buyers for hotels and delicatessen shops. Thirty-three products shown were given A No. 1 score. The criticisms of the products that did not come to standard were forwarded by us to the producer. To aid them in perfecting their products, individual help is being given these women. As a result of the exhibit made at the South Florida Fair products were shipped into fifteen states. A letter followed each shipment asking for comments. The following replies are typical:

"Fargo, N. D., Feb. 24, 1922.

"Dear Madam:

"The guava jelly reached us in fine shape, and we think it unsurpassed in texture and quality. We shall want more when this is gone.

"Yours respectfully,
"MRS. C. B. WALDRON."

"Baltimore, Md., Feb. 25, 1922.

"Dear Madam:

"I am in receipt of your letter of February 21st in reference to an order of the whole crystallized grapefruit peel filled with French fondant. The same was received on February 16th in perfect condition. It was the daintiest and most attrac-

tive piece of confection I have ever seen and was also delicious to the taste. There will be no doubt of your customers being pleased with your new project.

"Thank you so much for the suggestion as to cutting. I had been taking out the fondant with a spoon but enough was left to see the great difference between that and cutting. In the language of the present day, 'I am crazy about it.'

"You are engaged in a very interesting line of work in which I wish you every possible success.

"Yours truly,
"MAUDE TURNER."

A number of duplicate orders have been received. This is the best possible proof of the satisfaction given.

Fourteen women have enrolled as members of our Home Industry Project. Markets are located for the products and the producer then deals directly with the consumer. Thus far difficulty has not been in locating the market, but in supplying the demand. One of the leading hotels of the State has placed a standing order with us for products. The manager offers top prices for all products. He says they are superior to any other products he is able to get.

One young woman in a remote section is producing products that wherever shown are calling forth favorable comments, and bringing to her orders for her output. With more experience and a little financial backing she should in time be able to rival with her products the famous Pin Money Pickles. One of the women has already outgrown the family kitchen and has moved into a small building with

modern equipment such as steam-jacketed kettles, thermometers, hydrometers, etc. She has recently been offered the management of a factory. Another woman has temporarily converted her basement into a special products kitchen. Several working women are making products during their spare time, the sale of which supplements their other earnings. A small exhibit of these products is on display in the lobby of the Thelma Hotel. They show the quality, containers and labels.

Some work has been done in a number of counties in the making of muscadine products. The demand for the fresh fruit is so great that there is but small chance to develop this project as yet. The commercial possibilities in this fruit will be fully discussed by Chas. Dearing, Bureau of Plant Industry, Washington, D. C.

Another Florida product that may be used in developing a home industry is the manufacture of confections in which the pecan is used. This report covers briefly the work that is being done in the field.

Investigational work is being carried on in the research laboratory of the Florida State College for Women, which it is hoped will solve some of the present problems that we meet or suggest other uses for the Florida fruits and nuts. Experimental work is being carried on in the canning of grapefruit heart. Researches in the nutritive value of avocados and of pecans are being made.

Though a small beginning, our goal is to have standardized products with the Florida labels in all homes, on dining cars, in delicatessen and gift shops in this State.

The Present Status of Fruit Products Manufacture

Seth S. Walker, Exchange Supply Co., Tampa

Practically every visitor coming into Florida for the first time is astonished and horrified at the vast amount of fruit going to waste—fruit that drops from the trees and rots; fruit that is culled out at the packing houses and hauled to the dump because for one reason or another it is not considered suitable to ship. It is perfectly obvious that this fruit represents a dead loss and that some means of converting it into an asset is extremely desirable. It may not be so obvious, but is equally true, that a large portion of the fruit now shipped should in reality never be put upon the market as fresh fruit if there were some other way to dispose of it. This third and fourth grade fruit is often of the best flavor but because of poor keeping qualities, off-size, or poor outward appearance it meets with small success on the market and continually operates to lower the prices for the better grades. Moreover, it would seem that new citrus plantings are coming into bearing at a faster rate than the market can be expanded to take care of this increased production.

Evidently there is a very real need for a fruit products industry—an industry that will convert the non-shipable fruit

into marketable products, valuable for their own sake and doubly valuable because of the increased price obtained for high-grade fruits.

I have taken the trouble to do a little figuring on the amount of grapefruit and oranges available for manufacturing purposes, basing my figures on conservative estimates made by men who are in a position to know what they are talking about. The results are illuminating.

There have already been shipped from the State this season over eleven million boxes of fruit and the total for the entire season will approximate twelve millions of boxes. Fully ten per cent—often more—of the fruit actually raised never reaches the market but goes to the dump pile. In other words, at the end of the present season, something like one and one-third million boxes will have gone to waste.

On the other hand it is estimated that twenty-five per cent of the fruit shipped will be classed as third and fourth grades—fruit that in seasons of normal prices gluts the markets, often failing to pay transportation charges and *always* operating to demoralize the market for high grade fruit. Twenty-five per cent of this season's shipments will amount to three

million boxes of fruit which really ought to be kept at home. Adding to this the one and one-third millions of the dump pile we have available for fruit product manufacture four and one-third million boxes, or 172,000 tons of fruit.

The question naturally arises: To what extent is this available fruit being utilized for the manufacture of products? I have undertaken to collect data on this subject by sending out a questionnaire to all of those, who, so far as I knew, were supposed to be operating on a commercial scale. The information thus obtained was very fragmentary and unsatisfactory, but I will attempt to summarize it for you.

Twenty questionnaires were sent out and only ten replies received. Of these ten, two reported that they were still in the experimental stage and not yet producing anything.

One firm reports that it is finding a larger demand than it can supply for bottled orange juice, natural concentration. Two other concerns signify their intention of bottling orange juice in the near future.

One company is producing concentrated orange, grapefruit and lime juices for the first time this season. They report a ready sale for their product and estimate that they will use about fifteen carloads of fruit this season. One other company is planning to produce concentrated juice.

