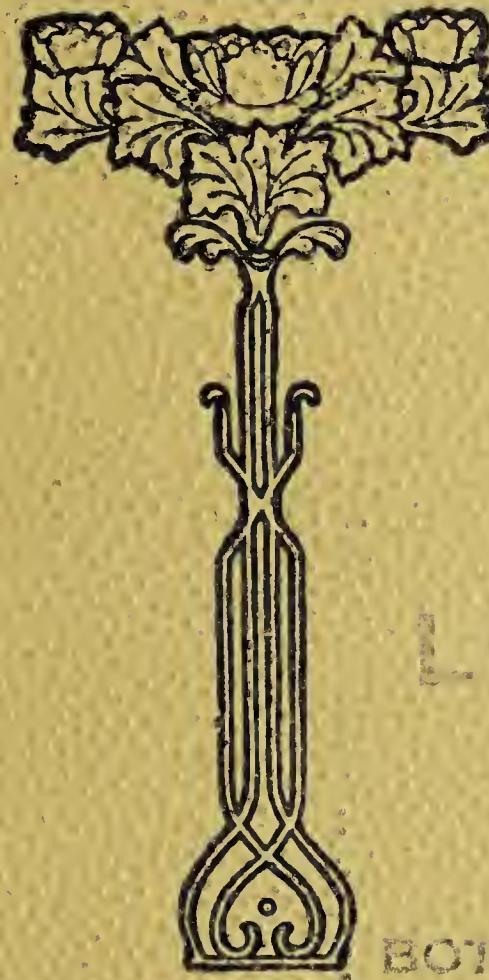


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Vol. 28

PROCEEDINGS OF THE  
FLORIDA STATE  
HORTICULTURAL  
SOCIETY *for* 1915



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PROCEEDINGS  
OF THE  
TWENTY-EIGHTH ANNUAL  
MEETING  
OF THE  
FLORIDA STATE  
HORTICULTURAL SOCIETY  
HELD AT  
TAMPA, FLA., APRIL 13, 14, 15, 16  
1915



COMPILED BY THE SECRETARY  
PUBLISHED BY THE SOCIETY

THE E.O. PAINTER PRINTING CO. DE LAND, FLA. NO 10409

# CONSTITUTION

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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 may become a member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a Life Member of the Society by subscribing to the Constitution and paying ten 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.

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# BY-LAWS

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

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.

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# *Florida State Horticultural Society*

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## **OFFICERS ELECT FOR 1916:**

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### **PRESIDENT:**

H. HAROLD HUME, Glen St. Mary.

---

### **VICE-PRESIDENTS:**

|                            |  |                            |
|----------------------------|--|----------------------------|
| L. B. SKINNER,<br>Dunedin. | MRS. MARIAN A. McADOW,<br>Punta Gorda. | W. J. KROME,<br>Homestead. |
|----------------------------|--|----------------------------|

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### **SECRETARY:**

OKLE C. PAINTER, Jacksonville.

---

### **TREASURER:**

W. S. HART, Hawks Park.

---

### **EXECUTIVE COMMITTEE:**

P. H. ROLFS, Gainesville; E. S. HUBBARD, Federal Point; G. L. TABER,  
Glen St. Mary.

President, Secretary and Treasurer, ex-officio.

## Standing Committees

*Methods of Packing and Shipping Citrus Fruits.*—A. W. McKay, Orlando, Fla.; J. C. Chase, Jacksonville, Fla.; C. W. Barnes, Winter Haven, Fla.; S. C. Inman, Florence Villa, Fla.

*Methods of Handling Citrus Groves.*—B. F. Floyd, Gainesville, Fla.; L. D. Niles, Lucerne Park, Fla.; H. E. Cornell, Winter Haven, Fla.; S. C. Warner, Palatka, Fla.

*Irrigation.*—T. Ralph Robinson, Terra Ceia, Fla.; D. C. Gillette, Tampa, Fla.; F. W. Stanley, Washington, D. C.

*Peaches, Etc.*—W. L. Floyd, Gainesville, Fla.; Ira E. Soar, Dade City, Fla.; A. D. Doty, MacClenny, Fla.; A. A. Lewis, Kathleen, Fla.

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 Floyd, Mrs. B. F., Gainesville, Fla.

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 Story, S. L., Eustis, Fla.  
 Street, A. W., Ormond Beach, Fla.  
 Stuart, Mrs. E. V., Jacksonville, Fla.  
 Sturrock, David, Miami, Fla., Box 400.  
 Sturrock, Wm. D., Miami, Fla.  
 Swartwont, L. G., Fowl River, Ala.  
 Swinburne, G. O., Zephyrhills, Fla.  
 Taber, G. L., Glen St. Mary, Fla.  
 Taber, Mrs. G. L., Glen St. Mary, Fla.  
 Talbott, W. O., Goulds, Fla.  
 Talton, E. H., DeLand, Fla., Box 347.  
 Taylor, B. F., Arcadia, Fla.  
 Taylor, Mrs. B. W., West Palm Beach, Fla., 419 Okeechobee Rd.  
 Taylor, Jas. A., Oak Hill, Fla.  
 Taylor, W. D., Ocala, Fla.  
 Taylor, W. S., Tampa, Fla., R 2, Ybor City.  
 Tenney, F. F., Federal Point, Fla.  
 Tenney, Mrs. F. F., Federal Point, Fla.  
 Tenney, Lloyd S., Orlando, Fla.  
 Tenney, Mrs. Lloyd S., Orlando, Fla.  
 Thalwitzer, Dr. De La Belle, Citrus Park, Fla.  
 Thiele, Albert H., Wauchula, Fla.  
 Thomas, C. E., Tampa, Fla.  
 Thomas, Jefferson, Jacksonville, Fla., Thomas Adv. Co.  
 Thompson, C. H., Winter Haven, Fla.  
 Thompson, Mrs. C. H., Winter Haven, Fla.  
 Thompson, Ralph, Winter Haven, Fla.  
 Thompson, T. R., San Antonio, Fla.  
 Tilden, A. M., Winter Haven, Fla.  
 Tilden, L. W., Winter Garden, Fla.  
 Tillinghast, B. F., Crescent City, Fla.  
 Tillinghast, Mrs. B. F., Crescent City, Fla.  
 Tillinghast, Miss Helen, Crescent City, Fla.  
 Tirrell, D. C., Zephyrhills, Fla.  
 Tischler, P., Jacksonville, Fla.  
 Tison, J. L., Eagle Lake, Fla.  
 Tourtellotte, L. E., Limona, Fla.  
 Tonner, Wm. G., Citra, Fla.  
 Townsend, C. Marot, Phila., Pa., 500 N. Broad St.  
 Townsend, J. L., Wauchula, Fla.  
 Trabert, L. D., Evanston, Ill., 1123 Madison St.  
 Trueman, R. B., Jacksonville, Fla.  
 Truitt, A. M., Brooksville, Fla.  
 Tucker, Helen S., Merritt, Fla.  
 Tucker, R. M., Orange City, Fla.  
 Tucker, W. R., Daytona, Fla., 1023 Terrace Ave.

- Tully, Chas. H., Alliance, Nebr.  
 Turck, Jas., Valrico, Fla.  
 Tussey, H. H., Alva, Fla.  
 Tyler, A., Glen St. Mary, Fla.  
 Tysen, J. R., Jacksonville, Fla.  
 Van Roy, Frederick, Crystal River, Fla.  
 Van Wyck, Miss Mary, Federal Point, Fla.  
 Varn, P. H., Brandon, Fla.  
 Varn, W. R., Kuhlman, Fla.  
 Varnes, D., Crescent City, Fla.  
 Varnes, W. S., Crescent City, Fla.  
 Varney, Burton M., Fellsmere, Fla.  
 Vernon, J. J., Gainesville, Fla.  
 Vertress, J. C., Palatka, Fla.  
 Vogel, Dr. Wm. R., Pinellas Park, Fla.  
 Vollmer, Fred, Davenport, Iowa, 417 Lane Bldg.  
 Von Luttichau, H., Earleton, Fla.  
 Waddell, Edwin A., Miami, Fla.  
 Waite, F. D., Palmetto, Fla.  
 Waldin, B. H., Homestead, Fla.  
 Waldron, Max, Lake Alfred, Fla.  
 Walker, N. S. A., Chicago, Ill., 3404 Southwestern Ave.  
 Walsh, C. A., Ottumwa, Iowa.  
 Walsingham, J. A., Largo, Fla.  
 Wall, A. H., Dundee, Fla.  
 Ward, James W., Winter Haven, Fla.  
 Warren, Geo. E., Miami, Fla. R. F. D. 1.  
 Warner, S. C., Palatka, Fla.  
 Waterbury, W. G., White Plains, N. Y.  
 Watkins, P. C., Sharpes, Fla.  
 Watts, B. F., Leesburg, Fla.  
 Wedding, R. T., St. Petersburg, Fla.  
 Weigle, Theo., Newport, Ky., Southgate & Mt. Pleasant Ave.  
 Weissinger, J. F., Tampa, Fla.  
 Werner, Robert, Davie, Fla.  
 Westbrook, D. J., Clermont, Fla.  
 Whidden W., Useppa Island, Fla.  
 Whipple, Herbert G., New York City, 220 Broadway.  
 Whitaker, S. I., Bristol, Pa.  
 White, Herbert C., Putney, Ga.  
 Wightman, L., Tampa, Fla., Box 576.  
 Wightman, Miss Edna, Fruitland Park, Fla.  
 Wilbur, John E., Winter Haven, Fla.  
 Wilmhurst, H. J., DeLand, Fla.  
 Wilson, C. H., Clermont, Fla.  
 Wilson, Frank T., Tallahassee, Fla.  
 Wilson, L. A., Clermont, Fla.  
 Wilson, R. A., DeLand, Fla.  
 Wilson, Dr. S. S., Ozona, Fla.  
 Wilson, W. N., Gainesville, Fla.  
 Willard, C. W., Westerly, R. I.  
 Williams, S. F., Jacksonville, Fla., 600 Professional Bldg.  
 Winberg, Dr. O. F. E., Silverhill, Ala.  
 Windsor, Lester, Winter Haven, Fla.  
 Wirt, R. D., Crooked Lake, Fla.  
 Withoft, F. W., Fort Valley, Ga.  
 Wolfe, R. L., Glen St. Mary, Fla.  
 Wolfenden, J. L., Evington, Fla.  
 Wood, L. R., Tampa, Fla., Gulf Fertilizer Co.  
 Wooddell, Geo. P., Safety Harbor, Fla.  
 Woodruff Machinery Co., Winder, Ga.  
 Woodruff, Hamilton, Jacksonville, Fla., care J. R. Tysen.  
 Wright, Edgar A., Tampa, Fla., Fla. Grower.  
 Wyckoff, John S., Citra, Fla.  
 Wyman, A. F., Fradentown, Fla.  
 Yoder, S. I., Palm City, Fla.  
 Yohe, J. H., Sarasota, Fla.  
 Yothers, W. W., Orlando, Fla.  
 Young, G. F., McKinlay, Isle of Pines.  
 Zachar, Jerome, Racine, Wis., R. F. D. 1.  
 Zeall, J. B., Sebring, Fla.  
 Zetrouer, R. G., Ocala, Fla., Box 465.

## Proceedings of the Twenty-Eighth Annual Meeting of the Florida State Horticultural Society

When the members voted in 1914 for the next meeting to be held in Tampa, they went with promises of much in store for them, and they were not disappointed. The people of Tampa entertained the Society royally. One very interesting feature of their entertainment was the display they had in the Fair Building of things useful to the grower on his farm. They also gave a very pleasant morning to the members in the way of a vaudeville entertainment and moving pictures. Mr. Hamner was untiring in his efforts to give individual attention to each member and help everyone have a good time.

Never before have the members responded so willingly to help make our Tampa meeting a success. The papers were unusually good, and a full

report was made by each committee. We were unusually fortunate this year in having with us Dr. L. H. Bailey, former Dean of Horticulture at Cornell University. His address was unusually interesting and his pleasant manner charmed his hearers. We hope to have Dean Bailey with us again some time in the future.

When the question of next place of meeting was taken up, Arcadia, Orlando and Fort Myers all sent invitations for the 1916 session to be held with them. When Arcadia invited the Society at Palatka and Tampa took it away from her she said she would win out the next year. This year her delegates came to win, and they won. Therefore the Twenty-Ninth Annual Meeting will be held at Arcadia, Fla., next May.



# Call to Order, Addresses of Welcome and Responses

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## CALL TO ORDER

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L. B. Skinner, Vice-President

*Members of the Florida State Horticultural Society, Ladies and Gentlemen:*

The meeting will please come to order. I am very sorry, and I know you all feel the same way, that Mr. Hume is not here to start this meeting, but I promise you he will be here in a day at the latest; sometime tomorrow, we hope. Mr. Hume is at Tallahassee working very hard and,

as we hope, successfully, to get our crop pest bill passed in order to save the orange and grapefruit industry of Florida from what apparently threatens its utter destruction.

It devolves upon me to take Mr. Hume's place and to call the twenty-eighth annual meeting of the Florida State Horticultural Society to order.

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## ON BEHALF OF THE CITY OF TAMPA

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Mayor D. B. McKay

*Mr. Vice-President, Ladies and Gentlemen:*

I welcome this convention to Tampa with very great pleasure and with the keenest satisfaction. I anticipate that this is to be one of the most important conventions ever held in this state. I have read the subjects that are to be discussed; I have considered the make-up of your Society, and I feel confident I am justified in that prediction.

Tampa feels the keenest interest in your deliberations; our fortunes are bound up with yours. You represent the greatest industry of the state; this is its center. We want you to feel confident of our co-operation, our sympathy and our interest. If there is anything we can do to promote your welfare, to preserve your comfort or your happiness while you are here, you have but to make your wants known. I thank you. (Applause)

## RESPONSE

Dr. W. F. Blackman, Winter Park, Fla.

*Mr. Vice-President, Ladies and Gentlemen:*

I have been asked to respond on behalf of the Horticultural Society to these words of welcome by the mayor of the city, and I do so with great pleasure. These words of Mayor McKay have been friendly, though few; beautifully so; friendly, courteous, hospitable, nor have they been sounding brass and tinkling cymbals. We know they were sincere and honest. They represent the feeling of warm welcome which this kindly city gives to us as representatives of the fruit growing industry of the state. I trust we will act in such a way that we will not appear before the mayor's court and in that way bring disrepute either to the city or the Society. (Laughter.)

This is the Valley of Baca spoken of in the Scriptures—where cigars are made in great abundance. (Laughter.) But it is also a town of very many other interests and enterprises of great importance in many directions. When I think of what Tampa was about thirty years ago; a village, small, straggling, sandy, ill-kept, and compare it with the Tampa of today, with its splendid buildings, its substantial banks, its newspapers, and realize the success that has made these things possible, I rejoice greatly, as a citizen of Florida, because this success belongs not only to Tampa, but to the state

as a whole. We are all of us proud of Tampa; as proud as we are of any city in the state. (Applause.)

I want to tell Mayor McKay—I think he knows it—that we, the horticulturists of the state, are a body of very considerable importance and force, and we deserve these words of welcome. We think well of ourselves. We are the representatives of the most ancient order in existence; we were old before there were any colleges, any doctors, any lawyers or preachers. We are older than the Masons, the Knights of Pythias, the Odd Fellows; not even the churches are so old as we nor so important, in some ways. We trace our pedigree back to Adam and Eve: they were the primary horticulturists, and from their day to ours there has been a splendid line of tillers of the soil on the earth, and we are the last and the best of them, no doubt. We are the primary foundation upon which our civilization rests; upon which nations rest, and cities, and communities, and the whole order of men lives.

Time was when the farmer was laughed at; he was the butt of ridicule; the "rube," the "hayseed," the "horny handed son of toil." He is no longer so estimated. He has developed into a scholar, a scientist, a philosopher. He is coming into his own and taking his proper place among the orders of men on earth.

And this particular Society, as I reflect upon it, seems to me to be worthy of the splendid men and women who have formed it and to whom it belongs. There have never been, so far as I know, a finer company of men and women than those who have gathered from time to time in the meetings of the Florida Horticultural Society.

More than a quarter of a century ago, when men were laying the foundation of the citrus industries in this State, men like Dudley Adams, and Dr. Inman and Lyman Phelps, in the days when I was young and full of enthusiasm, how I loved to listen to them and read what they said in the papers. They were men of competency and culture, and quality and kindness. They are all gone from amongst us, but we still have with us men like our presiding officer, and Mr. Hart, and Mr. Hubbard; some still remain of those fathers to show us what they were like. There were giants in those days; giants in intellect.

There is something about the cultivation of fruit, especially I might say, the cultivation of fruit in Florida, that appeals to what is fine and imaginative in men. There is a certain element of allurement and charm that does not go with all lines of work, by any means. This work is developing a fine quality of men, and I think Florida is to be congratulated upon the kind of citizens who are tilling her fields.

I want to say a word, if possible, of encouragement and inspiration with reference to Florida and its industries. I trust we shall enter upon these meetings with high hope and good cheer. We have

not gotten as much money as we would like out of our fruits this year and we pause appalled before the canker and other threats of disaster. We have always been in a "funk;" always having some great disaster which is about to befall us, and this year we have had our full of that sort of thing.

But how much happier we are than some. At least, we who are tilling with plowshares, are not handling swords. When we are wielding pruning hooks, we are not piercing men's hearts. And we sit down in peace under our own vine and fig tree, instead of devastating the home and the hearth of innocent non-combatants.