Grapefruit juice is being produced by two different concerns, using a total of about twenty carloads of fruit. Another company expects to enter this field.

One company reports the manufacture this season of 10,000 cases of canned grapefruit, utilizing 20,000 field boxes,

or about 70 carloads of fruit. At least one other company expects to begin canning next season.

One firm reports a production of 30,000 pounds of orange and grapefruit jam.

Two companies report crystallized grapefruit peel produced to the amount of 5,200 pounds. I am sure that there is a large amount of this commodity produced by various small scale workers, which is not covered by this report.

Orange marmalade and grapefruit marmalade are manufactured by one factory at the rate of one carload per week, requiring 150 boxes of fruit. One other correspondent reported production of marmalades but failed to state quantities. Doubtless there are others.

One concern expects to manufacture orange oil and citric acid at some future date.

As already stated, the above report is by no means complete since some of those known to be engaged in fruit product work failed to report, and doubtless some were overlooked in sending out the questionnaire. However, it does show plainly that we have scarcely scratched the surface yet. We estimated that 172,000 tons of fruit were available this season for manufacture into products and our survey of the situation shows that considerably less than 2,000 tons are actually being used for this purpose.

Of course we all understand the reasons for this situation—the difficulties both in manufacturing and marketing which are encountered by those who enter this field. I would not wish to give the impression that, because there are 172,000 tons avail-

able, we are criminally negligent in not using them. In fact it is far better that this fruit be not used at all than that it be made into products which are inferior and unmarketable. Such products bring nothing but loss and disappointment to their maker, disgust to the consumer and general discredit and injury to the entire fruit products industry. Quality *must* precede quantity, and I have assembled the quantity figures given in this paper merely to show what a large opportunity awaits the manufacturer of quality products.

In this connection I cannot do better than to read one of the letters received from a well known and successful manufacturer in reply to my questionnaire. He says:

"Replying to your letters of April 12th and 15th, will say that I shall be glad to co-operate with you in any way that will tend to improve the status of fruit products manufacture in Florida. However, if you will pardon me for differing with you, I do not think your questionnaire is along the right lines. Your questions relate entirely to quantity, and quantity of the quality that is made at present is already excessive. What the State should interest itself in is quality, and the quantity would take care of itself. What Florida should do, is to restrain in some manner the low-grade stuff that is shipped out of the State. On a recent trip that I made to Tampa, Tarpon Springs, Clearwater, etc., there were three busted concerns represented on the shelves of the majority of stores that I visited. These concerns busted not for lack of quantity,

but for lack of quality. The merchants of this State are very kindly disposed towards those making efforts in this line. They buy once, but they do not ever have to buy any more. This is the present status of the fruit products manufacture in Florida in a nutshell."

My paper would not be complete without venturing a few remarks and guesses regarding future development.

Practically all of those answering my questionnaire displayed a most cheerful attitude toward the future. They are making plans to increase their output of the products already established and many expect to introduce new products. Of these new products the most interesting and outstanding one is canned grapefruit. Never in the history of Florida fruit products has anything aroused such a widespread interest and promised so much as a real quantity outlet for our off-grade fruit. For the benefit of those not already acquainted with this product, I will say that the grapefruit is peeled, the seeds and bitter membranes removed, and the "meats" thus obtained are packed in tin cans, like peaches, tomatoes and other such products.

Two plants have been producing canned grapefruit in Porto Rico for about two years with marked success. One factory has been operated in Florida during the present season. Many experiments are being carried on by different workers at the present time and it seems safe to predict that canned grapefruit will soon be a staple article of commerce along with the sliced pineapple and many other delicious things that come in tin cans.

But in discussing this subject I cannot refrain from repeating what was said above about quality vs. quantity. Canned grapefruit offers dazzling allurements, but it will be an easy matter to kill the goose that lays the golden egg. It is greatly to be feared that many, in their haste to get in on the ground floor of this new opportunity, will throw caution to the winds and flood the market with an inferior product, greatly retarding the growth of the new industry. It is not the least bit

safe to make assumptions or draw hasty conclusions regarding any of these citrus fruit products and no one is justified in entering this field without first making careful experiments and tests, including ageing tests, so that he knows what he is doing.

In conclusion, I would give it as my humble opinion that the Florida fruit products industry is today on a better footing, with more hope for the future, than at any time in the past.

Standardization of Nursery Inspection

F. M. O'Byrne, Gainesville

In 1915, Florida inaugurated a new idea in nursery inspection methods. It was based on the fact that no inspector in the world can tell infallibly whether or not a plant is absolutely free from pests. Florida's new departure consisted in requiring the nurserymen to file with the nursery inspector a complete record of their shipments so that the State would have this record instantly at hand should an outbreak of some serious pest occur in some nursery. Recognizing the great advantage of this system, Mississippi and South Carolina adopted the Florida system in toto.

It soon became apparent that there was need of standardization of nursery inspection methods among the various states. Heretofore each state has had its own set of requirements, differing in many unimportant details. This has resulted in the utmost confusion. It requires a whole book of tiresome, tedious instructions to make these requirements clear to transportation agents and nurserymen. So many and confusing have been the rules that nurserymen have not complied and transportation officials have been unable to co-operate properly. Neither could figure out what the requirements in another state were.

Obviously if we are to receive the full benefit of nursery inspection in the various states, we must standardize our re-

quirements so far as possible so that the transportation agents can co-operate. Florida, therefore, broached the matter at a meeting of southern horticultural inspectors and the plan was well received, the speaker being appointed chairman of a committee to suggest ways and means. This committee reported at Atlanta last February. Besides the chief inspectors of most Southern States, there were in attendance a number of prominent Southern nurserymen and the president of the Georgia peach growers organization. Great progress was made and the Florida plan was accepted by all in principle, but certain details could not possibly be agreed upon at that time.