The Citrus Exchange states that oranges are coming up a little in the markets, and grapefruit are, also. So I hope we may have a cheerful view of ourselves and our occupation, while we are together here.

When the doctors and friends said to me a little while ago "It is necessary for you to resign the presidency of Rollins College," and after a long struggle of spirit—for I loved the work to which thirteen years had been given—I concluded that this must be, Mrs. Blackman and I sat down together to plan what we should do. We were about to be foot-loose and free; the whole earth was before us. Golden California with its wealth of sunshine, New England with its green fields (and old maids), Sunny Italy, where we had spent many happy days, Germany, now bloody indeed, but with its philosophy, its music and its culture, the mystery of the Orient; wherever we wanted to go, we were free to

go. We thought of these places, and then we said, "We will stay in Florida. We will live here together so long as God gives us to live, and when we shall cease to live on this earth longer, God grant that we may lie down together beneath the pines and sleep until the resurrection."

This decision of ours represented a very real and profound affection for, and belief in, this state and the people of this state. And so, being bidden to give up any considerable amount of work, I bought a four-thousand-acre ranch, so that I might have room enough to lie down and rest. Then came a man who wanted to know if my orange and grapefruit groves were for sale. I put upon them a price twice as much as they were worth and he turned away. I did not want to part with them.

So I hope you will be hopeful and joyous for the outlook of this State.

As a part of this message of cheer, I want to read to you a poem about Florida. When we decided we would live here and die here, I wrote down on a little card, a creed which was printed in the papers. I daresay some of you have read it. This is the creed of a Floridian, and I hope you will join with me, with conviction and enthusiasm.

*"I believe in Florida, land of the open and fathomless sky, of lambent stars, of mountainous opalescent clouds, of soft benignant airs, of incessant summer, of unstinted and vivifying sunshine, of responsive and fecund soil."*

*"I believe in Florida, laved on every hand—cooled and warmed and cleansed and fed and decorated—by the azure and*

teeming waters of tropic seas, and by countless and sparkling lakes and streams.

*"I believe in Florida, land of wide-stretching and open woods, of limitless green prairies and glades, of dense and vine-hung hammocks, of mysterious bays and swamps, all in their various forms lovely and fruitful; the land of fragrant pine and mourning cypress, of moss-draped oak, of waxen magnolia, of comely palm, of regal poinciana, of flaming vine and of shy and brilliant orchid."*

*"I believe in Florida, land of the orange and pomelo and spicy kumquat, of peach and pear and persimmon and loquat, of pineapple and guava and mango and avocado; of corn and cotton and cane and cattle, and of whatever else is anywhere borne of trees or grown by the soil of the earth."*

*"I believe in Florida, the home of creatures strange, curious and beautiful—the saurian monster, the gliding reptile, the darting dainty lizard, and aquatic manatee, the egret in snowy nuptial array, the roseate spoonbill, the exuberant mockingbird, the flame-like, flute-like cardinal, the woodpecker with ivory bill and the humming-bird with ruby throat, the painted butterfly sipping nectar in winter days."*

*"I believe in Florida, land of romantic legend and adventurous history, of towns the most ancient and the newest, of swiftly growing cities, of farms and orchards, and of wide and inviting solitudes still awaiting man's coming."*

*"I believe in Florida, magnet and meeting place for men and women of the North and the South, the East and the West, and countries over-sea, Americans all, one blended and indissoluble and free"*

people. I believe in her eager boys and winsome girls, in her schools and colleges, in her churches of divers faiths, in her institutions of philanthropy and mercy, and in her press, the voice and the instructor of her common mind and will.

*In fine, I believe in Florida,* the commonwealth old, yet young, unformed as yet, but palpitant with energy and faring forth into the future with high hope and swift step; and believing thus, I covenant with all her citizens of like mind to

give myself to her service, mind and heart and hand and purse, to explore and develop her hidden resources, to celebrate her praises truthfully, to win worthy citizens for her void spaces, to till her fields, to keep pure her politics, to make more efficient her schools, to strengthen and unify her churches, to cleanse and sweeten her social life, and thus to make her in full fact what she is by human right and Divine dower.

#### THE QUEEN OF COMMONWEALTHS.

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### ON BEHALF OF THE BOARD OF TRADE

D. C. Gillett, President Tampa Board of Trade

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*Mr. President, Ladies and Gentlemen:*

Representing the Tampa Board of Trade, I heartily appreciate this opportunity and the privilege accorded me in being permitted to bid you a sincere and cordial welcome to the most prosperous and progressive city of Florida—and destined to be the greatest city of the South.

We people of Tampa *believe* that statement, and we are strenuously and steadfastly working to that end with a firm and an abiding faith.

As a member of your organization, and keenly alive to its usefulness and possibilities, I feel a personal pleasure in extending to you the hospitality of my home town. I want *all* of you to come to know Tampa *as she is*, and to *believe* in her as she is to be.

It seems to me that it is peculiarly appropriate that the State Horticultural Society should meet here at this particular

time. Tampa business men have just had a revival. We have all joined forces, and in a systematic and persistent way we are going to exert our every effort in the determined endeavor to build a greater and a better city.

We know that primarily and fundamentally all wealth comes from the soil, and that every city, in large measure, is necessarily dependent on the surrounding country, and we realize that as the territory tributary to us grows and prospers, just so will we thrive and attain to civic greatness—if we do our part.

Our revivified Board of Trade will be divided into departments, and one of the departments which will have our most thoughtful and persistent attention will be known as the Bureau of Agriculture.

The men of Tampa know and appreciate the worth and importance to a city of the farmer, the fruit grower and the

stock raiser, and we are going to widely and loudly proclaim the merits and the rewards of the calling which you men represent, and we are going to invite the dissatisfied thousands of other states to come and cast their lot among us.

We will preach the doctrine of the soil, and recommend that they get close to Mother Earth and delve into Nature's secrets, assuring them that they will find not only that wealth which all men crave, but a veritable storehouse of happiness and contentment—and the life which God intended.

The country is the backbone of the city. Among the cities of Florida, Tampa is the natural and logical center of the businesses in which you are engaged, and while we expect to derive great and lasting benefits from your industry and advancement, just as all cities do from the country back of them, we want you to feel that you have our co-operation and support, and that in every way consistently possible, we are spending our time and our money in the promotion and encouragement of the things you represent. We intend to give you ample proof of this in the years that are just ahead.

But, I digress. I have not forgotten, though, that I was to extend the hand of welcome, but sometimes I get so enthused about Florida as a land of fruit and vegetables, of palms and flowers and hidden wealth, that, were it geologically possible, I would be inclined to believe that the Garden of Eden had been located here.

Voicing the sentiments of the business men of Tampa, I want to bid you a welcome which will not end with your departure. As an organization, or as indi-

viduals, you will always be welcome to a share of anything we have.

Today, we offer you as many as you can smoke of the 4,000,000 cigars which our factories will make during the four days that you are with us;

We offer you the use of a land-locked harbor and a twenty-four-foot channel;

The use of 75 miles of paved streets and boulevards, and 52 miles of street railway;

The use of 82 miles of gas mains, and complete possession of our two and one-half miles of bright White Way;

We offer you the use of 5,500 automatic telephones, and for irrigating as well as drinking purposes, 4,500,000 gallons of pure water each and every day.

We offer you the use of our clubs and the hospitality of our homes; we offer you our fine hotels and our public buildings and the strength of our financial institutions, and in the future years, as we grow in wealth and in those things which make for greatness, we hope to share our prosperity and our successes with you.

On behalf of Mr. Louis A. Bize, President of the Citizens Bank and Trust Company, I extend to the members of this Association a cordial invitation to view the city of Tampa from the top of their ten-story building, Citizens Bank and Trust Company. On behalf of Mr. J. T. Mahoney, President, I extend to the members of this Association the courtesy of the Tampa Yacht and Country Club. On behalf of Mr. Frank Bentley, Vice-President, I extend to the members of this Association the privilege of the Tampa Automobile and Golf Club. On behalf of Mr. George Stecher, President, I extend

to the members of this Association the courtesy of the German-American Club. On behalf of Mr. A. L. Cuesta, President, I extend to the members of this Association the courtesy of the Centro Asturiano. On behalf of Mr. R. T. Joughlin, Exalted

Ruler, I extend to the members of this Association the courtesy of the Elks Club.

Just as we do today, so will we always welcome you, collectively and individually, with all the cordiality contained in that one word—welcome.

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## RESPONSE

A. P. Spencer, Gainesville, Fla.

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*Mr. President, Ladies and Gentlemen:*

It gives me a great deal of pleasure to respond to the address of welcome.

My first visit to this city was the time of the meeting of the Pomological Society here in 1911. I know that what Mr. Gillette has said comes from the bottom of his heart and that it is prompted by the Board of Trade of Tampa. I am pleased to note in his remarks that they have established in their Board of Trade what is called an agricultural bureau. This is a step in the right direction, and I should like to see Jacksonville and other cities doing the same thing. In our work at the University and in the extension work, we require the support of the horticultural and agricultural people of this state, and I am pleased to say that we are receiving that support, and receiving it in a most satisfactory way. I want to say something especially good about Hillsborough County. We feel that the work is going along more smoothly because we have the backing of the agricultural bureau and its superintendent. This is very gratifying and encouraging indeed.

Mr. Gillette has offered us a great many attractions. He spoke of the 4,500,000 gallons of water per day we are in-

vited to enjoy. It reminds me of the old lady who had not had very much to eat, and the preacher came along and told her she should pray for what she wanted, so she got down on her knees and said, "Oh, Lord, send me a barrel of flour, and a barrel of pork and a barrel of meal and a barrel of salt and a barrel of pepper—oh, no, Lord, that's too much pepper." So that 4,500,000 is more than we need.

There is one thing that I regret; that is, that the President of the Society cannot be with us. There was another gentleman who promised to be with us and bring with him a membership of 1500. I don't see him, either.

I want to close my remarks about here. I predict for you a happy sojourn in this city of Tampa. I have been here many times since my first visit; I know something of Tampa and something of her hospitality, and we will not regret that this meeting is held here. I hope we may see a great deal of each other in our meeting here. I believe our Horticultural Society will have one of the best and greatest meetings it has ever had, in view of the fact that we have some very important legislation now before the legislature in Tallahassee. I thank you.

## SOME REMARKS

B. L. Hamner, Secretary Board of Trade

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*Mr. President, Ladies and Gentlemen:*

These men have been given weeks to prepare a speech; they give me half a minute to come up here and make an address. I take it they do this because they have run short on the program and the President, who was to deliver an annual address, has failed to deliver the goods.

Now, I am not going to make the President's annual address.

I remember the first meeting of the State Horticultural Society I attended, and I sat down in the audience and I wondered what it took to become a member. Now, if there is anybody in this audience who does not know what it takes to become a member of the Horticultural Society, let me inform you that it takes \$1.00, and you sign your name, and you hear these fine addresses, and when the report is printed you get your copy.

Mr. Skinner has said I am here to get the money; that is my place on the program on this occasion, and I will live up to it. I do not want anyone to lose the opportunity of becoming a part of this Society. This Society is made up of those who are interested in seeing our country prosperous, from a horticultural and agricultural standpoint.

Now, if you want to know what you are going to get for your dollar, let me tell you; tomorrow, and the next day and the next day you will hear from those who know whereof they speak; men who are trained in horticultural and agricultu-

ral lines. It is worth a dollar to hear any one of them talk upon the subject assigned to him. In addition to that, every word of the speeches and the discussions is taken down and reduced to writing, and that is put into a bound volume that is delivered to you about the month of August, and that book alone is worth from \$5.00 to \$10.00; they are treatises upon the subjects of horticulture and agriculture, and I don't want anybody to leave here without becoming a member of the Society, and if you are once a member, you are always a member, provided they do not take the meetings so far away that you cannot get to them.

Tampa will try to entertain you during the next three days, and tomorrow we will have 1500 people in attendance at the meetings. We promised that to you last year and we are going to deliver the goods, so you will appreciate that we cannot provide the usual form of entertainment; it would be an impossibility to provide enough automobiles to carry this large crowd about the country, so if you will be here, in this room, next Thursday morning, you will see what we have provided for you.

I don't want any of you to overlook the exhibits we have put here for your entertainment. Immediately back of the Tampa Bay Hotel, in the ball ground, is what is known as the Woman's Building. In that building is an exhibit of anything that was ever advertised in the Florida

Grower, and these gentlemen can tell you how to spray and take care of your groves and your farms, and you can purchase there the things you want, and the men will tell you how to use it. Then you will find irrigation and spraying outfits, which will be demonstrated and in actual operation, irrigating and spraying trees in the park. Then in the front porch and the hall there is fruit and exhibitions of paper with which to wrap your fruit. Then, on Thursday, there will be another demonstration, and I am going to mention this because your chairman this even-

ing is too modest to mention it; there is going to be demonstrated automobile trucks in the heaviest sand that can be found, with the idea of getting the growers in this state to realize the advantage to be gained by using these trucks, thereby reducing their cost of operation in hauling fruit from the grove to the packing house. You will find other exhibits scattered around through the hotel; there is an exhibit of pianos in the parlor.

We want you to take in all these exhibits and the entertainment we offer, and we will ask you to come again to Tampa.

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## INTRODUCTION OF QUESTION BOX

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### Okle C. Painter, Secretary

For the past several years it has been customary to the opening of our meetings for the Secretary to present to the members of the Society the Question Box. If you have any questions you would like to have asked and do not have a chance to ask them from the floor, if you will write your question on a piece of paper and drop it

in the box, your question will be answered from the platform some time during the meeting. These questions and answers are always made a part of the report when issued.

The Question Box has been of great help to many of the members in the past and I strongly urge you to make use of same.

# Farmer's Co-operative Demonstration Work in Citrus and Trucking Counties

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A. P. Spencer, Gainesville, Fla.

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*Mr. President, Ladies and Gentlemen:*

In presenting this paper, it is not my intention to go into the demonstration work as fully as it is carried on in the territory in which I work. Several new fields of activity present themselves each year, but none seems more important than the application of farm demonstration principles to citrus and truck conditions. For this reason, I have prepared these few notes from the standpoint of those who might be expected to attend this Horticultural Convention.

The movement has become nation-wide and, as the horticulturists of Florida are ever alive to the opportunities offered them, it was at the suggestion of the program committee of the Horticultural Society that this paper is offered.

The purpose of the Farmers' Co-operative Demonstration Work, wherever established, is to diffuse useful and practical information on subjects relative to farm life and to encourage their application. This work was first instituted in Florida by the Southern Education Board in 1907 under direction of the late Dr. S. A. Knapp, directed on the same plan of farm Demonstration Work as in the cotton-producing states, where the boll wee-

vil had gained entrance. The boll weevil was the center of attack and, while efforts were made to control it, the most important thing was to encourage the growing of staple crops to supply the home and other markets, and more especially for home supplies.

In 1911, by an act of the Florida Legislature, \$5,000 a year was appropriated for similar farm demonstration purposes. This \$5,000 was applied in counties where cotton is not a staple crop, as the original appropriation by the Southern Education Board required that their money be used only in cotton-producing states.

In the same year, the U. S. Department of Agriculture assumed the financing of the Demonstration Work, relieving the Southern Education Board, and continued it without county support until the close of the fiscal year of 1913, when it was required that each county in Florida appropriate a minimum of \$175 annually, where it was desirable to retain the Demonstration Work in that county.

July 1, 1914, the Smith-Lever Agricultural Extension Law became effective. This law provides for an appropriation of \$10,000 each year, unconditionally, for each state. It further provides for each

state an additional \$6,491 for the fiscal year beginning July 1, 1915; \$11,898 for fiscal year beginning July 1, 1916; and \$5,000 additional for each succeeding year until a total of \$44,345 annually is reached; with the provision that the state must appropriate an equal amount for the same period; that is, the Florida legislature must also appropriate not less than \$6,491 for the fiscal year beginning July 1, 1915; \$11,898 for 1916; \$16,898 for 1917; and increase this amount each year until this appropriation should amount to \$44,345 in order to get this increase. These appropriations will give for Farm Demonstration and Home Economics Work in Florida a total of \$23,982 for next year, beginning July 1, 1915; \$33,796 for 1916; \$43,796 for 1917; and this amount will then increase \$10,000 annually until 1922, when the total appropriation from the Federal and State sources will be \$98,690 to be applied to Farm Demonstration and Home Economics Work.

At the present time each of the thirty-eight counties in Florida having the Demonstration agents receives an appropriation of \$675 from Federal and State funds. The minimum appropriation from each county must be not less than \$175, making a total of \$850, which is the smallest salary paid to any demonstration agent in the state. But as \$850 is not sufficient to induce well-trained successful business men to enter the field or to induce younger students to prepare themselves for the work, it has been urged that the appropriations from the counties be larger, which is the case in most of the southern counties. The county demonstration agents' salaries in the southern

counties range from \$850 to \$2,400 annually.

For conducting Demonstration Work in Florida, the Board of Control of the University of Florida has entered into a co-operative agreement with the Secretary Houston of the United States Department of Agriculture.

Mr. Bradford Knapp, Special Agent, Farmers' Co-operative Demonstration Work, and Prof. P. H. Rolfs, Director of Extension Work of the University of Florida, are entrusted with carrying out the plans of the work.

Prof. C. K. McQuarrie, State Agent, has general supervision of the Demonstration Work, Boys' Corn Clubs and Girls' Canning Clubs.

Miss A. E. Harris is assistant state agent, Canning Club Work; Prof. E. S. Pace is district agent for North and West Florida and my part is district agent, East and South Florida.

#### BRIEF STATEMENT OF WORK ACCOMPLISHED

The following is a brief condensed report of the work from January 1 to December 31, 1914.

There were 1929 demonstrations with corn, cotton, oats, legumes and citrus fruits on 7,725 acres. These are definite planned demonstrations where the farmer or demonstrator carried out the work according to detailed instruction from the county agent.

In addition to this, the county agents had these farmers establish 74 pastures, mainly for hogs and cattle, plan and carry out 162 rotations for soil improvement and pasture crops, use lime on 773 acres,

securing the lime in car lots by getting several to order at one time.

There were 636 farmers who selected seed corn in the field or early in the season.

These farmers purchased 2334 improved farm implements at an average cost of \$15.

\$9,365 were expended in the purchase of pure bred hogs for breeding stock, \$18,225 for pure bred breeding cattle.

There were 23 dipping vats built and 23 silos erected in these counties.

In carrying out this work the county agents traveled 16,728 miles by railroad and 50,035 by team and automobile, making a total of 66,763 miles traveled by them.

To supervise the work the district agents traveled a total of 31,624 miles.

In the canning club work Miss Harris reports that there was an enrollment of 1,153 girls working under 24 different county canning club agents.

The total profit was \$4,561.06 from the girls' plots and the average profit, over all cost, was \$12.22 for each tenth acre.

This year Miss Harris is working in 21 counties.

The Bureau of Animal Industry, Washington, D. C., has placed Dr. Geo. F. Babb, hog cholera specialist in Florida for this year, to conduct educational and demonstration work to control hog cholera to work with county and state agents. Hog cholera meetings and demonstrations have been completed. The county agents have been fully instructed and are now well equipped to conduct single and simulta-

neous treatment for the prevention of hog cholera.

The Dairy Division, Bureau Animal Industry, has worked co-operatively with the University Extension force the past year in an educational campaign for the erection of silos and growing of silo crops, resulting directly in the erection of eight silos with capacity from 75 to 200 tons each.

This encourages improved live stock and better facilities for feeding dairy and beef cattle.

I have outlined the operations very briefly that we may fully understand from what sources this work is being conducted, and something of the plans under way.

For some years, the citrus and truck growers have made demand of the Florida Experiment Station for Demonstration Work applied to citrus and truck crops and as soon as specific demonstration work was provided for and could be conducted along definite organized methods, plans were arranged that would give assistance to citrus and truck growers.

Not until 1914 was there any demonstration work conducted in citrus groves in Florida under the direction of the Federal or State Government, although the Experiment Station undertook to carry on demonstration principles in a small way in Lake County, but for lack of funds that could be applied to such work it could be conducted only incidentally with other work and in an advisory way by the Experiment Station officials.

#### CITRUS WORK UNDER WAY

In May of 1914 the Extension Division of the University of Florida undertook to

carry out practical demonstration work in groves in DeSoto County. The advice and assistance of Prof. H. E. Stevens, Plant Pathologist of the Experiment Station, was secured. The county agent first arranged with the owners of the grove to conduct these demonstrations by treating a few trees in each grove for the control of foot-rot and gummosis by thorough application of Bordeaux paste and carbolineum and the scraping away of the diseased area, giving the trees an opportunity to heal over and to prolong their bearing life, which treatment the county agent applied systematically to each of 10 groves, revisiting them at stated intervals to watch the development and call the attention of the owner to any new infection that might be present, and renew the treatment as many times as it should be necessary.

We found that many of these trees had already received similar treatment in past years, but they had used various preparations of unknown strength and applied them without any definite system, and in very few cases had attempted to remove the diseased wood; with the result that the treated portion would partially overcome the disease, but it would break out again in fresh places, causing the impression on the owners that the treatment had been useless and there was no relief.

From the citrus standpoint, the next important work carried on by demonstration was by Mr. I. E. Soar, Pasco County, whom you will remember as having made an excellent report on peach culture before this Society last year. Mr. Soar's work with citrus was in control

of gummosis, foot-rot and scale, and similar to that conducted in DeSoto County, but only when he was called on and not as a regular demonstration. This agent graduated from the University of Florida and had been associated with fruit-growing and nursery work for several years, so he was frequently called on to select citrus land, citrus stocks, select bud-wood, and more especially for the control of citrus scale.

#### WORK WITH CITRUS CANKER

The agents of Osceola and DeSoto Counties gave some special attention to citrus canker immediately following the citrus seminar at Gainesville last September. Mr. Crews, the agent of DeSoto County, attended the citrus seminar and on his return made a report to the Arcadia Board of Trade and County Commissioners of DeSoto, emphasizing the necessity of definite action on their part to prevent the spread of canker in the citrus groves of DeSoto County. Following this, the County Commissioners recommended that he visit the canker-infected territory on the lower east coast and familiarize himself with the disease, inspection work, method of control, etc. Mr. Crews spent about a week in this territory visiting the most important centers, and by using his car got in communication with the inspectors, and thus obtained a good idea of the situation. The country paid his expenses. On his return he conducted seven meetings in DeSoto County, at Bowling Green, Arcadia, Zolfo, Wauchula, Punta Gorda, Sebring and Avon Park, making a report at each place and

demonstrating specimens of citrus canker supplied him by Director Rolfs, teaching growers to recognize the disease and distributing much information about citrus canker and its control.

The Board of County Commissioners of Osceola also paid the expences of the county agent, Mr. Evans, to visit the same territory. On Mr. Evans' return he called the growers together and aroused their interest and then began on inspection work in groves where nursery stock had been purchased from infected territory, inspecting practically all young citrus trees in the county that had come from quarantined nurseries.

Legally, it is not possible to apply the funds of the Demonstration Work to citrus canker, consequently no money could be directly used for that purpose, but because of the urgency of the situation, it was deemed advisable to recommend that the agents spend as much time as could be spared on this kind of work, owing to the peculiar circumstances.

This constitutes the most important work conducted in citrus from the standpoint of the Demonstration agents to date, although much time is taken up by other agents who look to the Experiment Station workers for help when necessary.

The work of the demonstration agent is to make practical demonstrations of the beneficial practices and principles that have passed through the experimental state and not to undertake new experiments or assume the management or direction of groves, farms, or truck crops. It is difficult, however, to undertake work of this character without going slightly

out of the particular sphere for which it was intended.

For instance, the demonstration agents of Florida this year have inoculated upward of 25,000 hogs. A much smaller number would have been sufficient to demonstrate the use of serum, but as these agents are directed to assist the farmer in every legitimate way, it seemed advisable to do this work on such big scales, thereby conducting a thorough campaign against hog cholera. Hereafter, the duty of the demonstration will be stressed on this point and the agent will not be required to spend as much time as this has taken in the past year because of other pressing duties close at hand.

#### CO-OPERATIVE SPRAYING DEMONSTRATIONS

We propose to conduct practical demonstrations in spraying for the systematic control of whiteflies, scale, rust mites and such pests as may interfere with the thrift of trees or injure the fruit for market. The plan for carrying out demonstrations is to enter into definite co-operative arrangements with such growers as will carry out the different spraying operations at the proper time and with the proper solutions on a par or all their groves, as they see fit, for the purpose of controlling or holding in check such pests as may be present. These demonstrations are to be arranged, so far as possible, by the county agent, who will receive direct help and personal attention from the Florida Experiment Station through the special department working on such insects and diseases. As far as practical, such demonstrations shall be located near public roads, where they will be readily ac-

cessible to other growers. One plot, consisting of twelve or more trees, will be left as a check, so that the effect can be readily observed by those who can be induced to inspect the groves to see the effect. A special requirement will be that this grove shall be opened to inspection to visitors upon application and in accordance with proper methods.

An actual record of the cost of the work and materials will be kept so we may have correct data, giving us a better idea of the exact cost of spraying citrus trees. This record will go on file and become available to all. These spraying operations will be conducted according to the best methods known and at such a time as will be most effective.

I have just visited Lake county with Prof. Floyd and the county agent, Mr. Wm. Gomme. We have arranged for two demonstrations to be conducted near Eustis and three near Tavares. These will be under the close observation of the county agent with the assistance of the experiment station officials and the district demonstration agent, until the crop is mature and on the market.

On our visit to these groves, we found conditions ideal for carrying out such work. Mr. Booth, manager of the Lake Region Packing House at Tavares, assured me that the quality of the fruit in his groves and in the groves of others shipping through his house, showed a more thorough infection of pests each year, due to whiteflies and scale and other insects. Mr. Booth expects to erect an insecticide plant in connection with his packing house, and was very anxious

to have these demonstrations carried as far as possible.

We found Mr. Pond, of Eustis, and other packing house managers, ready to encourage growers shipping through their packing houses to hold these pests in check and consequently welcome any demonstration work in this direction. We find growers of that section ready to co-operate and it is our plan to follow this work up with care and vigor, feeling assured that the quality of the fruit can be improved, consequently bringing higher prices when these spraying operations have been demonstrated.

#### STRAWBERRY CULTURE.

A demand has come for co-operation from strawberry growers. The demonstration agents in Polk, Hernando, Bradford and Hillsboro counties have given especial attention to this crop. The service rendered in this connection was chiefly in the selection and preparation of strawberry land, securing suitable varieties to meet the market needs, handling the plant beds, fertilization, cultivation, rotation of crops and protection from frost. Mr. R. T. Kelley, from Plant City, Hillsborough County Demonstrating Agent, will present a paper on this subject, which I am sure will be interesting to everyone who can hear it. These agents have all grown strawberries successfully on a commercial scale and are experienced in strawberry culture, so their services will be particularly valuable.

#### SOME INDIRECT RESULTS OF FARM DEMONSTRATION WORK.

It is impossible to measure in dollars all the accomplishments of the farm

demonstration agents. Perhaps the greatest service of all is the indirect service and this cannot be expressed in dollars or numbers. For example, it is difficult to place a value on the work with the young folks in their tomato, corn, pig and poultry clubs and the assistance given in the teaching of agriculture; the holding of agricultural days, in the schools, which have tended to bring parents into closer touch with, and stimulate a keener interest in, the work of the school and the teacher. It is impossible to figure the direct returns from the economics in which many of the women were given their first lesson in the proper care and preparation of food, care of sick, rearing of children and the many suggestions for lightening of household and home duties. No figure will represent the inspiration received, often for the first time, at the several meetings held. These instances and many more that are similar, must find their justification in the minds of the leaders and sponsors for the moment; they will directly swell bank accounts by increased yield of corn and other crops, but they will also build for a bigger, broader and more satisfactory rural Florida.

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#### DISCUSSION.

Mr. A. P. Spencer: Of course, you realize a good deal depends on the county agent. He must be a man of mature judgment, have good ideas, and must be in harmony with the people's wishes.

It is our purpose to follow this work up in as definite a way as we know how. We have not found any real opposition in carrying this work out in various coun-

ties. In the past year, the number of agents has been increased 100 per cent. We find encouragement wherever we have taken up the work. In the past year we have received encouragement and co-operation from a good many business houses, manufacturing firms, and the bankers of the state appropriated this year a liberal prize for the Corn Club boys. The Women's Clubs have also made a liberal appropriation for the Canning Clubs. Different counties and individuals are taking an interest in it, and I believe the demonstration work is having its effect.

But I want to emphasize this fact; that the United States government is willing and anxious to finance this work with a liberal appropriation, but they do ask that the counties show some interest in it themselves. This year, the United States government will hand to Florida a little over \$16,000 in the demonstration work, and require the state to appropriate only \$6,000.

I feel that the demonstration work can be applied in a good many directions it is not now applied. It is co-operative work and depends on the farmers for co-operation and support. The report for last year has just come from the press, and anyone who would like to get it can receive a copy by writing the Experiment Station at Gainesville.

Mr. L. B. Skinner: I have often wondered what would happen if all the lands I pass over in Florida from one grove to another, were set out in citrus groves. It has never seemed to me that this land is fit for anything else; that is, you cannot grow much else on it at a

profit. But in the last few years, the work of the Experiment Station and the work of the County Demonstrators, has opened up to me a vista that is simply wonderful. If you Florida growers can conceive of something that can drive out sand spurs and give you a crop that will bring you as much money to the state as the citrus crop of Florida, you will admit it is wonderful: that thing is the Natal grass. It will crowd out sand spurs and

everything else, and think what prosperity this state would have if every piece of ground along the wayside, were planted to Natal grass. Do you know that we pay more every year for hay, than we take in from the orange crop?

I wish I were younger, to take hold of this work. I feel this state is on the verge of a prosperity that is immense; not from the citrus industry alone, but general farm products.

# Methods of Packing and Shipping Citrus Fruits

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David Scott, Arcadia, Fla.

*Mr. President, Ladies and Gentlemen:*

In this paper we shall attempt to give a brief outline of the history of the development of methods of packing and shipping citrus fruits in Florida. Other members of our committee will treat the more technical details of the subject.

During the decade from 1870 to 1880 the orange industry of Florida first assumed commercial importance. The fruit was mostly packed by the growers and marketed almost exclusively through the commission houses of the larger cities. As the industry assumed larger proportions buyers purchased much of the fruit on the trees and assumed charge of the picking and packing. They built packing houses usually equipped with nothing but simply constructed sizers. In many cases the fruit was sized by the eye. Much of the fruit was carelessly handled and roughly packed, and in these early days we hear of decay. But during the eighties and early nineties a number of packers built up a reputation for careful grading and neat packing. Much of the early popularity of the Florida orange as well as the introduction of grapefruit was due to the efforts of the local buyers and packers of this period.

When in 1893-4 the crop of the state had reached about 6,000,000 boxes the problem of distribution called for the best

energies of all factors in the business. But during the winter following, this problem was solved for a time by the "big freeze." There was little change in methods of packing or marketing agencies during the ten years following. A few packers adopted the California "Pony" box. But this did not meet with favor among the best packers. By 1905-6 the crop had increased to about 3,000,000 boxes. A number of good packs were well established, more than holding their own with the best brands from other orange-producing regions. But at certain seasons during damp weather heavy decay developed in transit. During 1907 the U. S. Government began extensive experiments in Florida to ascertain the causes of decay. This work was ably and thoroughly conducted over a period of about six years by such men as Lloyd S. Tenny, G. W. Hosford, A. V. Stubenrauch, A. W. McKay, H. J. Ramsey and others. If our people will properly follow up the work of these men Florida can easily save millions in a few years. Every grower or packer of citrus fruits would profit by a careful study of the results of these investigations as published in Bulletin No. 63 of the U. S. Department of Agriculture.

In 1909 the Florida crop had again reached and passed 6,000,000 boxes. The spread of whitefly rendered washing the

fruit necessary in some localities. With proper equipment washing and polishing is an easy process, and has become the rule in the best packing houses of the state. The best trade demand washed fruit.

With the introduction of more complicated packing house machinery, which has come largely from California, there has come also an inclination to copy the California package. Let us hope that while we are ever ready to adopt every new idea that is good we may still retain enough of the good old fashioned Florida package that our fruit may be recognized as distinctively Florida's own—the best fruit in the world.

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### J. C. Chase, Jacksonville, Fla.

*Mr. President, Ladies and Gentlemen:*

Mr. David H. Scott commissioned me to prepare a paper upon the methods of packing and shipping citrus fruits—handling the shipping end. This gives me the opportunity of submitting the results of investigations carried on this season in shipping and distributing grapefruit in carloads under a freight system that is more or less of a "lemon."

When we talk of furnishing grapefruit to the unsupplied who have not acquired the grapefruit habit, few realize the expense per grapefruit in freight alone in getting it to the market. No fruit is grown or shipped where freight charges per unit or individual fruit are a greater factor than Florida grapefruit.

A careful check of over four hundred (400) carloads of grapefruit distributed amongst ninety-six (96) cities in the

United States and Canada located in thirty-five (35) states exclusive of Canada, showed average freight charges from loading points to destination of 86.35 cents per box. Representative car-loads from different districts average fifty-six (56) grapefruit per box per car-load. On this basis, which is a fair one, the freight cost alone averaged slightly in excess of one and a half cents ( $1\frac{1}{2}$ c) per grapefruit per carload. Freight expense per grapefruit per box of each size standard pack as follows:

28—038; 36—023; 46—019;  
54—016; 64—014; 80—011.

Florida perishable products to supply the markets of the country move through certain gate-ways, and freight charges are regulated to the markets based upon these gate-ways. To understand how the population of the country is distributed the states can be divided into groups as follows:

#### FLORIDA GATEWAYS.

*Group 1.* Population 18,776,055. All states south of the Ohio and Potomac Rivers and east of the Mississippi River. Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.

This group, which comprises the Southern States, is not a large user of grapefruit, owing to the preponderance of the black population, and perhaps never will be; yet the freight charges per box are less into this territory than into any other section of the country.

#### POTOMAC YARDS.

*Group 2.* Population 33,163,986. All states north of the Potomac River. Con-

## FLORIDA STATE HORTICULTURAL SOCIETY

necticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Canadian Provinces.

This group contains the largest consuming markets and the most densely populated territory on the American Continent. The population of the State of Pennsylvania alone exceeds by over a million the combined population of all the New England States. The all-rail grapefruit freight rates into the principal markets of this territory (taking 20c a box as the average freight charge from the average grapefruit-producing district to base point) varies from 64c a box to Philadelphia to 71c to Boston, 72c to Pittsburgh and 73c to Buffalo, to 90c to Montreal, averaging per grapefruit from one cent (1c) to over one and a half cents ( $1\frac{1}{2}$ c).

## CINCINNATI.

*Group 3.* Population 18,250,621. Includes the states north of the Ohio and east of the Mississippi. Illinois, Indiana, Michigan, Ohio, Wisconsin.