It was therefore proposed that we adjourn, to meet again in some central location the last of May or the first of June, with the understanding that the four great parties at interest, the inspectors, the growers, the nurserymen and the transportation authorities, all be represented at this meeting.

We would ask, if it be the will of the society, that a motion be passed endorsing the movement for standardization, approving the Florida system of nursery inspection, and authorizing the president to attend the forthcoming meeting, as the representative of this, the largest and best growers' organization in the South.

Correlation Between Sun Spots and Florida Freezes

J. R. Watson, Gainesville

A year or so ago the writer ran across the chart of sun spot maxima which we have before us. This is copied from Elsworth Huntington's famous book on "Climate and Civilization." The correlation between certain dates on this map and certain Florida freezes at once caught the reader's eye. The result was that we looked up the records of Florida freezes, chiefly in the address of Geo. R. Fairbanks at the meeting of this society in Jacksonville in 1895, and reported in Bulletin No. 34 of the Florida Agricultural Experiment Station for the early freezes, and have plotted these freezes on this chart.

In talking over this subject with Mr. W. W. Yothers this spring the reader discovered that Mr. Yothers had worked and read along these same lines. The result is this paper, which owes much of its data to suggestions from Mr. Yothers.

It has long been recognized that sun spots, which are disturbances in the sun's atmosphere, similar in many respects to the areas of low pressure of cyclones in our own atmosphere, have an effect on the climate of the earth in that they increase the storminess of the surface; that is,

they increase the frequency and intensity of our cyclonic storms and as we well know, it is the areas of high pressure following these cyclonic storms which cause our Florida freezes. An area of low pressure traveling across the country from west to east usually brings rain and is followed by an area of high pressure and cold weather which, during winter time, usually enters North America from British Columbia or Washington, dips down to the southeast and then frequently turns to the northeast and passes off into the Atlantic, bringing with it cold weather and, if sufficiently intense, a freeze.

It has also long been recognized that sun spot maxima increase the unevenness of the distribution of the heat of the earth's surface. For instance, it is a well known fact that the west coast of any continent is warmer than the corresponding east coast in the same latitude by many degrees. We can compare, for instance, California with the Carolinas. During sun spot maxima this difference in temperature between the two coasts is increased. This explains why it very seldom happens that we have a freeze the same year that California has one. The same cause which makes California particularly liable

to freeze makes Florida less liable and vice versa.

Let us emphasize the fact pointed out by Prof. Brooks that winters with the maximum number of sun spots are not only somewhat colder in average temperatures but are frequently winters with uneven temperature, with great extremes of heat and cold, warm periods alternating with cold periods. It is this kind of a winter of course, that does the damage, not so much the degree of cold as the alternating of cold periods with warm periods. Temperatures during such winters are more variable. We might call them variable winters.

Sun spots have a tendency to occur in cycles from 9 to 13 years with an average of 11 years. Furthermore, there is a greater cycle from 80 to 100 years. There are many periods of sun spot areas which have not brought freezes in Florida. Some of the very highest sun spot maxima have not brought freezes. On the other hand, with one or two exceptions, all the freezes we have had have occurred during such periods of maximum sun spots, and with only one or two exceptions the period of low sun spot activity have been periods without severe freezes in Florida. There is apparently a strong correlation between freezes and sun spot maxima. It would seem that the correlation is altogether too close to be due to accident. There must be a relation of cause and effect between the two, or perhaps both freezes and sun spots are due to the same common cause.

It is not our purpose to predict freezes for Florida but rather to indicate the

periods of danger which are recurring on an average of about every 11 years, or perhaps to put it better, to call attention to the fact that there are periods of six or seven years' duration occurring every 11 years on an average which would seem to be pretty safe. Although this would seem more or less speculative, it would seem that the correlation is close enough to be of some value to Florida growers, as fore-warned should be fore-armed, to some extent, particularly as sun spots can be observed throughout the year and it would be possible to give warning as to these dangerous periods. For instance, the Weather Bureau has pointed out that the unusual weather which dominated the winter of 1917 began early in August; that is to say, the winter type of cyclones and anti-cyclones began to enter the country from the northwest as early as the first week in August, which is months earlier than usual.

Perhaps the only conclusion we are justified in drawing from this is that there are certain periods which can roughly be predicted during which one may feel reasonably safe from freezes in Florida. We are now in such a period, and there are periods during which the reverse is true, and the grower should perhaps take particular pains to apply the usual precautions against cold weather during these periods. The next period of maximum sun spot activity would be expected to culminate about 1929, 11 years after 1918, the last maximum.

Brooks has shown that during these periods of maximum sun spots that the Gulf Stream is warmer than usual but

the Gulf of Mexico is colder. This has a tendency to draw the areas of high pressure farther south, so we may say that during areas of high maximum sun spots there are three forces working for cold snaps in Florida. (1) The average temperature in winter is actually lower than normal. (2) The variability of range in temperature between the highs and lows is greater than in normal years. (3) There is a tendency to draw these cold areas farther south than during normal periods. We are well aware that the correlation here is not close enough to warrant any hard and fast prediction. It would seem, however, it is close enough to indicate what might be called strong possibilities. Leastwise, it was thought that the matter was of such importance to the citrus industry of Florida that the facts as they appear should be brought to the attention of this body of growers.