Freight charges on grapefruit per box in carload lots run from 66c in markets along the river to 86c in the markets north of Chicago and Cleveland, making a slightly higher general average per grapefruit than in Group 1.

## MISSOURI AND MISSISSIPPI RIVER.

*Group 4.* Population 9,316,284. West of the Mississippi and south of the Missouri, including Arizona, Arkansas, Louisiana, New Mexico, Oklahoma and Texas.

Grapefruit freight rates into this ter-

ritory, with the exception of New Orleans (which has a rate of 50c) vary from 82.8c to Galveston to 91.2c per box to all Texas and Oklahoma common points. The average per grapefruit per carload ranges from 1.48c to over 1.6c.

## ALL OHIO AND MISSISSIPPI RIVER GATEWAYS.

*Group 5.* Population 20,182,087. West of the Mississippi and extending to the Pacific Coast. California, Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, Washington, Wyoming and British Possessions.

The freight charges on Grapefruit into this territory vary from 70c to 75c a box at points on the Mississippi River to \$1.60 per box to the markets located in the States of Utah, (1.60), Idaho (1.60), Oregon (1.50), Washington (1.50) and with charges running \$1.16 to Winnipeg and Saskatoon. The freight charges per grapefruit will range from  $1\frac{1}{4}$ c St. Louis to 2.85c per grapefruit where the freight charges are in the neighborhood of \$1.60 per box.

Under Florida's existing rate scheme there is no such thing as making a uniform price in all markets on her products unless the growers equalize the cost laid down out of their own pockets. Unless the Florida initial lines and connections can be induced to put into effect a system of rates similar to those enjoyed by the California citrus growers, Florida products can only enter the markets of the northwest with a very heavy handicap in the way of freight charges. The rate on California oranges is \$1.15 per hundred

pounds or 82.8c per box to all markets of the country east of Colorado with the exception of a few markets in the southeastern territory. The rate on a box of oranges from California producing points to Chicago is 82.9c per box. The freight charge is the same to Pittsburgh, Philadelphia, New York, Boston and all intermediate markets. According to the writer's understanding the division of this freight rate of \$1.15 per hundred or 82.8c per box on business moving east of Chicago is on a basis of 75 per cent to the road or roads bringing it to Chicago and 25 per cent to the roads delivering it to markets in the eastern territory. The mileage via Santa Fe from Los Angeles to Chicago is 2,242 miles, and for ~~this~~ haul, on business moving east of Chicago, the railroads earn 62.1c per box. The distance from Chicago to New York is 973 miles, and to Boston is 1,032 miles, for which the railroads earn 20.7c per box. We do not know of any such low freight rates either per hundred or per box applying on Florida grapefruit.

We cannot reasonably expect the railroads to handle Florida grapefruit from the east into the west on any more favorable terms than California oranges and grapefruit are handled from the west into the east. The writer can see no reason why the transportation companies cannot move Florida grapefruit in carload lots to points along the Mississippi River on basis of rates similar to those now in effect, and in event Florida grapefruit and other products are moved into the territory beyond the Mississippi River have it transported on a blanket rate applying from point of production.

It is stated on good authority that there are thirty-six thousand (36,000) acres in Florida planted to grapefruit, with trees from one (1) to five (5) years old. This acreage is in addition to the acreage now in bearing. It is estimated in five (5) years, under favorable conditions, the crop of Florida grapefruit will aggregate fourteen million (14,000,000) boxes, equivalent to forty thousand (40,000) carloads of 350 boxes each.

The question confronting the Florida grapefruit growers is a market for this crop at a price that will not only pay the cost of production, but will allow a margin of profit. The cost of producing averages fifty cents (50c) per box, or nearly one cent (1c) per grapefruit. The average expense of picking, hauling, packing, loading and selling in carload lots is not less than seventy cents (70c) a box, or  $1\frac{1}{4}$ c per grapefruit. We have shown that the average freight charges on four hundred (400) carloads to ninety-six (96) markets averaged 86.35c per box or slightly in excess of  $1\frac{1}{2}$ c per grapefruit. These items of cultural cost, picking, packing and carlot selling total approximately  $3\frac{3}{4}$ c per grapefruit per carload when the fruit averages 56 to the box. If you take one grapefruit as equivalent to two oranges, and if we take a price of 25c a dozen on oranges (which figures insure a free consumptive demand) on an equal basis it would mean 50c a dozen for grapefruit. Grapefruit would have to be retailed at this price in order to insure a consumptive demand to take care of the present crop, yet this price only leaves five cents (5c) a dozen between the cost of the fruit laid down in the mar-

kets (45c a dozen) and the retail selling price of the same (50c a dozen), and this five cents under this scheme must take care of profit to the producer and a margin of profit for the jobber and retailer. The writer ventures the opinion that the Florida grapefruit growers have lost one million dollars in producing the crop that is not yet fully marketed; that is the results will be one million dollars less than it cost to produce the crop.

Some of the difficult obstacles encountered during the past season have been:

*First.* The excessive crop of apples, grapes and other fruits. The crop of apples is now said to have been seventy million (70,000,000) barrels, by far the largest on record and more than double that of the previous year. All fruits, and especially apples, have sold at exceedingly low prices throughout the season and have interfered greatly with the consumption of grapefruit.

*Second.* Unusual depression, adverse industrial conditions and a very unusual percentage of unemployed. Employment gives ability to purchase, and in many factory and industrial centers dealers have refused to handle grapefruit and other luxuries. They had to carry their customers through the winter on credit and therefore kept their accounts down to a minimum by handling only the prime necessities.

*Third.* The European war greatly reduced our Canadian trade and greatly reduced our southern trade from what it would have been had the South been able to sell cotton at the usual values and at the usual time.

*Fourth.* When newspapers are con-

stantly agitating the existence of poverty and exaggerating these conditions; every type of people, no matter what their circumstances, become conservative and feel poor, and advertising in the usual manner does not influence them to buy luxuries. From the opening of the season people have felt that the future might bring poverty and have conserved their resources.

The problem confronting the grapefruit growers is a difficult one to solve and cannot be settled in a satisfactory manner unless we are sure of the co-operation and assistance, along substantial lines, of the transportation companies. Grapefruit in rate making is entitled to be taken out of the citrus classification and given a classification of its own. Florida oranges at certain seasons may decay more freely than California oranges, but Florida grapefruit is hardy, ships well and keeps well after it reaches destination.

A retailer can purchase a box of Florida grapefruit and be reasonably sure of making a profit on each one. Florida growers realize the splendid keeping quality of grapefruit, as we see in our groves under some of our trees grapefruit that dropped early in the season from lack of market, and is in just as good condition now as it was several months ago. We can afford to load more boxes of grapefruit into a car than we can oranges, and feel that we are entitled to a freight charge that will enable us to reach the markets of the country and get in touch with the millions of people who have heretofore been unable to buy grapefruit because it was beyond the reach of their pocketbooks.

If you read the address of Mr. William Sproule, President of the Southern Pacific Railway before the Western Fruit Jobbers Convention you will note that he states as follows:

"It is not the fruit that is sold on the great avenues of our great cities which makes a fruit season prosperous. It is the distribution of fruit amongst the tens of thousands in the side streets of our cities and directly from the peddlers' wagons. In other words, the success or failure of a fruit season depends on the ability of the countless thousands to buy the fruit."

Do traffic officials of Florida lines realize conditions confronting the grapefruit industry? Will they come to its aid and keep it from going back? The facts were laid before them by the Florida Growers and Shippers League at the St. Augustine meeting, March 18, 1915.

The grapefruit acreage is here and in condition to produce an enormous and constantly increasing tonnage of highly desirable freight. It is not reasonable for railroad officials to think that grapefruit growers will continue to keep up properties merely for the sake of grinding out revenue for the railroads.

Many of us witnessed and suffered from the destruction of our citrus properties by the freezes of 1894-95, and succeeding cold years. These were acts of Providence and beyond human control. We do not want to again see the citrus territory of Florida disfigured with deserted and neglected grapefruit groves, brought about by the failure of transportation interests to take proper action.

We want our industries to prosper in order to attract to our future develop-

ment outside capital and a desirable class of settlers. To do this our products must have wider and better distribution, which can largely be brought about by more reasonable freight charges to remote markets.

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### S. C. Inman, Florence Villa, Fla.

*Mr. President, Ladies and Gentlemen:*

It is no little honor to be accorded the privilege of addressing so representative and intelligent an audience as is here assembled, and would that I were capable of doing justice to you and the occasion.

The subject assigned me, "Methods of Handling and Packing Citrus Fruit," would probably be more satisfactorily discussed by an experienced packing house manager.

By reference to Reports of Proceedings of previous meetings of this Society, over a period of several years back, we find that this topic has been very exhaustively handled by those far abler, hence I have no new ideas to hand you.

The various bulletins and other literature which have been published from time to time, giving results of scientific research, conducted by government experts, Messrs. Powell, Tenny, Ramsey and others, furnish us abundance of indisputable data, showing that by far the greatest portion of the decay which besets our fruit is the result of mechanical injury, permitting infection by the fungus, commonly known as blue mold.

These same authorities have demonstrated too, that fruit which has not been mechanically injured is not greatly prone to decay, and may be shipped to distant

markets and kept a reasonably long time, under ordinary conditions with practically no loss from this source.

These are lessons of inestimable value to the grower and packer, and if this truth could be indelibly engraved upon the minds of all growers, packers, pickers and others who have the handling of our fruits, the good work which these men have done would not be in vain.

Therefore, if you are expecting to win a favorable reputation for your brands in the market, it goes without saying that you have taken every precaution to protect your fruit from injury through every step of progress from the tree to the loading of the finished package into the car.

As I am not an experienced packing house manager, I shall not dwell at length on working details; leaving these to be worked out in the field and packing house, by those who have it to do, and know how.

All I shall attempt is to briefly outline such methods as may seem conducive to the most satisfactory results.

We are in the midst of an epoch of wonderful development and rapid changes in the citrus fruit business, compelling us to adopt up-to-date methods or submit to being pushed aside by the on-rushing wave of competition and progress.

Our big sister state, and powerful competitor, California, has had us pretty well pushed out of some of our once enjoyed markets, and is clamoring vigorously for the lion's share, winning by her up-to-date methods of packing and marketing, and by her extensive and persistent advertising, but Florida has seized the aggressor's weapons and is now winning back some of her lost prestige; compelling our

rival to accept a diminishing share of the coveted markets.

There are a few cardinal objects which must be kept clearly in mind in all packing operations. Briefly stated they are expedition, economy, dependability and attractiveness of the finished product. All methods, processes and efforts must lead unerringly to these all important results.

These attainments can be secured in the maximum degree only where thorough system prevails, where the needed equipment is installed and a well organized force kept continuously occupied at normal capacity.

The product should be uniform in quality for the various grades, neat in appearance, and stand as the embodiment of a *square deal*, from bottom to top, from end to end, from surface to center.

These are the outlines of method, and the underlying principles on which we should undertake the marketing of our fruits and when faithfully lived up to, should give the shipper a well earned reputation in the markets.

I know of no better way of procedure to secure these aims than to follow the plan of operation practiced at packing houses at Florence Villa.

I pray an indulgence by my hearers for thus referring to an institution with which I am personally connected, for I assure you that it is not with the idea that we are doing things any better than some others, for we rejoice that there are several really up-to-date packing houses in the state; some of them not so large, but all putting out fine packs and standing high in the markets, and we hope it will be but a few years when every citrus fruit

community will have its well appointed packing house, under good management.

When that day comes, Florida need have no fear of competitors, and she will then have squared herself for the successful marketing of the fifteen-to twenty million boxes of fruit which she will soon be producing. In fact today, Florida's greatest problem is to take care of our own products. A constructive plan of marketing should be engaging the serious consideration of all growers, and no factor is more potential than good packing.

I refer then to Florence Villa, not because we consider ourselves as a worthy model, but simply because we are familiar with workings there.

At this plant there is a competent manager. He is an expert in the fruit line, knows how to manage help to secure loyal co-operation, and is ever watchful that the operatives are placed where each man can accomplish the most good work. All picking and hauling is under his direction, as well as the inside work.

Picking is done by crews as far as practical, each crew working under close supervision of a picking foreman, who also looks after teamsters while in the grove, seeing that loads are promptly secured, trees not damaged by wagons or mules or by the placing of ladders while in hands of pickers. By-the-way we find this an all-round job, and one of the most difficult places to find a man who will fill satisfactorily. No man in the whole line-up of employees has greater opportunity for looking after the grower's interest than the picking foreman.

Pickers are required to place their numbered ticket on the filled box, and there

it remains until inspection has been made for clipper cuts, long stems, etc. Inspection is made at packing house, and we find this an improvement on inspection in the field.

When drivers deliver a load of fruit at packing house a receipt is issued stating what load consisted of, and exact time of arrival. Duplicate of this is sent to the office each evening, and same is checked the following morning. If intervals between loads seem unusually long, explanation is in order. Hauling being done on the day basis.

When fruit arrives at packing house the owner loses his identity, and is known by his number thereafter.

All fruit is washed and dried by the most approved appliances and delivered to the sorting belt perfectly dry.

No part of the work has received more careful consideration than the standardizing of our brands, and the uniformity of our grading. The idea has been to simplify to the fewest number of brands and grades, taking great care not to fix standards higher than could be uniformly and constantly maintained. We fixed upon three brands, representing three grades, which are distinctly designated on the boxes, and into these go all the marketable fruit of the house.

The "swell" or "bulge" pack is used, with metal center strap. Rounded edge boxes, finest quality printed wraps throughout, wraps given close twist, and fruit so placed in box that printing reads right side up when seen from branded end of box.

The average output of this house is from 1,500 to 1,800 boxes per day, the

boxes being nailed together by a nailing machine operated by a boy. This machine has been one of our most satisfactory economies.

The placing of fruit in boxes is done under the watchful eye of a packing foreman and any attempt to "slip bad workmanship over on him" would be a thing of short duration to say the least.

No detail of the work is more carefully performed than the making out of loading manifest, in order that each manifest may be a true exhibit of the various brands and sizes contained in the car. A duplicate manifest is placed in all cars for the convenience and information of receiver at destination.

All cars are skilfully loaded and stayed to insure the best possible delivery.

This completes our preparation of the fruit for the market, experts having directed and watched every step of its progress from tree to the car. We now turn it over to expert salesmen to get the most they can for it.

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**Dr. O. W. Sadler, Mt. Dora, Fla.**

*Mr. President, Ladies and Gentlemen:*

Regarding many of the points in the packing and shipping of citrus fruits, it is now unnecessary to dwell upon details.

After five years of experimentation by government experts, and enthusiastic practical experience instigated by the Florida Citrus Exchange, there is no longer need of detailed argument that all fruit should be gathered with the gloved hand, and cut by a clipper that insures short stems and no clipper cuts. Each fruit

should be removed from the limb to a thick canvas bag, by the hand, the bag not to hold over one-half box. The bag should open at the bottom, so that the fruit may be placed in the box without appreciable dropping.

The size of field boxes still varies in practice—some using those holding one-half box, two to count as one, others a full box, both intended to average a packed box.

The average class of pickers we are compelled to employ, prefer the full sized box. When using any other size, one would think they all "came from Missouri," as it takes a great deal of "showing" to make them believe they are not picking too much, when using two smaller boxes for one box.

#### HAULING.

When two men are employed loading in the field, there is one point in favor of the "whole box" standard, there is but half as many chances of bruising the fruit from over filling. And another, that the large box gives a smaller bulk on the wagon than the smaller boxes. The same careful handling to avoid bruising fruit, is necessary in either case.

#### IN THE PACKING HOUSE.

All "Exchange idea" packing houses are fitted up with machinery for handling the fruit with the least possible injury, and should be carefully watched, that no loose parts, slivers, or projecting nails shall bruise any part of the rind, and that it all be arranged so that fruit can not "drop," but must "roll" from start to finish.

### WASHING AND DRYING.

It is as yet absolutely necessary to wash fruit to give it the satisfactory appearance to please the trade.

During the early experience in washing, it came to be believed that "washing" greatly increased the decay of fruit. With the careful packing and handling of fruit, and the great improvements in washing machinery, the supposed bad effects of washing have mostly disappeared.

The best outfits for washing, now consist of a soaking tank filled with hot water, containing an alkaline cleansing powder, especially where the fruit is black from sooty mold from the whitefly. Gold Dust or other alkaline powders are now used in the water.

### THE PROPER DRYING OF FRUIT.

The next and most important step, is the proper drying of the fruit before it is wrapped and put into the box.

Two methods are employed for drying, involving two diametrically opposed principles—the absorption of moisture on the fruit, by *cold* air, the other by *hot* air.

Those using "cold air" seem to be prepossessed by the "precooling idea" as practiced in California, where they go still further, by precooling the fruit in precooled rooms, and load into precooled cars, and the cars iced sufficiently to maintain 37 to 40 degrees.

Those trying to dry by cold air blast in Florida, seem to forget the immense difference in climatic difference in the atmosphere in California, which gives them only eleven to fourteen inches of rainfall, and that of Florida, which gives from 53

to 56 inches of rainfall. They also forget that the California fruit travels to market over a dry, hot desert for over one thousand miles, where *dryness* is not a question, but where heat becomes their greatest foe, and naturally, and in consonance with the law of physics, suggests cold.

They who try to dry by the cold blast, also utterly forget the natural law of physics—that *cold* tends to *precipitate moisture*—that when the "dew point" is reached, water *actually deposits* on all objects down to the dew point temperature.

Two marked practical demonstrations of this point have come in my experience.

Several years ago, my wife in my absence, had about one hundred boxes of oranges packed on a clear cool day and left in the packing house. During the night the weather changed to a warm, muggy atmosphere. When she went to the packing house in the morning to continue packing, she found the paper and fruit throughout the packed boxes, as wet as though it had been given a Russian steam bath. It was put out in the sun, and dried as well as such could, and shipped to Baltimore. The returns were—"Received in very bad order"—for which \$1.00 per box was taken from the market price. This is a strong *physical*, as well as *financial* demonstration of precooled fruit attracting moisture in Florida.

Another demonstration was observed the 29th of December last. The previous day and night had been clear, cold and dry. In the morning it warmed up rapidly, and although the day was bright and clear, every casing and piece of wood-work inside the house was covered with

moisture *in drops*, turning the varnish bluish as you have all noticed under such conditions. The metal safe was so thoroughly wet that it dripped a puddle in the floor, and the paper on the walls was thoroughly wet.

A box of oranges I had packed the night before, and left under cover, I found with the papers as wet as if I had thrown a pail of water into the box.

A still more *practical* demonstration under up-to-date packing house conditions, I will now give you.

During a cold, damp morning in March, later raining, the Mt. Dora house was packing fruit with the cold air system, the fruit going to the bins glistening with moisture in every pore of the rind. The manager and myself drove over to Tavares, where they were drying by means of hot air, produced by radiation from twelve one-inch pipes, close up under the rolls that carried the fruit, extending lengthwise of the 36-feet-long dry box, all encased in a box made of flooring, the pipes being supplied by steam from a 10 H. P. boiler at 40 lbs. pressure. The fruit came through as dry as though it had been in the sun on one of our hottest and dryest days.

It is an axiom—The hotter the air, the more moisture will it *absorb*. The *colder* the air, the more moisture will it *deposit*. Hence the absurdity of trying to absorb moisture from fruit by a blast of air that is already loaded with nearly or quite all the moisture it can hold.

We have tried two years of the cold air blast at the Tavares house, by all the methods known at the time, and gave it up as a failure.

Two years ago we installed a hot water soaking tank, and radiated steam heat by a system of one-inch pipes the full length —36 ft., by 4 ft. wide, close under the rolls, with a small fan at the distal end, drawing the air through the main dry box, and blowing it back through the drip rack box by its side. The drip rack is also enclosed and supplied by a system of pipes that *can* be used when *necessary*. It has never proved necessary to turn the steam into the pipes in the drip rack, except on *very cold*, damp days.

The 10 horse boiler with 40 lbs. of steam, heats the water in the soak tank and maintains 90 to 100 degrees temperature in the drying box. Any desirable heat can be maintained.

The fruit is in the drying box about eight minutes, and emerges thoroughly dry. A thermometer thrust to the center of a 150 size orange, reads 96 degrees Fahrenheit. The water in the soak tank is maintained at 102 to 130 degrees, according to how black and sooty it is. There is no danger from heat of the water, as long as you can barely endure the hand in the water.

The greatest objection to the installation of the hot air drying, was the fear of cooking the fruit. Experience and actual thermometrical tests show how absurd was that fear.

I must call your attention to another point of *great value* in favor of *hot air drying*; that is, its aid in *preventing decay*.

Slight injuries that pass observation, are well dried out.

*Blue mold decay*, can only take place in the presence of *moisture*. This has been

fully demonstrated by experiments of the Government experts in actual tests: Therefore; bruises that are thoroughly dried cannot decay from "blue mold," unless the spores have been forced deep into the rind in the presence of constant moisture.

Ladies and gentlemen, I acknowledge that "Hot Air" is my hobby—to *dry oranges* in—yes, to live in. I can fully sympathize with the Esquimo, to whom *cold* is Hell, and heat is Heaven.

The reported opinion of the worthy business manager of the Exchange to the contrary notwithstanding, who advises through the "Grower," all new packing houses to put in the *cold* air process.

We of the Lake Region Packing Association, at Tavares, after two seasons of the most *absolute* satisfaction with hot air, beg to differ and say, *don't!*

Our manager, Mr. J. B. Booth, will take great pains and pride in showing any one interested all the details of our system, its advantages, cheapness of installation, cheapness of maintenance, etc., and while in operation its absolutely satisfactory workings. In this matter we have no "axe to grind," or financial interest in marketing any part of it. We only urge its principles for the benefit of all growers, after *extensive demonstration*. Come see us and "be shown."

#### PACKING

From the frequent returns of inspectors at the marketing end, "slack," or "flat pack," it is evident it is no careless job to pack fruit so firm that the box is as full at the market end as when it was first put in. It is evident that it requires the constant application of force to place every

orange *firmly* in its place, and that the sizer shall be so exactly adjusted that the average in each bin shall fill the box *firmly*.

As I go through packing houses, I see some packers laying their oranges in gently, and when the box is finished, it is piled high, depending on the foot press to push them down so the top can be nailed on. Others place each orange firmly in place, and when their box is done, the press only has to firm the top down to its bulged form, and the middle front is held as firmly as the ends. I then ask myself, how it is possible for the soft pack and the firm pack to give the same desired effect; the answer is, they can't. My opinion is that the loosely laid in fruit is the cause of the frequent complaint, "flat pack."

#### TO TWIST—OR WAD

I believe that a single twist, or sufficient to cause the wrap to stay in place, especially on the top layer, is necessary. Placing all brand printing on wraps in the same direction on top layer gives the most pleasing effect to the pack.

#### REGARDING THE SIZES TO MAKE

My attention has been called to the sales returns on account of *size*. Out of a considerable number of sales returns, I have been shown that 216's often brought 10 to 25 cents per box less than either 200's or 250's. I have never heard of a reason for the 216 pack, except that it was an *easy* pack. If it is true that 216's *average* less than 200's and 250's, why should we continue to pack that size, when

the large ones of the 216 pack will pack in 200's and the smaller in 250's—and bring more money?

#### THE SIZE OF THE BOX

The size of the box has become practically standardized in that of two sections of one cubic foot each. Does the present marketing customs call for, or *admit* of a change for the obtaining of a better price?

Our deceased fellow member, Mr. Dudley Adams, of Mt. Dora, used to pack his fancy fruit in *three* sections, instead of two, as we do tangerines, and had the reputation of securing from one-half to one dollar above the market price of standard boxes. Schrader & Co. are trying out the introduction of half-bushel boxes.

*Our parcel post regulations* will undoubtedly afford an outlet for fancy fruit in packages of one to four dozen, within the near zones, and enlarge the mail order business.

The packing of fruit in central packing houses at some large sales center, or at the more northerly diverting points, has been under consideration by some of our leading thinkers, and now that the new railroad rates on "bulk shipments" tend to make such a method practicable, it is worth investigation.

*A bulk shipment and northern central packing house* would have these advantages: Cheaper freight rates, more and cheaper labor in packing house, absolutely sound fruit to buyers, a larger F. O. B. market, and a better market for culls, and a better opportunity to sell small lots direct to consumers, or the retail trade, all of which seems to me to be worthy of the most *careful consideration*.

*Changes in Box to Meet Another New Marketing Feature That Has Developed Within the Last Year or Two.* The organization of consumers' buying clubs throughout the north is in practice, and might be encouraged and assisted by our selling organization of the exchange, and thus get closer in touch with the consumer—the end most desired.

*Direct from Grower to Consumer.* The express companies are succeeding in this method, why not the growers, through the Florida Citrus Exchange selling force?

After five years of insistent, persistent preaching and teaching of "The Exchange Way" of packing, and the very general practice of associations in securing a perfect pack, let every grower back up every packing house manager in *maintaining as perfect a pack as possible*. We all know how easy it is to "slack up" from the *best* both physically and morally. Don't.

*Can We Lessen the Expense?* Now that we *know how* to pick, handle, and pack fruit in a way to secure its sound and presentable delivery to the consumer, can we lessen the expense of so doing?

I naturally expected that by the use of machinery and systematized methods of handling fruit we would be able to do it *cheaper* as well as *better* than in the past; but instead, expenses have actually increased.

Now let me ask every grower, and especially every packing house manager, at the end of this season, to go over *every detail* of the business, and see if it is not possible to cut out a little expense here and a little there, and before the next season opens, call a meeting of packing house

managers in each sub-exchange or district, and all others interested, collaborate all suggestions advanced, and adopt a uniform system of packing, and packing

house work, and prices, and so increase the advantages of co-operation. The success of orange raising is going to depend upon the "survival of the fittest."

## DISTRIBUTION OF FRUIT TO THE CONSUMER

E. Stuart Hubbard, Arlington, N. Y.

*Mr. President, Ladies and Gentlemen:*

There has been a good deal of agitation in the press lately regarding the final method of distributing fruit to the consumer. There have been a good many claims made that the present manner of distribution is wrong and that it is a great deal more expensive than it should be; that is, the consumer has to pay a great deal more in proportion to what the grower receives, than he should. There have been statements made in the papers which are very misleading, often false, with regard to the prices which the consumer has to pay. For instance, with regard to oranges, in one of our late papers there was a statement made by a California grower that was something like this, as I recall it, that eighteen cars of California oranges had been sold on two successive days in New York market at auction at an average of \$1.80 per box, and that those same oranges would cost the consumer an average of something like \$4.50 per box; making \$2.70 profit to the brokers and retailers. A statement like that is an absolute falsehood.

There is a small proportion of trade in New York or any of the large cities which pays a high price for oranges; this trade

is supplied by the best oranges which reach the market. These prices are above the average of the sales. If you will look at your auction sales for any one day, you will find there are a few boxes which sell for much higher prices than the average. There are a few boxes of large sizes, like 126's or 150's of the best brands, which will sometimes sell for \$2.00 or \$3.00 a box more than the average prices.

The man who usually writes these articles is often an expert who is given the position of investigating, and he goes to the stores where this fine fruit is sold at high prices, buys fruit there, and goes back and writes these figures as his basis.

In the meantime, the great mass of fruit, good average fruit, is bought by the middle classes and the lower classes at very much cheaper prices.

I am primarily an apple orchardist, and while I have been brought up in Florida, and have grown and shipped oranges, I am now raising apples with my uncle in New York State. We have not been satisfied with the methods of selling fruit through commission men, and we have lately been selling it ourselves to the retailers. In that way, we have been try-

ing to find a better way of selling fruit. We have found that the fruit is bought by the consumer in three different ways: first, the best stores, grocery stores or fruit stores, handle only the best trade, and they deal almost entirely in small lots delivered to the houses or apartments of consumers on telephone or personal order, and sell on credit to a large extent. This is a small part of the great bulk of the fruit that is sold in the big cities, and it is the best fruit. It is true, these stores pay a premium for it in the market. This class of buyers will come to you usually, and say, "I don't care what you charge for the goods, so long as they are right." They want flavor, and if it is an orange, they want it of uniform size all through the box. They want the best that can be had, so that they can sell it at a higher price than the average; they have to have a big profit, because they have heavy overhead charges.

This is the class of stores most of these investigators go to, and they get the prices there and base their sensational articles on them.

Second, there is the smaller store which sells to the middle classes and which, in a great many cases, sells for cash. They handle a grade of fruit which is good average fruit; fruit that will bring average prices. They sell at a closer margin and they pay less rent than the stores first mentioned; their expenses are less and they can sell cheaper. They sell at reasonable prices. They expect to make, say, 75 cents or \$1.00 a box on oranges.

The third class is the peddler. The peddler is becoming more and more important. In New York City, they are

mainly Russian Jews and Polish Jews, and they will take a wagon and a helper, buy a bag or two of potatoes, a box of oranges, a box of grapefruit, some onions and cabbage and be set up in business. Each peddler usually has his own district, so that he is fairly well known and has to give pretty good satisfaction or else, of course, his patrons will not buy from him again. They sell at very close margin. Now, we have a good grade of apples; we raise good apples and buy a good many. These peddlers use nearly 75 per cent of our fruit. Our fruit is well up to the average of the fruit in the market. We have peddlers who will buy fifty barrels of apples and one hundred boxes of oranges at a time. They go right down to the auction, and if they do not buy for themselves, they have a good, bright man buy for them, and it takes a good, bright man to buy fruit at the auction. Then they sell that fruit at a cent a piece; that has been the price all through the winter for 250-size oranges. So long as they can make 25 cents a box, they are satisfied. They will sell two or three boxes in a day, and a barrel of apples, and if they can make a profit of \$2.00 or \$3.00 a day, they are satisfied.

One of these peddlers, a Russian deserter, said to me this winter, "Business is bad; too much competition. All a man has to do is to take \$10.00, rent a wagon and horse for \$2.00, buy a bag of potatoes, a box of oranges and a barrel of apples; that is all it takes to make him a business man." There is so much competition that it is almost impossible to make a profit.

That, too, is the way with the small

stores. There have been more changes and failures in the New York stores this winter on account of the poor business than were ever known before. We have a list of over one thousand stores, and every time we sent out a price list, many of the cards came back because the stores have gone out of business.

The profits are not large; they are very small, and the present method of distribution is, I think, as nearly correct as we can have it where the big markets are near enough to the consuming public.

If you have a wholesale market ten or fifteen miles away, it takes but little expense to get the fruit that distance. But if you have too many smaller wholesale markets and carload lots of fruit shipped there, the markets are liable to be over filled. It is just as bad to get too much fruit on a small market as it is to have your big markets too far away. The fancy store wants just what it needs. Some stores will use only 126's of the best oranges. You cannot sell them anything else, because they cannot use it. The smaller stores want only the small oranges, 200's and 250's, because that is what their demand is for, an orange that sells at a fair, average price. The peddlers use anything under the sun, so long as they can get it cheap.

The peddlers are the most valuable part of the trade you have, because they can change so quickly to satisfy the needs of the market. If you get over-stocked in one line, they will clean that line right up, if you sell it cheap. If you ship a lot of sour, unpalatable oranges in the fall, the better grades of stores may handle the

first shipments, because some of their customers are convinced that they must have oranges; but they do not buy more than once. Then the fruit settles in the markets all over the city, and they are finally sold cheap to the peddlers. Their customers taste them, and they are not good; so they don't buy any more. Finally the peddlers clean up that poor, cheap fruit at low prices, but it takes quite a good while. Then the peddlers begin to sell the good fruit, and an enormous amount is consumed, because we have to depend always on the masses of the people who are supplied to a large extent by peddlers to consume the bulk of the fruit.

This talk about raising hundreds of thousands of boxes that will bring the top price is out of the question. You have to raise all grades of fruit. You have to get fruit that all the people will buy and can afford to buy. The whole problem for the orange people and the apple people is to raise the standard of the quality of the fruit, and its eating quality, so that even the peddlers can get plenty of it, and they will be willing to pay satisfactory prices for it. If the peddlers cannot get cheap fruit, they will buy the better fruit; if they cannot get oranges for \$1.00 a box, they must pay the market price, even as high as \$3.00 per box.

This year apples and oranges were exceedingly cheap and we sold a great quantity of apples, but the retailers made no money on them, and they are all hoping that next year there will be a little less, so that prices will be a little higher and they can make more money.

# Methods of Handling Citrus Fruits

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J. W. Sample, Haines City, Fla.

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*Mr. President, Ladies and Gentlemen:*

By way of a preface I might say that the methods of handling citrus groves are as varied and diversified as are the methods of raising children, and I have had some experience with both, and would add that the more experience I have, the more I find I don't know.

My method of handling citrus groves will vary as the seasons vary, but generally speaking, I pursue the following plan. About the middle of February, I apply fertilizer, keeping up cultivation every two weeks until the rainy season begins. The second application of fertilizer is made between May 15 and June 10, after which time it is preferable to let some cover crop grow; personally, I am favorable to beggar weed and crab grass, as they add both nitrogen and humus to the soil. If the season is dry in September, as is often the case, it may be necessary to run over your grove with cutaway harrow. I plan to plow under the third application of fertilizer some time in December.

Irrigation is a good thing to have in a grove in case of a drought; but I would not advise an expensive plant, as the only thing you require is an abundance of water, and do not need it sprinkled on the ground or plants, as is necessary for the

successful growing of truck; and it has been my experience that the irrigation is not needed every year on bearing groves.

I find that a great deal of good can be accomplished through intelligent spraying, to control the insect and scale pests that infest our trees. Keep your trees clean!

I have acquired the lime habit! I use burnt lime if I want immediate results, then follow up with raw ground limestone, of which we have an abundance in the State and which can be procured at a moderate cost. I would refer all growers who are interested in the use of lime, to a paper prepared and read by Mr. R. E. Skinner before our Society at Palatka last year. You will find it published in the the last issue of our Proceedings.