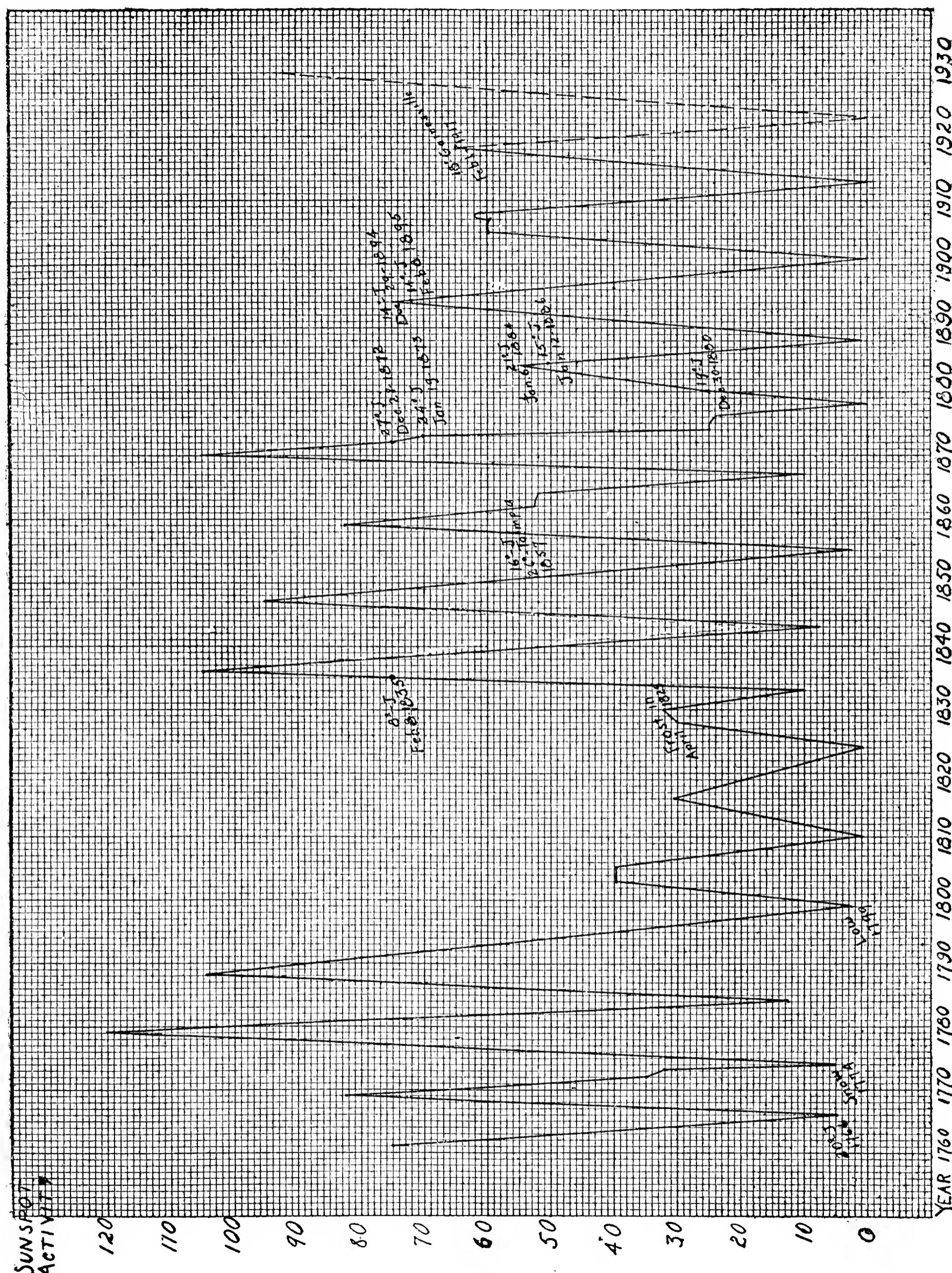
The earliest freeze recorded (1766) occurred during a period of low sun spot

activity. A temperature of 20 degrees was reported near Jacksonville, but this was, of course, not an official record. We are told that citrus trees at St. Augustine were in fruit two years later, so it could not have been a very severe freeze.

Of the six most severe freezes recorded for Florida (a temperature of 18 or lower) all occurred during periods of high sun spot activity. If we call 20 degrees or lower a severe freeze there have been eight, seven in periods of maximum sun spots. If we adopt 25 degrees or lower as the standard freeze, there have been fourteen, ten during periods of sun spot maxima and four during periods of low sun spot activity.

On the accompanying chart the sun spot activity is indicated by the solid line. On this line are indicated in dots the freezes, and opposite them the lowest temperature. In most cases the temperatures are those of Jacksonville but a few marked "G" are of Gainesville and one of Tampa.

The dotted line on the chart indicates what we may expect in sun spot activity during the next few years.



Annual Reports

REPORT OF AUDITING COMMITTEE

We, the undersigned, your auditing committee, beg to report that we have carefully examined the books of the Sec-

retary and Treasurer, finding them correct. E. W. BERGER, *Chairman.*
R. E. LENFEST.

REPORT OF SECRETARY

Cash Account to May 4, 1922

Receipts	Expenditures
Balance from 1921 ----- \$1,987.48	
Receipts from patron memberships, 6 at \$100.00 ----- 600.00	18 bills totaling ----- \$ 564.83
Receipts from life memberships, 2 at \$25.00 ----- 50.00	7 remittances to Treasurer, totaling -- 3,865.87
Receipts from perennial memberships, 6 at \$5.00 ----- 30.00	
Receipts from donations to deficit of 1920 ----- 325.00	
Annual membership fees, sale of back reports, etc. ----- 1,438.22	Total ----- \$4,430.70
Total -----	BAYARD F. FLOYD, <i>Sec.</i>
\$4,430.70	