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S. H. Gaitskill

*Mr. President, Ladies and Gentlemen:*

Our president has given me a subject to discuss—I fear with malice prepense. I fear he knew that my methods of handling an orange grove were quite different from the generally accepted methods. I will give you my methods, after thirty-one years' handling of orange groves in Marion County. To begin with, it is very

important to have a good foundation for an orange grove, and the bedrock of the good foundation is good soil. To begin, now, after thirty-one years of study, I should select some good hammock land, well drained naturally, good loamy soil, sandy subsoil, with clay not too close to the surface; preferably, I should select a piece of uncleared hammock. I should select land that grew large hickory, oak, ash, magnolia, and red bay trees. Large trees indicate fertile soil and shows well developed top roots. I would cut this timber all down in the spring and early summer, felling the trees in windrows, and putting the smaller trees and brush in the windrow with the large trees. I would let this timber lie in windrows until fall. I would then put fire in the windrows and burn all I could without moving any of the timber. After fire had run through the windrows, I would cut all limbs and brush from the tree trunks, cutting to lengths that could be easily handled. Then I would cut the logs into ten- or twelve-foot lengths, or short enough for a few men to handle conveniently. After the cutting was done, I would roll the logs into piles, piling the limbs and brush with the logs; then I would make a clean burn of all of this timber; or, if there was a market for the logs, I would sell the logs and burn all I could not sell. When we planted our first groves there was no market for our logs, and we piled and burned all of the timber. After the logs and brush were burned, I would plant a crop of snap beans hoping to get some beans to ship before frost killed the beans, and after the bean crops were all killed in the north. Then

I would stake my land, setting stakes where I wanted to plant a tree. In past years, we put our trees twenty-five feet apart. Now, I would plant trees fifteen feet apart. I would plow the land as best I could, using a strong plow stock, with a root cutter. This would merely cut some roots and stir the soil a little bit. Planting fifteen feet apart is too close for permanent trees, but I would plant fifteen feet and cut out as trees begin to crowd. The trees to be taken out will have paid for themselves before they begin to crowd injuriously, and I want to shade the ground as quickly as possible. After the trees begin bearing, I would quit growing vegetables, and would begin fertilizing the trees. The trees would need no fertilizer as long as I was growing vegetables, and very little cultivation, as the fertilizer and work given the vegetables would be ample for good growth of tree. I would cultivate the trees shallow in the fall and during the spring, possibly until the rainy season started, until the trees had made a fair top, and were bearing some fruit; then all cultivation would cease. I would mow the grove twice each year, once about July, letting the grasses and weeds lie on the ground just where they fell when cut, and I would mow again in October or November, and use this crop for hay, or rake into the middles as a safeguard against fire, and possibly clean and harrow or plow an occasional row, simply as firebreaks; I would sow fertilizer broadcast twice each year about May and November; but it does not matter as to the time of the year about applying fertilizer, the rule being to apply more fertilizer before the last ap-

plication was exhausted. I am well aware of the fact that I have but little company in my plan of non-cultivation of a bearing grove. Most of my neighbors cultivate, but I am quite willing to compare groves and fruit, both in quantity and quality. I think there is only one reason for cultivation—and that is to admit air to aid the soil in digesting the raw material, and making plant food of it, to keep the soil open and porous. The stirring of soil does not add a particle of plant food and, if there is an abundance of plant food with a soft, open, porous soil, the rains will carry the plant food to the feeder roots of the tree. My best groves have not had the soil stirred, not even to hoe around the trees, for over ten years. The trees were planted twenty-five feet apart, and some are meeting in the rows. There are many rows that I cannot go through with a one-horse wagon without rubbing the limbs on either side. They bear good crops, and the fruit has a good finish. The soil, for several inches, is filled with humus, constantly decaying, and with the chemicals that I apply is taken to the feeder roots with every rain. In walking through the groves the foot sinks into the soil, almost like walking over fresh plowed land. Now, Mr. President, bear in mind that I am telling of *my* method, in *my* kind of land. I cannot tell what is the best method on the turkey oak land that the grower says is good orange land; in fact, I don't think I would ever be able to learn what is the best method on that kind of land, as I would never have the hardihood to try to make a grove on that kind of land. I am too lazy to make the necessary effort.

Fortunately for Florida, there are many men who do not agree with me, and there are good groves growing on what I consider a very poor foundation, but I think there must be quite a difference in the cost of producing fruit.

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T. Ralph Robinson, Terra Ceia, Fla.

*Mr. President, Ladies and Gentlemen:*

The chairman of our committee suggested that a member should contribute to the subject of grove management with a view to bringing out the varying conditions and hence different methods in evidence in the various sections of the state where citrus fruits are grown. At the 1913 meeting of the Society, as a member of this same committee, I briefly recounted the methods in vogue in my immediate neighborhood; viz., on Terra Ceia Island.

We have a low hammock soil that is almost black, underlaid in most places at two to five feet with a so-called hard pan. The most noticeable feature of grove planting on the island is perhaps close planting, 100 to 200 trees to the acre being the usual range, though a few small settings have close to 400 trees to the acre. Grapefruit is chiefly grown and on account of its shallow rooting habit, and vigorous growth, the rough lemon stock is almost universally used. The trees are set on mounds or ridges for drainage, and some of the best groves are also tiled for drainage and sub-irrigation. The fertilizers used are usually relatively low in ammonia (the soil containing much latent nitrogen), and high in potash, 10, 12, or even up to 16 per cent. Ground limestone

has been found to be quite advantageous in sweetening the soil and invigorating trees. Where the hard pan comes close to the surface (2 to 3 feet), dynamiting the subsoil has proven to be very beneficial, seemingly curing bad cases of die-back, in my own experience, and rendering the trees better able to withstand both drouth and extreme wetness.

Cultivation in a close planted grove (carrying 200 trees to the acre) is limited after the first few years to an occasional hoeing, simply to keep the rank growth of weeds and grass from robbing the trees of moisture and plant food. A moderate growth of volunteer cover crops, especially of legumes such as beggar weed, is permitted and encouraged to keep up the humus content of the soil, and thus maintain even temperature and moisture conditions.

Fertilizer is simply broadcasted through the grove and the occasional hoeing can usually be timed to follow an application of fertilizer. I have found it economical and satisfactory in every way to apply separately the fertilizer materials instead of using always the complete fertilizer mixture. I have used nitrate of soda in the spring, phosphate in April and May, and sulphate of potash in two small applications during the summer. With heavy bearing trees, a complete fertilizer is later applied, in October or November.

Spraying for rust mite, melanose, scab, etc., has not been necessary until the last

two or three years, at least very fine bright fruit was usually produced without spraying; but we now find we must face the spraying problem, if we would produce marketable fruit. With thick planted groves this becomes indeed a problem. Large power sprayers are out of the question. However, a barrel mounted horizontally on a low sled, answers the purpose very well, especially where hydrants are distributed throughout the grove, convenient for filling the spray barrel. A double-acting pump with a suction hose leading to the barrel will furnish pressure up to 75 pounds if the air chamber of the pump is of good size. This will supply two leads of spray hose. One mule can draw the outfit; the driver does the pumping and alternates with those operating the spray leads. One advantage the sled has over a wagon is that it may be dragged across open drain ditches, where they are not wider than one foot.

As to the sprays advisable to use, this is fully covered in other reports. Spraying must be supplemented by careful and systematic pruning and the prunings removed from the grove. It is only by attention to these so-called refinements of grove management that we may hope to produce a large percentage of high-grade fruit, and it is only the grower who can and will produce this large percentage of high-grade fruit that will continue to be a grower of citrus fruits.

## PRODUCTION OF CITRUS FRUITS

Eugene L. Pearce, Clearwater, Fla.

*Mr. President, Ladies and Gentlemen:*

As the title implies, this paper will discuss practical considerations connected with the production of oranges and other citrus fruits. Of necessity it must be a condensed statement and merely suggestive, since the time allotted is brief and there are many matters of interest to come before the Society.

In further explanation, I wish to confess with apology that no new or startling information will be offered, for the simple reason that I possess no information which is not a matter of common knowledge to all growers who make orange production a business. The discussion will be in most respects academic, dealing with certain principles which for the present seem to be established, and of benefit only to the grower who has yet to produce his first car of oranges.

In creating or building an orange grove, the first consideration, and possibly the most vital, is the selection of the land. Generally speaking, not more than one acre of land in twenty is suitable for the growth of citrus fruits. Reference is made to land in Florida within the orange-growing belt.

The fact alleged arises from a number of conditions. Certain lands are swampy or do not drain readily, while other lands are closely underlaid with hardpan, also failing to drain. Some lands are covered with a natural growth of scrub-oak, indicating that these lands drain too readily.

Lands on which live oaks or large pines grow usually meet the specifications. The better grades of Norfolk fine sand are orange lands. Portsmouth fine sand is to be avoided. However, the old pioneer does not care what terms we employ. He is able to select suitable orange land without the assistance of Tallahassee.

Let this point be emphasized: Choice as to the land is vital. Years of painstaking labor will not overcome such initial error of judgment or inexperience. Thereafter it is a handicap which is always present.

In clearing the land selected, do so by contract if possible, making some advantageous disposition of the wood. In the contract, it is well to stipulate that the land be plowed by the contractor, since all the clearing is not above ground. After clearing and plowing the land, give it further preparation. Remove as many roots as possible by cross-plowing; also by a liberal use of axe and grubbing hoe.

This preparation minimizes the danger from wood-lice, as these insects seriously injure many young citrus trees planted in virgin land. For a like reason, do not permit quantities of wood and brush to go to decay on the edge of the clearing.

In the selection of the trees for planting, decide on varieties which have previously been grown to advantage in the section where grove is to be located. For instance, the Pineapple orange and the King cannot be grown profitably in cer-

tain sections of Pinellas county; whereas these varieties can be profitably grown in other parts of the state. In further consideration, it is recommended that the prospective purchaser consider only the trees of nurserymen known to be reliable. In nursery stock, deception can be very easily practised, and it is a form of deception the ill effects of which are cumulative. Hence, it is quite important to buy from a man whom you have good reason to believe is square.

Stipulating variety and receiving it will not entirely protect you. Specifying height and inspecting the trees in the nursery is not enough. Exacting a certain caliper is not sufficient. You may receive the variety demanded; also an old dwarfed tree, passed in the nursery as unfit during two or three previous seasons. You may purchase a five-to-seven-foot tree which has been trained to its spindling height without possessing a vigorous root system. You may receive an inch-caliper tree, produced by repeated pinching of the bud, and with a root system not so strong as a three-quarter inch tree should possess.

It is well, unless purchasing from a highly responsible nurseryman, to select one-year-old buds, whose leaves still cling to the trunk. One should insist on purchasing trees from unbroken rows when buying two-year-old stock. While such an attitude may at times be unreasonable, under such method it is at least certain that a survival of the unfittest does not fall to your lot. The best trees are none too good. Inferior trees in the end prove very expensive.

In planting, set the trees so that the

top of the crown will be about one-half inch below the level of the ground. The trees will afterwards settle slightly. Trim all broken roots. Place lateral roots horizontally and water-pack. Never plant excessively high; that is, with the tree on a pronounced mound to avoid excessive moisture. Trees so planted seldom thrive and there is more land in Florida where oranges may be grown commercially than will ever be cleared for that purpose.

December and January are the best months for planting. Trees set in November will often force a growth the last of January, and a very slight cold will destroy this growth, further shocking a tree which had previously endured the shock of transplanting from the seed beds, its top removed when budded, and a second transplanting from the nursery to the grove—all within the space of two years. A fourth shock is one too many and seriously affects the vitality of the tree. Any planting later than January is unfavorable by reason of the fact that the dry season usually begins by the first of April or earlier, and a later planting than January does not permit of sufficient time to acquire an adequate system of fibre and lateral roots before the intense heat of April and May. Also the sap is rising by the fifth or tenth of February, and no tree should be transplanted with the sap up.

During the first ninety days water frequently.

As to general tillage, there are several methods, all of which yield satisfactory results if consistently followed. The clean cultivation advocate must provide humus by hauling it into his grove. The man

who plows deep and the man who believes in shallow plowing have each been successful. The man who sprays and the man who declines to spray have each grown superior fruit. The man who irrigates and the man who does not have in many instances produced equally heavy crops, though in quantity the balance is with the irrigated grove, and carrying quality is usually with fruit which has not been irrigated.

In some respects a young tree requires more attention than an established tree. Under my personal management frequent hand cultivation is the rule until the trees are four years old. They are fertilized often and sparingly. For working stock a scuffle hoe shaped without heating from an old cross-cut saw is useful. Some such complicated process is necessary at present to secure a blade which is harder than the scuffle hoe generally sold. The hard blade obviates the necessity for frequent filing.

This hoe saves much hand labor, as one man with such a hoe will destroy more grass than two men with hoes of the ordinary type. For aerating the soil after the use of the scuffle hoe, a four-tined potato digger is employed. There is a saving of labor after the use of both tools, and better work.

For horse implements, the turn-plow, the improved disk harrow, the Acme harrow, the mower and horse rake appear to be the most effective.

The mule is the most reliable and the cheapest traction engine in existence for all-round work. Compared with the horse, he eats less and does more. Stocky mules of average weight are more satis-

factory than mules excessively large or small. A mule in good flesh eats no more than a poor one, while the extra weight furnishes additional energy.

From my observation, the effective grove unit, capable of producing fruit at the least cost per box, is a three-man, two-mule grove. The object is to provide a sufficiency of labor and the minimum of waste and overhead expense. The force mentioned will care for three thousand trees, approximately.

It is economy to have sufficient labor at a time when it is needed. When young trees become wrapped in grass, more labor is required to work them properly than if the necessity had been met at an earlier date. The same is true with regard to land in the open "middles" subjected to clean cultivation in the spring. Should labor be unavailable when required, grass is eventually subdued at an increased cost. The old adage "a stitch in time" has direct application in the management of an orange grove.

It will pay any grower in Florida to produce his own hay, and it is worth while to build a barn large enough to store the hay when produced. Stacking hay is bad practice, necessitating a double handling when the stack is broken and the loss of considerable hay from leaky stacks. It is also poor economy to provide more tools than shelter for their protection. Bear in mind as well that one inroad of cattle will damage a grove more in dollars and cents than the expense of maintaining a good fence.

Clean cultivation in the spring and cover crops in the summer and early fall is

the general practice of Pinellas county growers.

Leguminous plants build up the soil of a grove, but beggar weed in my section the third or fourth year offers free nitrogen at a prohibitive price. It is impossible to calculate just how much nitrogen the soil receives from this source, due in part to variant seasons, and a coarse crop of fruit results in a greater money loss than can be saved by avoiding the usual purchase of chemical ammonias.

When a soil has been built up by two or three successive seasons in beggar weed the plant may be eradicated by harrowing after the first summer rains. Beggar weed seed germinates rapidly and the young plants may be destroyed as they break from the soil. Other grasses will come later, and the cheapest protection against cold is banking. Some growers bank even young seedling grapefruit, to protect the crown. Doubtless oil heaters offer much greater protection to both the fruit and the tree, but the smutting of the fruit, the expense, the small net return for citrus fruits this year and last, as well as the fact that our cycle of winters free of extreme cold has made us careless—these various causes have somewhat discouraged the use of fire pots in Pinellas county.

In my opinion, every grower should at least know enough of soil chemistry to write a fertilizer formula and calculate its analysis. With this knowledge as a basis, the traveling representatives of various fertilizer manufacturers will be able to complete the grower's education in practical chemistry, adding considerably to his vocabulary touching such words as

'reaction, combination, acidity, alkalinity and affinity.'

Trees of the same stock and variety should be planted in solid blocks, in order that they may be fertilized intelligently, within our present knowledge. Various stocks seem to require different amounts and proportions of fertilizer material. The grower should study his land, planting sour stock on the lower land, and in sections where freezes are infrequent, rough lemon on the higher land. Grapefruit stock does best on land neither excessively high nor low.

On three points all growers seem to be agreed—first-class land, first-class trees, and a liberal amount of fertilizer. Soil is dead without humus and unproductive. Florida lands are usually deficient in lime.

With bearing trees, except in extreme cases, it is not advisable to omit chemical ammonia from the early spring application.

Concerning diseases and insects: These problems will doubtless be covered in another paper, for which reason they will receive limited attention here. It might be well, however, to touch a few points, as we are after every possible angle.

First, no grower should neglect to avail himself of the good offices of the Experiment Station at Gainesville. In time its staff will reduce much inaccurate knowledge to an exact science. In the case of a new disease, the grower, barring scientific attainments and comprehensive method, is for a short time on even terms with the plant pathologist and the entomologist. Under such circumstances the grower must either wait for the department to establish the cause of the disease

and the best treatment, or he must think and act for himself.

As an instance in point, the scaly-bark or nail-head rust disease was first brought to the attention of the Experiment Station some six or eight years ago. Nothing whatever was known of the new trouble. At that time it suddenly became quite virulent in certain sections of Pinellas county. The Experiment Station responded promptly, but meanwhile one man whose grove was badly infected, decided to attempt a simple treatment on his own account. He pruned his trees carefully, wherever the infection was present on limbs or twigs. All pruned branches were burned. A few weeks after pruning, the trees were fed as strongly as seemed prudent. The new growth in turn became infected, but not to the same extent as the old growth. In six months the pruning was repeated. The policy of maintaining the vitality of the trees by any means possible was continued. At the end of two years, after four applications of saw and clippers, the trees were virtually free of the disease. Evidence of the disease on the fruit had been reduced from approximately eighty per cent to less than one per cent.

The instance narrated merely adds its slight weight to the law of immunity: If the vitality of the animal or plant attacked by disease can be maintained for a certain period of time, the animal or plant eventually develops within itself powers of resistance. This is not a scientific explanation, but it will convey the idea intended.

In my opinion, the attack of lemon scab will be overcome in the same way—in

this instance by spraying as well as pruning—the main consideration being to maintain the vitality of the tree until the attack weakens.

With fruit at low prices, spraying does not seem to pay—general and continuous spraying. The insect and fungus friends of the grower are cheap laborers. When for any reason they are manifestly too few and the damage is severe, they should receive assistance, using every possible care in the selection of spraying chemicals and the method of application, to do the least injury to the grower's friends.

Pruning is a cardinal rule of horticulture. A pruning which is not too drastic puts new life into a tree. The removal of all dead and diseased wood forestalls various attacks of insect and fungus enemies.

Ants may be kept within bounds by uncovering the hills and thereafter sparingly applying a mixture of crude carbolic acid and air-slacked lime, reduced to a brown powder.