REPORT OF TREASURER

Treasurer's Account on May 4, 1922

Receipts	Feb.	9, C. G. Atwater (perennial) ---	5.00
1921	Feb.	25, Loan from Treasurer -- ---	324.29
April 12, To balance in treasury ----- \$ 79.38	Feb.	27, E. O. Painter Estate -----	370.00
May 22, Secretary Floyd ----- 1,000.00	Feb.	28, Secretary Floyd (contributed) -----	100.00
May 30, Secretary Floyd ----- 200.00	March	8, President H. H. Hume (contributed) -----	50.00
May 30, Secretary Floyd ----- 15.00	March	9, H. W. Townsend's fee -----	1.00
July 25, Secretary Floyd ----- 987.48	April	25, B. L. Hamner, patron fees --	100.00
Aug. 25, Secretary Floyd, ----- 241.34	April	26, Secretary Floyd -----	500.00
Nov. 19, Interest on bonds ----- 51.87	May	1, Mr. and Mrs. Mendell's fees --	2.00
Nov. 19, Interest ----- 13.78	May	4, Secretary Floyd -----	937.05
Dec. 28, S. C. Warner for P. H. R. -- 100.00	May	1, Interest --- ----- .97	
1922			
Jan. 25, Secretary Floyd ----- 100.00			
Feb. 9, C. E. A. Hale's fee ----- 1.00			
			\$5,180.16

Credits

1921

June 4,	By E. O. Painter Ptg. Co.	\$ 931.64
Aug. 13,	By Patron fee account	600.00
Aug. 13,	By Perennial fee account	23.00
Aug. 13,	By Balance patron fee acct.	18.38
Aug. 13,	By Telegram	.50
Aug. 25,	By Patron account	100.00
Aug. 25,	By Perennial account	25.00
Oct. 20,	By Stenographer's bill	40.00
Nov. 23,	By E. O. Painter Ptg. Co.	600.00
Nov. 28,	By E. O. Painter Ptg. Co.	239.00
Dec. 25,	By Patron's account	100.00
Dec. 25,	By Secretary Floyd	100.00
Feb. 13,	By Secretary Floyd	6.00
Feb. 25,	By E. O. Painter Ptg. Co.	324.29
Feb. 27,	By Return Hart Loan	324.29
March 20,	By Secretary Floyd	1.00
April 2,	By Telegram delivery	.50
April 25,	By Postage	1.00
April 27,	By Secretary Floyd	100.00
April 27,	By Volusia Co. Bank & Trust Co.	500.00
May 4,	By Balance	1,145.56
		\$5,180.16

Patron Fee Account

1920

July 24,	To Secretary Floyd	\$1,600.00
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1921

Aug. 13,	From cash account	600.00
Aug. 25,	From cash account	100.00
Nov. 28,	S. C. Warner	100.00
		\$2,400.00

Credits

U. S. Bonds and Their Cost

1920		
May 12,	By Third Liberty Loan bonds	\$ 988.62
Oct. 12,	Victory Loan Bonds	593.00

1921

Aug. 25,	Liberty Loan Bonds	711.50
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1922

May 1,	Balance on hand	106.88
		\$2,400.00

U. S. Bonds and Their Par Value

1920		
May 12,	Liberty Loan Bonds $4\frac{1}{4}$	\$1,100.00
Oct. 12,	Victory Bonds $4\frac{3}{4}$	600.00

1921

Aug. 20,	Second Liberty Loan Bonds	800.00
		\$ 2,400

Perennial Membership Account

1921		
Aug. 13,	To cash account	23.00
Aug. 25,	Secretary Floyd	25.00
		\$ 48.00

**W. S. HART,
Treasurer of Florida State Horticultural
Society.**

REPORT OF EXECUTIVE COMMITTEE**MEETING OF JANUARY 26, 1922**

The Executive Committee of the Florida State Horticultural Society held its spring meeting in the office of President Hume in Jacksonville on the morning of January 26, 1922. There were present Messrs. Niles, Stirling, Floyd and Hume of the Executive Committee and Messrs. A. A. Coulter and Dr. David Fairchild as visitors.

The minutes of April 14, 1921, were read and approved. The finances of the Society were discussed and contributions

asked for to cover a deficit from 1920.

A resolution was presented and passed to ask the Society to raise the annual membership fee from one dollar to two dollars.

The time of the meeting of the Thirty-Fifth Annual Session was set for May second to fifth inclusive.

A resolution was presented and passed to ask Mr. M. G. Campbell of Lake Wales to act for the Society and invite the former inspectors of the State Plant Board who were active in the eradication of Cit-

rus Canker from the citrus groves of the State, to meet with the Society at Lakeland.

After discussion of the program, the meeting adjourned.

MEETING OF MAY 4, 1922

A meeting of the Executive Committee of the Florida State Horticultural Society was held in the lobby of the Thelma Hotel, Lakeland, on the morning of May 4, 1922. There were present Messrs. Niles, Stirling, Hart, Hume and Floyd. The

minutes of the meeting of January 26, 1922, were read and approved.

The finances of the Society were discussed in detail. A number of resolutions for presentation to the society were considered and ordered presented.

A resolution was presented and passed authorizing the Secretary to publish the Proceedings of the Thirty-Fifth Annual Meeting in numbers of 100 in excess of the actual membership at time of going to press.

There being no further business the committee adjourned.

Election of Officers

On Thursday evening, May 4, 1922, the following officers were elected by the Society to serve during the calendar year of 1923.

President—L. B. Skinner.

Vice Presidents—Wm. J. Krome, S. F. Poole, A. H. Brown.

Secretary—Bayard F. Floyd.

Treasurer—L. D. Niles.

Executive Committee—Frank Stirling, B. L. Hamner, H. Harold Hume.

Selection of Meeting Place for 1923

Official invitations were extended the Society by St. Petersburg, Eustis, Jacksonville and Orlando, to hold its Thirty-Sixth Annual Meeting in their cities. After much discussion, during which the

representatives of Orlando pledged themselves to secure several patron members for the Society, it was voted to hold its 1923 meeting in Orlando.