Citrus trees should be fed liberally, but it is well to remember that an orange tree can be over-fed, our good friend, Colonel Shepard, to the contrary. I persist in terming the condition resulting from an excess of ammonia, ammoniation. (Possibly the hypothesis itself indicates persistence.) The fertilizer experts term the condition, from whatever cause arising, malnutrition. Stiff, new growth and multiple buds are among the most noticeable indications, and on observing these indications, the grower should at once take steps to restore a balanced ration. By increasing the proportion of potash in summer and fall applications of fertilizer,

and by discontinuing for a time the use of nitrogen-producing plants, for the legumes appear to be a contributing cause, the balance may usually be restored before the fruit is greatly affected and the trees have lapsed into that advanced stage of malnutrition known as dieback. When these steps do not prove effective, non-cultivation of the soil and elimination of all fertilizer will usually conquer the condition, and it is cheap treatment. Over-feeding is not the only cause of die-back, but gout and dyspepsia bear a close and frequent relation.

Bluestone inoculated into the sap or scattered broadcast is advocated by some growers as a remedy for die-back. Personally I am not certain that the last mentioned use of bluestone has ever resulted favorably. However, liquid bluestone does not leave the experimenter long in doubt. It speedily converts the condition from die-back to stone-dead.

In conclusion, while citrus culture is at present conducted to a certain extent by guess and as a science has few rules which have been firmly and exactly established,

we have at least more theories than can be formulated within the narrow scope of this paper. Bearing in mind my own limitations, it has been the intention merely to suggest a few of the practical problems which confront the grower of oranges. Rigid economy on broad lines is necessary to wring the wherewithal to conserve and increase, and this paper reflects the close calculation of ways and means, the sordidness, if you will, on which successful business is usually based.

There is, of course, another side. We will call it the ideal. With this side the paper here offered has no concern. Orange blossoms may be associated with brides; orange groves may suggest sub-tropical skies, golden fruit and eternal summer. Touching this aspect we have nothing to do. Three blades of crab grass may at times be induced to grow where one blade of wire grass grew before, but even this practical suggestion we accept grudgingly. All that is of present moment is the production of a superior grade of oranges at  $49\frac{1}{2}c$  per box; of an equally superior grade of grapefruit at  $24\frac{3}{4}c$ .

# Orchard Heating

H. B. Stevens, DeLand, Fla.

*Mr. President, Ladies and Gentlemen:*

I have prepared no paper on orchard heating, so I do not propose to take very much of your time. If you want anything in the minutes on orchard heating, you will have to help me out. How many in this audience fired any during the past winter. I see three hands up. We will have a Sunday school class. Will Mr. Waite and Mr. Stevens and Mr. Billings come down in front? Mr. Billings, you are from Hastings, aren't you?

Mr. Billings: Yes, sir.

Mr. Stevens: How many times did you fire this winter?

Mr. Billings: One time.

Mr. Stevens: What months?

Mr. Billings: March.

Mr. Stevens: What did you use?

Mr. Billings: Crude oil.

Mr. Stevens: What heater?

Mr. Billings: I don't know the name. It is just a small, square box.

Mr. Stevens: At what temperature did you start your fire?

Mr. Billings: 31 degrees.

Mr. Stevens: How low did it get that night?

Mr. Billings: 28 degrees.

Mr. Stevens: That was the 22nd of March?

Mr. Billings: Yes, sir.

Mr. Stevens: Mr. Waite, what month did you fire.

Mr. Waite: March and April.

Mr. Stevens: What dates?

Mr. Waite: The 22nd and the 1st or 2nd; something like that.

Mr. Stevens: What heater did you use?

Mr. Waite: The National.

Mr. Stevens: Crude oil?

Mr. Waite: Yes, sir.

Mr. Stevens: No other fires but that?

Mr. Waite: That was all.

Mr. Stevens: How many fires to the acre?

Mr. Waite: About 100 to the acre; it depends on the trees whether they were large or small and whether they were planted thick or thin.

Mr. Stevens: How many acres did you fire?

Mr. Waite: About 25 acres.

Mr. Stevens: Did you have any trouble with water in the oil?

Mr. Waite: Once in a while.

Mr. Stevens: Did it cause any trouble in your stoves?

Mr. Waite: It boiled over.

Mr. Stevens: Did it have any bad effect on the stove itself?

Mr. Waite: Not at all.

Mr. Stevens. At what temperature did you begin to fire?

Mr. Waite: 31 degrees one night and 30 degrees the other.

Mr. Stevens: What condition was the grove?

Mr. Waite: In bloom.

Mr. Stevens: Did you have any good effects from the firing?

Mr. Waite. One of the trees was burnt by the fire; it was not frosted. (Laughter.)

Mr. Stevens: Was any injury done to the trees you did not fire?

Mr. Waite: Occasionally. Just a little bit frosted, here and there.

Mr. Stevens: Mr. Billings, did anyone fire except you?

Mr. Billings: No, sir.

Mr. Stevens: Were other groves hurt at all?

Mr. Billings: I know of one that was hurt. Most of them were not.

Mr. Stevens: Now, gentlemen, I have asked these questions for two reasons; one is I have been firing for about forty years. I began firing the first day of December, 1876; nearly forty years ago, and I have had wonderful success with firing; that is, I got the fires going and saved my fruit. The other fellow who did not fire saved his, too. (Laughter.) I fired on the 21st of November. I started my fires when it was down nearly to 27 degrees. It only went down to 27 degrees. I fired fifty acres that I was trying to save the fruit and new growth. I did save it I thought. In one of the groves where I did not fire, some of the trees were killed clear to the ground. But some of them were not hurt at all.

Cold goes in spots. When I fired the 22nd of March, I was caught napping. I think it was the only time I was caught napping since I have been in the business. That night it was 44 degrees at 10:00 o'clock, and cloudy, and I had no idea it would clear and the temperature would drop so quickly. About half past two, I was called and it was down to 30 degrees. The groves were full of bloom. It had cleared up and the temperature had dropped steadily. We got the men out and started the fires in the most exposed groves as soon as possible; we fired twenty acres in a few minutes. In fifteen acres there were 400 fires; in that fifteen acres there were about 2700 trees. In that grove, the cold did some damage in spite of all the fires. In the five acres we fired, I saw no damage; nor did I see any damage in the groves we did not fire.

A few nights later, on the 24th, we fired again, except the five acres which I did not fire, they were not hurt.

I use coke stoves in every place except about 200 oil heaters: the Marks heater. In the fall, when I fired them, I had poured in kerosene with just about enough crude oil in it to keep the darkies from stealing the kerosene. They worked splendidly. Afterwards I got crude oil and filled them up. This time when we fired, we got them going first and when we came around later, we found a good many had exploded. The base sat there with a great lot of burning oil around on the ground, part of the stove here and part over yonder.

Mr. Hebmer had informed me that every time he used his heaters, he had to

draw off a full bucket of water before he got to the crude oil.

In conclusion, let me say that in all the years of my firing, I do not see that I have saved enough to pay the interest on the cost of my stoves.

Mr. Skinner: I might make a suggestion about this heater proposition that Mr. Stevens speaks of; and that is, when you put oil into the tank, you have two openings; one six inches below the other. Then you can draw the water from the lower opening and the oil from the top opening.

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### G. M. Wakelin

*Mr. President, Ladies and Gentlemen:*

The chairman of this committee has asked me to give some information on handling and operating oil and heaters.

The first step is to provide adequate storage capacity for enough oil to burn at least for three nights, say thirty hours. Damaging cold seldom lasts more than two nights, but it is wise to have plenty in reserve. It takes considerable time to get a new supply into the grove, usually more than one expects. The best plan yet would be to store a supply for the whole winter, and be absolutely safe. Cement tanks are all right for the purpose, it is said, if properly made and plastered; (otherwise the oil will percolate) but not much cheaper in first cost than metal. Oil may be stored in tanks at a central spot for distribution thence by tank wagons or may be placed in tanks of smaller capacity, 800 gallons or so, at intervals through the grove. The latter plan is well enough for an emergency supply or

sufficient for a small installation, but calls for dipping out, filling and refilling by hand buckets—laborious operations.

The ideal plan is to have the cisterns, so located on a side hill that they may be both filled and emptied by gravity. This being seldom possible in Florida the next best plan is to place metal tanks on a framework high enough to give a quick gravity flow into the tank wagons. Of course that means a pump of some kind to put into the tanks the initial supply, but as you will have to pump one way anyhow it is far better to pump *in* than have to pump *out*, when minutes may count and delays may be costly. Our plan when completed will give us 10,000 gallons reserve in a cement cistern, and 10,000 gallons more in two metal tanks on a framework. There is no likelihood of oil ever being any cheaper. A 2-horse power pump run by the sprayer engine handles the oil very quickly.

Now as to kind, get the regular fuel oil. Mexican crude is cheaper, but it will prove troublesome even in the draft heaters. It contains upwards of 40 per cent asphalt, which positively will not burn up in an open heater, and even in the draft heaters with careful handling will leave a layer of hard ash difficult to get out when cold unless every drop of asphalt has been burned up. It was a surprise to find by test that the two oils burned just about the same length of time and gave off similar amounts of smoke. The crude oil, however, left a large amount of soot in the stack; the fuel oil hardly a third as much, and no ash whatever. Fuel oil must be primed and lit in one operation as the gasoline mixes so

readily with the oil that it will not easily catch a few minutes after application.

New heaters should be dipped all over. Mexican crude serves very well for this purpose. If you are in a rush to get them out this plan may be used. Fasten a stout box with the front side cut out all but a strip at the bottom to the back of your wagon under the tank spout. Keep a little oil in the bottom and place a burner on this when filling. This oiling will preserve the bottom for one season, and after being filled and placed the other surfaces may be covered by hand with a brush as time serves, but do not be too long about it.

In putting out the burners we have a wagon loaded with bowls and tops follow the tank wagon through the grove. As indicated above, the bowls are filled and placed two rows on each side between the trees, but not in the squares. This leaves the rows open one way and puts 65 to 70 pots to the acre. A quick shut off valve in your tank is a necessity. While the tank wagon is being refilled at the main supply the other hands can fit on the tops, stacks and stack covers. We are depending on tank wagons to refill even at night, using special five-gallon buckets to carry oil to the burners. It would be best to begin refilling if weather conditions are very bad some time before actually needed, but better yet, to have burners of sufficient capacity to burn nine hours at full blast.

We have been painting the covers once a year and the bottoms of the bowl are automatically oiled when filled. When taken up the oil is hauled back and pumped into the storage tanks, the bowls nested and turned upside down and put

under shelter. When the nests are thus handled the oil adhering to the inside of one bowl drops down on the bottom and sides of the bowl within it. This method seems to keep them in a good state of preservation without further dipping. If they are burned they will have to be dipped again.

In case of cold without rain we expect to have all burners ready for lighting, with drafts pretty well open. Six men with gasoline torches can then light them very rapidly, so we can afford to wait until the last moment. If it is raining and freezing too, we will have to begin earlier, allowing for time to open and light at one operation. This is not usually the case as the rain stops before the cold comes in, but it happened once. After the burners are lit the men will come back and regulate the drafts to the lowest point that will hold the temperature. All authorities agree that it is much easier to keep up the temperature than to raise it again when once fallen. One should therefore begin on time. The actual temperature to begin operation depends on several factors. Oranges would not freeze above twenty-eight degrees. Not even then if the temperature does not last long. If the trees are dormant they will stand it also. With trees in a normal winter condition, it will be safe to wait for a temperature of thirty degrees, with indications of further drop before firing, provided, of course, that it can be done in a reasonable time. The previous rate of fall of the mercury gives a pretty good indication of what the next morning's cold will be. The barometer also studied

in relation with the direction of the wind gives good advice.

We made our first installation four years ago but so far we have never fired. Doubtless we have much to learn about the actual operation. These preparations for orchard heating are expensive and handling the oil is a nasty job, but if we save one crop one time all costs would be more than balanced. A freeze is likely to strike the orange section any winter; indeed the probability increases with every passing year. Some localities had cold last November sufficiently severe to damage fruit and even cut back trees. Best be prepared!

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#### DISCUSSION

Mr. Hart: I am hoping that at our next meeting, we will have a little more discussion from the floor. This time there was almost none of it. The time was almost all given to listening to papers from the stage, and addresses. I think it is very desirable that we should get the opinions and hear the experiences of members of the Society and it adds immensely to the value of the report we get out.

I have just wondered in the matter of Mr. Stevens' report on Orchard Heating. You will remember Mr. Stevens' inference was that there was no use in protecting groves. He said he had protected his groves for forty years in different ways and tried all methods, and where he had fired and saved the crop, his neighbors who had not fired, saved theirs.

Now, in my opinion, that is the wrong impression. I know I am \$16,000 or \$17,000 better off today than if I had not

had protection. I would dislike to have the impression prevail that protection of the crops in the northern parts of the state, is not necessary.

I am strongly in favor of having more time given to discussion in future meetings. I appreciate the difficulties of preparing beforehand a program that will work out just as you want it to, but I think, if necessary, we had better leave out some of the papers and have more discussion from the floor.

Mr. Skinner: I think Mr. Hart is entirely right about that. I sometimes discuss from the floor, more, perhaps, than I should.

Now, this meeting this morning I would not have missed for anything. I think it is one of the best we have had. I think a great deal of it. Those who have gone do not know what they have missed.

In regard to this fire protection, I have spent a good deal of money in fire protection. I felt I could not afford to be without it, even if it is yet an experiment. But I do not know how we are going to arrive at conclusions if we do not try these experiments out and find how they work in a practical way.

Take the advance in orchard heaters. The heater five years ago was a joke. They get water in them, it is true, and we had to learn all these defects by experience. Take this new heater that is on the market, it is something we have all been wanting; it generates the gas in the lower part and consumes it in the stack. But in the construction of the heater there is one weak point, and that is the point where the collar comes out of the top of

the sheet; my understanding is that it is a .(slot piece) and wherever there is a seam, you get rust. And where you get rust, there is trouble with the heater system.

I do believe that no man who has money invested in a grove can afford to take a risk and do without insurance of every kind.

In my neighborhood, a man and his family worked all night long protecting their grove, and saved it only by their efforts. That was the turning point of that man's life. If he had lost his grove, he would undoubtedly have been a poor man all the rest of his days; as it is, he has been a wealthy man ever since. You couldn't tell him that orchard heating does not pay.

Mr. Weeks: One other point ought to be brought out with regard to these heaters, and that is the covers. We have had some experience with heaters, we have had something like 20,000 of them. We have had more or less trouble with covers blowing off. We went to the expense of having new covers made weighing a little over a pound, yet we find there

are currents of air that will blow those off, sometimes ten feet away from the fire. This new heater Mr. Skinner speaks of, there is a possibility of the cover being blown off.

We have had to resort to the practice of putting dust on them; first we get bricks and put them around the trees, but they were distributed and scattered, so now we have men go around and put dirt on the covers. This has worked very nicely. Of course, it is a little more trouble, perhaps, but it serves the purpose.

Mr. Skinner: They will send you another cover two inches longer, if you kick on it. I think it is one of the best fire pots I ever saw.

Mr. Waite: We purchased National heaters about a year ago. Speaking of the value of fire in a grove, I think it was in 1905-06, we had a very cold winter and Mr. ——— conceived the idea of protecting his grove with fire, and that winter he saved the trees. It would have taken us four years to grow the wood, if it had been lost, and get back that 32,000 boxes of fruit we saved.

# Irrigation

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## RESULTS OF SOIL MOISTURE TESTS IN IRRIGATION EXPERIMENTS

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F. W. Stanley, Orlando, Fla.

*Mr. President, Ladies and Gentlemen:*

Last year while at our Palatka meeting, I promised to give you some of the results of our experiment, with soil tests in connection with furrow irrigation, and also showing the effects of cultivation in conservation of available moisture for the tree roots.

The charts shown are very general in character, as too much detail is not possible in a short paper, so the conclusions must be taken to apply to soil and crop conditions similar to those at, and near Orlando, where the soil is very light and sandy and the clay substrata is six or more feet beneath the surface.

(The charts are made to show graphically the path of the moisture after running in open furrows for 40 minutes, and for 15 minutes in the Walter Drennen Grove at Maitland, showing path of moisture both in percentages of soil moisture contained and the cross sections of the same. Another chart shows graphically percentage of moisture contained in the soil in cultivated and noncultivated groves also in cultivated and noncultivated open space, where the moisture can not be effected by tree roots).

The conclusions derived from the charts are very decided. It is plainly shown that the sandy soils of Florida will not permit running water for long lengths of time in open furrows as is the common practice among California irrigators. If the soils are as loose and porous as at Maitland, it is a good plan to run water in open furrows not over 20 minutes. It is seen that running water for 40 minutes results in considerable waste below the 6th foot, which probably means that the water has gone beyond the reach of any tree roots. In fact it is not likely that any appreciable amount of feeding roots from the orange tree reach below the 4th foot, while most of them are between the surface and the second foot. Capillary attraction will draw water upwards for several feet in some soils but this action seems to be very slight in the sandy Florida soils, especially when the soil gets very dry.

When water was run fifteen minutes in open ditches or furrows it is seen that there was no waste below the third foot, at any time, which would mean that the tree roots probably took up about all the moisture. The moisture curves for suc-

ceeding days show that it has disappeared with great rapidity. It was also noticed that the trees perked up within a few hours, which would tend to substantiate the theory that much of the moisture had been taken up through the tree roots. The comparison of the soil moisture in sections where no tree roots could reach, also shows a decided difference in the moisture content in favor of the treeless section.