Resolutions

COMMITTEE ON INSTITUTIONS

Resolved: That the Florida State Horticultural Society in session at Lakeland, Florida, May 4, 1922, appreciating the immense value of the results already obtained through the aid of the United States Department of Agriculture specialists engaged in investigating methods for citrus fruit improvement by selection and breeding, the control of insect pests and diseases, together with problems related to storage and decay in transit, all of which work has for its end a greater profit to the grower and a reasonable cost to the consumer, do urgently

request that the budget for the U. S. Department of Agriculture provide for a more adequate support through increased appropriations, to make effective these lines of work; and that a special committee of three be appointed by the President of this Society to take steps with the proper authorities to secure such increased appropriations for the investigations concerned as are warranted by the great importance of the industry and the demonstrated value of the work.

Passed.

NURSERY INSPECTION

Resolved: That the Florida State Horticultural Society approves of the practices of the Florida State Plant Board, as carried out in its nursery inspection work in Florida.

That it approves of the movement started by that Board to secure the establishment of standardized methods in nur-

sery inspection practices in the Southern states.

And that the President of this Society shall be authorized to attend the coming meeting called to consider standardization of these practices, as its representative.

Passed.

AMENDMENT TO CONSTITUTION

(Amending Article 2)

Whereas, The fee of one dollar for annual membership in the Florida State

Horticultural Society does not provide sufficient funds to pay for the publication

of the Proceedings of the annual meeting and take care of the other activities of the Society,

Therefore, Be It Resolved, That Article 2 of the Constitution be changed to read as follows:

"Article 2. Any person or firm may become an annual member of the Society by subscribing to the Constitution and paying two dollars. Any person or firm

may become a perennial member of the Society by subscribing to the Constitution and paying the annual dues five or more years in advance. Any person may become a life member of the Society by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a patron member of the Society by subscribing to the Constitution and paying one hundred dollars."

Passed.

STATE FLOWER SHOW

Whereas, Florida is the Land of Flowers;

Whereas, There is growing interest in the propagation of flowers and foliage plants, and an interest in the beautification of the home gardens and of the highways;

And Whereas, Numerous successful local flower shows have been held at points in the State;

Therefore, In order to unify the efforts for the beautification of the gardens and highways of the State, and to foster an interest in the growing of flower and foliage plants for this purpose,

Be It Resolved: That the President of this Society appoint a committee of three members to meet with similar committees from the Florida Federation Women's

Clubs, and the Florida State Florists Association, to discuss the feasibility of and decide concerning the holding of a State Flower Show; that in case it is decided to hold such a show, this committee shall act for the Society under the direction of the Executive Committee of the Society; and that the Executive Committee shall give this committee full co-operation in carrying out the Society's part in the co-operation with the other organizations.

Be It Further Resolved, That the Secretary of this Society shall address a letter to the President of each of the organizations mentioned above, requesting their co-operation and the appointment of committees to meet with the committee from the Florida State Horticultural Society.

Passed.

Final Resolutions

Whereas, There will be a hearing in Washington, D. C., on May 15, 1922, before the Federal Horticultural Board, at the request of persons and agencies who oppose the continued enforcement of Quarantine No. 37, and who desire that this Quarantine be repealed, and

Whereas, The repeal or modification of this quarantine would be inimical to the horticultural interests of Florida and the entire nation, therefore

Be It Resolved, By the Florida State Horticultural Society in its Thirty-Fifth Annual Session, at Lakeland, Florida, held May 4, 1922, that it is strongly opposed to the repeal or any modification of Quarantine No. 37 which will in any way interfere with its present effectiveness.

Be It Further Resolved, That the President, or an alternate named by him, be instructed to attend this hearing as a representative of this Society.

Resolved, That the Florida State Horticultural Society extend their appreciation to the members of the Lakeland Chamber of Commerce for handling the local arrangements of the meeting and furnishing a convention hall and motorcade, also a banquet to the Citrus Canker Inspectors and for their courtesies to the members of the Sorosis Club for decorating convention hall with flowers each

day; to Mrs. George Peterkin of Lakeland, Florida, for her untiring efforts in the success of this meeting; to all of the citizens of Lakeland for their hospitality and support; to the Lake Wales Chamber of Commerce for the invitation to the fish fry following the adjournment of the Convention; to the newspapers in Lakeland and also throughout the State, for their co-operation in keeping the activities of the Florida State Horticultural Society before the public; to the speakers for their assistance rendered in making the programme interesting and instructive; to the officers for their time and effort in arranging the programme and carrying on the work of the Society.

Whereas, So long as free range for live stock is permitted in Florida the horticultural and agricultural development of the State will be greatly handicapped, and the beautification of our highways and lawns with shrubbery and flowers cannot be accomplished, therefore,

Be It Resolved, by the members of the Florida State Horticultural Society in the Thirty-Fifth convention at Lakeland, on May 4, 1922, that we urge all who are in sympathy with the development of the State's resources to work for enactment of a law that will permit the people in any county to vote for a stock law which will require live stock owners to keep all of

their cattle, hogs and other domestic animals confined in pastures or enclosures, and make the live stock owners liable for damages to persons or property of others within that county, and be it further

Resolved, That candidates for the legislature be requested to state their position on this subject before the primaries in order that all the voters may know what to expect at the next session of the legislature of those who are elected.

Whereas, The available supply of timber in the United States is being cut about four times as rapidly as new timber crops are being grown, and the marketing of fruits and vegetables grown in Florida is dependent upon an adequate supply of crate material for future years, while the development of the State's resources will require large quantities of lumber for res-

idences and other building purposes, and

Whereas, Nature in Florida is being greatly handicapped in providing for the future requirements through the frequent burning of the woods and denuded areas by the open range cattlemen to get a little green grass for their stock resulting in destruction of untold quantities of merchantable timber and prevention of natural reforestation of cut over lands, therefore be it

Resolved, That the Florida State Horticultural Society, in its Thirty-Fifth Annual Convention at Lakeland on May 4, 1922, recommend the enactment of a law creating a State forestry commission authorized to inaugurate a reforestation program and charged with enforcement of laws to prevent setting out of fires on any property other than that of the owner.

M. G. CAMPBELL, *Chairman.*

W. W. YOTHERS.

A. A. COULT.

Resolutions Committee.

Report of Committee on Necrology

W. L. Floyd, Chairman

CHARLES KENNEDY McQUARRIE

One of the outstanding figures in Florida agriculture during the past 20 or more years, has been Charles Kennedy McQuarrie. This genial Scotchman has traveled the length and breadth of the State many times, giving advice, counsel, and encouragement to the inexperienced, unsuccessful seeker after better methods in agricultural and horticultural lines, and keeping closely in touch with well informed and successful growers, that he might encourage others to do as they were doing.

He was born in Glasgow, Scotland, October 12, 1851, and died in harness as State Agent of Farmers' Co-operative Demonstration Work at Gainesville, November 16, 1921, thus rounding out an active life of more than three score and ten years.

He was a direct descendant of the McQuarries of Ulva's Isle, Scotland. He received his early educational training under a "Dominie," and later completed his education in Glasgow, where he attended a technical college. In his early manhood he was a cloth manufacturer in his native country, but suffering financial losses due to a bank failure, he came to America.

He settled near DeFuniak Springs in

Walton county in 1888, and there for 25 years was a "real dirt farmer." It was there in 1893 he raised the first velvet beans for feed and for turning under as a soil improver that we have any account of in Florida. He found these beans growing as ornamental vines on the front porch of Dr. Felton, a retired Methodist minister, and with that quickness to see agricultural possibilities in new plants and energy in trying them out so characteristic of him, he demonstrated the value of this plant now so important in Florida.

He practiced diversified farming and proved what so many are slow to learn, that this is far wiser and safer than the one crop method. He carried on various fertilizer experiments on his farm and learned much about the value of fertilizer on Florida soils and desirable mixtures for different crops.

He maintained a good home orchard, was the first to grow Elberta peaches in North Florida for shipment to Northern markets, and his keen eye was the first to detect the presence of San Jose scale on Florida fruit trees.

He was appointed assistant superintendent of farmers' institute work in 1909, which position took him before farmers'

meetings and organizations in various parts of the State, where from experience as well as knowledge and observation he told Florida farmers how to improve their methods and attain greater success. In the years 1913 and 1914 he was County Demonstration Agent in Escambia county, where methods he had successfully practiced in the nearby county of Walton aided him in giving the most helpful practical assistance. He was elected in 1914

as State Agent, Farmers' Co-operative Demonstration Work in charge of county agents, which position he held at the time of his death.

We shall all sadly miss his genial countenance, cordial greeting and his rugged Scotch characteristics, but feel that the work he has done will live on in the renewed effort and increased success of those who follow the principles he so ably set forth.

ALFRED JOHN HOLWORTHY

Alfred John Holworthy was born February 22, 1867, on board a vessel in the English Channel. His early life was spent in England, but when quite a young man he came to the United States, and after some business experience he entered the ministry of the Episcopal church. He served various charges in the West, his last being that of rector of the Church at Corpus Christi, Texas.

Mr. Holworthy threw his whole strength of body and mind in what he undertook, and so earnestly did he devote himself to the work of his holy office, that he suffered a nervous collapse, which made it necessary for him to retire from the ministry. While seeking to recuperate he came to Florida. He was first connected with the Brooksville Hammock Land Company at Brooksville. In the fall of 1911 he moved to Lakeland and became business manager of the Lakeland Evening Telegraph. After serving for over a year in this capacity he was selected as secretary of the Lakeland Chamber of Commerce, and he labored for nearly 10

years in this capacity most efficiently and successfully for the upbuilding of Lakeland and the surrounding country. The crowning achievement of his career of public value for the city and country, was in connection with the building of Polk county's magnificent roads. In the campaign for bond issue his voice was heard in every precinct. He furnished the facts and figures, which enabled other able advocates to present this great proposition to the people in such a way as to bring about its acceptance.

The high tension under which this and other work was done, his conscientious adherence to the following out of the minutest details, brought on again a nervous breakdown, which necessitated the relinquishment of his work as secretary of the Chamber of Commerce. One of the last undertakings, which he aided in putting through for Lakeland, was in securing the location of Southern College there. It was done just before he resigned his position and went to the mountains of

North Carolina hoping to rebuild his shattered system.

Mr. Holworthy was a man of versatile ability, which had he chosen to exercise in the commercial or industrial world, would undoubtedly have brought him material success. He was much loved in Lakeland

and his work was recognized throughout the State, so that when he rose to speak in any gathering he was listened to with attention and respect. He died February 28, 1922, and was buried in Corpus Christi, Texas.

D. T. McCARTY

By the death of D. T. McCarty on April 14, 1922, Florida lost one of its ablest horticulturists and most reliable and substantial citizens, and St. Lucie county and Ft. Pierce have lost one of whom they were justly proud.

Daniel Thomas McCarty was born in Vinton, Iowa, March 31, 1880, the son of C. T. McCarty, who was the third president of the Florida State Horticultural Society. He was therefore 42 years old at the time of his death. In 1898 he graduated from the Tilford Academy at Vinton, Iowa, and moved immediately to Ft. Pierce, Florida, where he spent the remainder of his life.

On October 25, 1905, he was married to Miss Frances Lardner Moore, at Charlotte, N. C., and to this union six children were born: Anna Lardner, an infant, Daniel Thomas, Jr., Brian Kenelm, John Moore, and Evelyn Wallace. He is survived by all of the children, except the infant, who preceded him.

Mr. McCarty was one of the largest independent fruit growers in Florida.

His magnificent grove west of Ft. Pierce is the result of his labor and planning and is one of the finest citrus groves in the world. For nearly two years he has been president of the Ft. Pierce Bank and Trust Company, having served as a director since 1907. For a number of years he has also been a director of the East Coast Lumber and Supply Company and of the Dade Lumber Company of West Palm Beach. He was a progressive citizen, a careful and successful business man, devoted to his home and business, city and county and unceasingly strived to make all of his business enterprises uniformly successful. One of his striking characteristics was his determination to stick by his friends. Always loyal to his own, he drew close to him friends and admirers by the hundreds. His devotion to his family and church was often noted, and his very generous nature never permitted him to refuse an appeal for aid.

His untimely death leaves a host to mourn his departure and to sympathize with the stricken family.

HARVIE EARNHARDT HEITMAN

Harvie Earnhardt Heitman was born at Lexington, North Carolina, December 17, 1872, where he lived until about 16 years of age. He was educated in the private schools of his native town.

Mr. Heitman came to Florida in 1888, and was employed by his great-uncle, M. A. Parker, who conducted a general store with a small bank in connection in Fort Myers. He soon became manager of the business and by close application, business sagacity and an appreciation of Florida's possibilities he became one of the most successful business men in South Florida.

He purchased the land, cleared and planted the Flowerree Groves of 600 acres in 1900, which was at that time the largest citrus grove in the State. He managed this for 21 years, and owned and managed several other citrus groves. He was regarded as one of the best informed men

on citrus culture and marketing in the State.

He led a most active life, seemed to be almost untiring in his efforts and was interested in a surprisingly large number of business enterprises. As merchant, banker, builder, real estate owner and developer, fruit grower and promoter of enterprises for the upbuilding of his town, county and State, few men have accomplished more for the material advancement of Florida. He was a real source of information and inspiration to tourists and other visitors to his locality. He interested capitalists in investments and spent liberally of his own funds for civic and general improvement.

He died at Fort Myers April 17, 1922. His marked success in a life of less than 50 years is an evidence of what may be accomplished in this "Land of Flowers."

LOUIS D. JONES

Louis D. Jones was born near Vinton, Ohio, in the year 1864. He took up railroading in his early life, advanced rapidly and became chief dispatcher of the Big Four in Ohio. In this capacity he came to Sanford, Florida, in the year 1901. Looking abroad he saw a great future for citrus growing, invested in citrus property, and after becoming a grower learned from experience some of the difficulties in marketing the fruit. He became a dominating figure in organizing the Florida Citrus Exchange, and for a few years he was manager of the Orange County Sub-Exchange. His marked ability here caused him to be selected as general manager of

the Florida Citrus Exchange, which position he held from 1913 to 1916.

Returning to his grove at Winter Haven after retiring from the management of the Exchange, he made his influence felt in all that made for the development and advancement of his community. He lived to spend and be spent for the good of others.

He was a man of enthusiasm, which was revealed through all his activities, railroading, lodge, club and citrus industry. This element never waned, but rather enhanced with age. He died at Winter Garden, March 14, 1922.

JAMES A. HARRIS

James A. Harris has been called the father of the orange industry in Florida. He was born at Yalaha, on Lake Harris, May 5, 1847. He became interested in early life in citrus growing, and was a leader in the development of the famous Harris and Bishop grove on Orange Lake, one of the most successful and best known citrus groves of the early days in Florida.

He is generally credited with having introduced Florida grapefruit into Northern markets.

He was a prominent factor in the up-building of Ocala. He was for many years the proprietor of the Ocala House and the Montezuma Hotel.

He died at Crystal River, December 30, 1921, at the ripe age of 74 years.

GEORGE EARLE MOORE

Dr. George Earle Moore was born in Jefferson county, Wisconsin, May 18th, 1860. Died in Ironwood, Michigan, March 3d, 1922. He graduated from Rush Medical College, Chicago, in February, 1883. For a great many years he lived in Oconomowoe, Wis. He became interested in contagious diseases and desiring a larger field for his work moved to the iron mining region of Northern Michigan, settling in Ironwood in 1900. He was soon made County Contagious Physician, holding that office almost to the time of his death. He carried the county through several severe epidemics of smallpox, without the loss of a life. When he died he had the wonderful record of never having lost a case of smallpox, pneumonia or scarlet fever.

He was of a genial nature, a loyal friend and a great lover of children.

About twelve years ago, he became greatly interested in Florida, believing it to be the coming State of the Union. He

purchased a small tract of land west of Delray, in Palm Beach county. Had it cleared and used for a truck garden. When the soil became sweetened, he planted several acres to citrus fruits which justified his faith in the soil. He took great delight in treating his friends to fruit from this small grove, and had planned to retire from the practice of medicine this fall, and make his home on this land. Had the plans for his house all drawn and was looking forward with pleasure to the time when he could spend his leisure among the orange trees and flowers.

Death came very suddenly of heart failure after an illness of only three days.

During the war he served on the Draft Board, which with his regular work overtaxed his strength.

He was laid to rest in the Riverside Cemetery, Ironwood, where the little children, whom he loved, keep fresh flowers on his grave.

ANDREW H. YOUNT

Andrew H. Yount was born in Lafayette, Ind., September 17, 1852. He graduated from Depauw University, where he studied law, and was admitted to the bar and practiced his profession until 1884, when he went to Chicago.

He became connected with the Chicago Daily News in 1884, as political editor, and for four years city editor.

In 1906 he was appointed secretary to the president of the County Board, which position he retained until ill health compelled him to come to Florida.

He purchased a tract of land near Fort Lauderdale and set out a grove four years

ago. Here he lived until the time of his death, June 27, 1921.

He was a member of the Press Club of Chicago, Caxton Club, Chamber of Commerce and a very enthusiastic member and supporter of the Florida State Horticultural Society.

He is survived by his widow, who is carrying on the work of the grove, and one daughter, Mrs. L. L. Latorn, of Atlanta, Ga.

He was a collector of first editions, and left a library of rare books, the value of which can hardly be estimated.

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