The charts comparing cultivated and noncultivated groves were made from data collected from soil borings made in May of 1913 and 1914. The soil in the grove was very dry, so dry in fact that the sand would run from the hand like perfectly dry beach sand. The actual percentage of soil moisture contained in the open space shows that cultivation has conserved a great deal of moisture, especially within the top three feet. (The noncultivated space being very dry to the 4th foot, while the fifth and sixth feet show some moisture.) The cultivated treeless space shows that the soil is in good condition all the way down, containing the moisture within the top three feet of soil. On the other hand the difference in the moisture content in the cultivated and noncultivated grove show very little difference, both being very dry. (The cultivated grove showed a little more moisture but both were dust dry.)

The conclusions to be drawn from the above would tend to show that cultivation conserved moisture. (Shown by comparison of noncultivated spaces). But that the tree roots take up this moisture very rapidly, and when the drouth is protracted all of the available moisture is taken up, so that continued cultivation would be

of little or no use. Yet it must be seen that cultivation has done a lot of good as the trees have had the benefit of the moisture that otherwise would be lost by evaporation and grass and weed roots. So it seems apparent that cultivation will tide over a drouth of short duration, but that irrigation would be necessary to materially benefit the grove over a long drouth. It was shown last year that long drouths can be expected about one year in two, taking averages over a period of 25 years although several wet years may follow in succession.

The furrow tests are also conclusive. They show that if furrow irrigation is to be practiced, it is wise to have large heads of water, and get it over each tree row rapidly. Or if the grades are not fit for large heads of water, it would be a good plan to use portable pipe made from galvanized sheet iron. (Using nothing less than six-inch sizes, made of 24-gage iron in ten-foot lengths.)

The use of terra cotta pipe for mains and laterals has been taken up in detail for the last three meetings. The favorable rains of the last few years have not called for much grove irrigation but the dry years are coming and the man that is prepared is the man that is going to make the money. It has been shown this year that when everybody grows big crops, no one gets big prices. Let's wait and see what the man will get who has a good irrigation plant, when another batch of those dry years come around. Most of us know what many of the growers will get who can't irrigate.

In conclusion it should be understood that the reason for irrigation is to apply

water to the soil, and to apply enough you must have a pumping plant and distributing system of large enough capacity. I have gone into much detail on the use of terra cotta pipe. I want to emphasize its use again. First, it is cheap. Second, it never wears or rusts out. Third, don't

use it until you know how to lay it or you will burst the pipe. Our office is always willing to give engineering aid on the construction of any irrigation plant, so I won't enter into detail here but will be glad to see any of you personally.

# Citrus Canker

## ITS ORIGIN, DISTRIBUTION AND SPREAD

E. W. Berger, Gainesville, Fla.

Mr. President, Ladies and Gentlemen:

When and how citrus canker was first discovered in Florida by the Inspector of Nursery Stock, and Deputy Inspector E. V. Blackman of Miami, its distribution in the Gulf States, its introduction from Japan, and original distribution in Florida, was told by the writer at the meeting of this Society at Palatka last year (See Proceedings, Florida State Horticultural Society, 1914, p. 120.)

A rather concise but detailed account by the writer, on the History of Citrus Canker, together with papers by Prof. H. E. Stevens and Mr. Frank Stirling, were also read at the last Citrus Seminar at Gainesville, Sept. 23, 1914, and printed in Bulletin 124, Florida Experiment Station, October, 1914. A still more complete account on its history in Florida was later published by the writer in *The Florida Grower* of November 14, 1914. Bulletin 122, Florida Expt. Station, by H. E. Stevens, April, 1914, is probably the first document on this disease ever printed. In May, 1914, Dr. F. A. Wolf and A. B. Massey, A. & M. College, Auburn, Ala., published Circular No. 27, independently corroborating the results given in Bulletin 122. In October, 1914, appeared

Bulletin 150, Louisiana Expt. Station, by C. W. Edgerton. For the purpose of this paper, therefore, only the briefest kind of summary on its origin and introduction into Florida will be offered.

### ORIGIN AND INTRODUCTION.

Citrus Canker is present in Japan and specimens have been received from there at the Florida Expt. Station. The specimens had been labeled "Scab" by the Japanese.

During a visit to the Gulf States in 1914, (March 14-April 5), the writer found the disease in Alabama, Mississippi, Louisiana and Texas. Information elicited there from nurserymen and others was always to the effect that the disease had first been observed on C. T. stock recently obtained from Japan. The infection started at Monticello also had its origin in C. T. seedlings from Japan, planted in the Spring of 1910. As per statement of the owners the infection at Silver Palm was brought from Port Arthur, Texas, in January, 1912, on sour seedlings.

As to the distribution of Citrus Canker in Japan or whether it exists in other foreign countries nothing is known.

The writer saw, what now appears to have been the first citrus canker seen in Florida, at Monticello, Sept. 30, 1912. Specimens were collected, as the thing looked suspicious, and referred to plant pathologists, who diagnosed it as common citrus scab. No stock was sold out of the block, less than one acre, as the owners became financially embarrassed and the stock was temporarily abandoned.

In April, 1913, specimens from Silver Palm, South Dade county, were received at the Experiment Station (Bul. 122) and the disease recognized as something different than scab; but the Nursery Inspector did not learn of this until he had himself received specimens from there. In July, 1913, under date of the 18th, the first specimens and a letter were received from Deputy Inspector, E. V. Blackman, appraising the inspector of a new disease in a nursery at Silver Palm. On July 28, the Inspector personally visited this nursery, saw the disease and collected specimens. Certificate was withheld and treatment recommended which resulted in materially reducing the amount of infection. The nursery was again visited on December 15, 1913 and April 21, 1914, and comparatively few specimens of the disease found.

On Sept. 23, 1913, the block at Monticello in which the suspected material had been found on Sept. 30, 1912, was again visited and the infection recognized as being the same as the one in Dade county. Certificate was withheld and the block later grubbed up and burned. Two other isolated blocks at Monticello found infected in Sept., 1913, were later voluntarily burned by the owners.

Preliminary reports on the presence of a new citrus disease in Florida were made at the Citrus Seminar at Gainesville in Oct., 1913, by Prof. H. E. Stevens and the writer. On February 11, 1914, the disease was discussed by the writer at a Farmers' Institute at Lakeland. In March, 1914, Bul. 122, Citrus Canker, Fla. Expt. Station, was published and mailed to the public in April. The disease was again discussed in April, 1914, at the Palatka meeting of this Society. In May, 1914, the first specimens were received at the Experiment Station from a grove in South Dade County. On May 19th, the writer conducted Mr. Frank Stirling, a deputy inspector of nursery stock, but under pay of the Florida Growers and Shippers League, to Silver Palm, Dade county, to look up infected places, and to advise and assist in the treatment of infected stock as directed in Nursery Inspector Circular 8. On June 4th, 1914, citrus canker was discussed at a large meeting of growers at the Redland P. O., Dade County. Mr. Stirling has told us in Bulletin 124, Florida Exp. Station, what happened after that and will tell us more today.

#### DISTRIBUTION IN FLORIDA.

In view of the fact that Mr. Stirling will give details on the distribution of citrus canker in Dade county, I shall limit myself to the distribution outside of that county.

When at the Citrus Seminar on Sept. 23, 1914, the growers of the state had taken steps to raise funds for the purpose of tracing and inspecting every suspected

shipment of stock sent out from Dade county, or received from other states, the Florida Growers and Shippers League, under whose auspices the money raised was to be spent, placed eight additional inspectors in the field. This was in addition to Mr. Stirling whom the League had employed since the middle of last May. The additional inspectors, like Mr. Stirling, were also appointed Deputy Inspectors of Nursery Stock in order to give them a legal status in the nurseries. This arrangement was, furthermore, fortunate as it permitted the Inspector to use their reports on nurseries for issuing certificates, and besides, by consent of the League to use them in making inspections of nurseries in the territory to which they were assigned, because the Inspector would have found it impossible to have made any but a few of the 200 and more inspections himself.

These eight additional inspectors are F. M. O'Byrne, A. M. Henry, Edgar Nelson, I. F. Hunter, L. A. Daniel, J. A. Miller, D. M. Badger, and Virgil Clark.

It may, furthermore, be explained here that, under the circumstances, the single Inspector provided by the Nursery Inspection Law of 1911 has become wholly inadequate to meet the demand for inspection. In 1911-1912, 70 nurseries were inspected; in 1912-1913, 102; in 1913-1914, 142; and in 1914-1915 the number has increased to over 200.

Several lists of sales and shipments made from nurseries one or two years prior to the discovery of canker in them, were obtained from the nurserymen, and these lists were used by the inspectors. One extensive list representing just about

500 sales and shipments furnished by a leading nurseryman of Dade county became the principal factor in arousing the growers of the state at large to action. While the figures of this list appeared very formidable, a careful analysis of the list brings out the fact that the distribution of the shipments was not correspondingly state wide, but wide enough to warrant the apprehension that was aroused. Herewith follows a summary of the list in question:

|   | No. sales. | Trees and buds. | No. sales. | Trees and buds. |
|---|------------|-----------------|------------|-----------------|
| Total No. of sales and shipments, trees and budwood per list, about   | —          | —               | 500        | 169,290         |
| Number into Dade county   | 252        | 28,495          |            |                 |
| Number into other East Coast counties   | 143        | 8,124           |            |                 |
| No. into state at large, not including East Coast, and not including seedlings and buds to branch nurseries | 69         | 26,148          |            |                 |
| Seedlings to branch   | 17         | 88,521          |            |                 |
| 3000 buds and some trees to main nursery  | 4          | 4,810           |            |                 |
| Out of state into other states  | 7          | 10,106          |            |                 |
| Out of mainland of U. S.  | 8          | 30,86           |            |                 |
|   | 500        | 169,290         | 500        | 169,290         |

This analysis shows that only about 69 shipments, but representing over 26,000 trees and buds, were sent into the state at large, the greater bulk having gone into Dade county and the other lower East Coast counties.

I should add that the parties outside of the United States receiving the eight shipments listed were notified either directly through this office or through the

Federal Horticultural Board, Washington, D. C., that the stock they received from Florida had been exposed to infection by canker.

#### EAST COAST INFECTIONS.

*Pompano*—Messrs. Henry and O'Byrne discovered a large infection at this place early last fall. The infection involves approximately 200 trees. None of these trees have been burned as the owner believes he is going to show us how to eradicate canker without destroying the trees. He has sprayed them with Bordeaux and other dopes, many of which the trained plant pathologist has long ago cast aside as useless. But the owner refuses to be advised. Fortunately his grove is isolated by at least five miles from any other grove and being off the road the danger of the disease spreading from it to other groves is much lessened. There is no law to compel the owner to eradicate the disease, except, perhaps, that through a long process of litigation, it could be declared a public nuisance.

*Other East Coast Infections*—Messrs. Henry and O'Byrne, and later Mr. O'Byrne by himself, have found infections at Boynton, Stuart, Micco, Tillman, and Cocoa. In so far as the writer is aware, nothing need be feared from these infections as all diseased trees are burned as soon as found, and only a few have been found recently, so that we look forward to an early eradication of the disease in these places.

#### WEST COAST INFECTIONS.

Slight infections have been found at Elfers by Messrs Hunter and Clark, at

Largo by Mr. J. A. Miller, at Alva (Lee county), by Prof. H. E. Stevens, and at Edge and Ft. Myers, (DeSoto county), by Mr. D. M. Badger. All of these infections were promptly burned and presumably eradicated as no new infections have been found, except at Elfers, where a few trees have recently been found; but we expect these to be the last and do not fear the outcome.

#### WEST FLORIDA INFECTIONS.

No canker has been found at Monticello since December when a few infected trees were discovered in town and burned. None of the nurseries doing a citrus business there now ever had canker. The nurseries and the groves near and about town have been repeatedly inspected by Messrs. Nelson, Hainlin, and Daniel, since October, 1914, and all indications are that canker at Monticello is a thing of the past.

Other infections in West Florida were found near Paxton by Mr. Nelson and by Mr. Daniel at Cottage Hill, Santa Rosa, and Galliver. Due to the rather extensive defoliation of small citrus trees and young citrus trees here, inspection work was suspended after December but has recently been resumed. We are therefore not so well informed on the situation in extreme West Florida as in the rest of the state.

#### THE GULF STATES.

In Alabama, beginning in November, 683,359 citrus orchard trees (441,116 Satsuma, 242,243 miscellaneous), have been inspected in Mobile county. Sixty-one orchards and five nurseries were found more or less infected. Infected

pomelo, round orange and lemon trees were burned in a manner similar to that in Florida. Infected satsuma trees have been defoliated and treated with Bordeaux mixture. Very little has been done in Baldwin county. Lack of funds is delaying the work. (Information per letter, dated April 6, 1915.)

Mississippi has three inspectors in the field and expects to put on two or three more. Mississippi plans to inspect every citrus plant in the state. All infected trees found are burned. My informant states that most of these trees were burned before systematic inspection was undertaken as the owners wished to eradicate the disease. Their principal infections are at Wiggins, and Big Point, Jackson county—(Information per letter, dated April 6, 1915.)

In Louisiana, my informant states that they are "in nearly a hopeless condition." Plaquemines Parish and New Orleans appear to be the only localities in which funds for eradication of citrus canker have been raised. The state has not assisted with funds and only one canker inspector has been employed. Several large nurseries, however, have been destroyed; one of 65,000 trees; another of 30,000; and another of 40,000. "Otherwise the number has ranged from a few trees up to several hundred in different cases." No regular burning outfit has been used, but trees were simply cut, piled and burned by the best available means in the field. Louisiana has, furthermore, been unable to meet the conditions for Federal co-operative aid. Neither can the Louisiana Inspector of Nursery Stock pass upon and refuse entry of ship-

ments of citrus stock from outside nurseries because the Supreme Court of that state has annulled the quarantine regulation intended to protect Louisiana against the further introduction of diseased trees. (Information per letter, dated April 7, 1915.)

Information from Texas is to the effect that 10 inspectors are engaged permanently in canker work. These have four assistants; besides three gang foremen, a total of 20 to 30 laborers are employed, cutting, grubbing and burning infected stock. A small tractor has also been purchased for jerking out citrus trifoliata by the roots. Satsuma trees are being cut back and treated but other citrus is burned. A state appropriation of \$5,000 with a small sum, amount not named, from the Federal Government, has recently become available. By November 2th, 1914, canker had been found in 67 out of 92 nurseries growing citrus in Texas—(Information per letters, dated April 8, 1915, and November 5, 1914.)

The comparatively small figures representing the expenditures and men employed in the Gulf States do not necessarily indicate that no efficient work is being done in any of them. It is probably not claiming too much to state that many counties in Florida may contain more citrus than any one of those states.

#### THE DANGER.

But it must not be assumed that the battle against canker has been won. The amount of money already spent and that will be spent by July 1st, will be wasted if the inspection and eradication work is

not continued after that date. Any single case of canker left undestroyed would soon increase and endanger the whole state.

I have in mind the foolhardy experience of Massachusetts with the Gipsy Moth. Up to 1900 really good progress had been made toward exterminating this pest—such excellent progress apparently that the reduction in the numbers of the Gipsy Moth influenced the special legislative committee which was appointed to investigate the Gipsy Moth work to report adversely to continuing the same. I shall quote herewith in full a short section from Bul. 87, Bureau Entomology, U. S. D. A., 1910:

“DISCONTINUANCE OF THE STATE WORK  
IN MASSACHUSETTS.”

“At the annual session of the legislature in the winter of 1900 a special committee was appointed to investigate the gipsy-moth work. After numerous hearings it was reported that the insect need not be considered a serious pest, and further that ‘we find no substantial proof that garden crops or woodlands have suffered serious or lasting injury or are likely, with that precaution or oversight which prudent owners are disposed to give their own interests, to be subjected to that devastation which one woud have the right to anticipate from these reports. It appears to us that the fears of the farmers throughout the state have been unnecessarily and unwarrantably aroused, evidently for the purpose of securing the effect of those fears upon the matter of annual appropriations \* \* \* We do not share these exaggerated fears, and the

prophesies of the devastation and ruin are unwarranted and in the most charitable view are but the fallacies of honest enthusiasts.’ As a result of the report of this committee no further appropriation was made for carrying on the work. The tools and equipment which had been used were ordered sold, and the insect was allowed to develop without restriction.”

But we need not go to Massachusetts for men who fail to understand. We have those in Florida, right now, who believe that all agitation on account of canker is for effect. Note the following taken from a letter received a few days ago:

“Neither did the \* \* \* Nursery Company have any citrus stock that was infected in any way with Citrus Canker. The particular block of citrus nursery stock that you mentioned in above (named) circular was diseased on account of fertilization. The 18,000 of nursery stock you mention in your circular was on less than one-half acre as you well know, and to be right frank with you, the writer was of the opinion that you did not know any more about what you were trying to do than he did after seeing you make your inspection, while he knew himself what was the matter with this particular block of citrus stock, and he wanted to test you and see what you would have to say about it, and he really found out that you did not know anything at all about what was the matter. As a matter of fact on this particular block of less than one half acre, there were used four sacks of nitrate of soda and four sacks of fertilizer that contained a very high percent of potash and in less than two weeks after it was applied this

scaldy, rusty looking appearance on the leaves showed up.

"\* \* \* In the judgment of the writer, you have created a great big scare and done the people here a great injustice where there was no excuse for it known to the writer, except that you are not competent to handle your job.

"Now on account of this citrus fruit scare, there is a howl from different parts of the United States landed in the law-making bodies in Washington, D. C., and in Tallahassee, Fla., for appropriation to take care of the citrus canker, where you, the man in authority for the State of Florida, know absolutely nothing about it, it seems to the writer; but, as you have acted, shot off a lot of hot air seemingly to help get the legislative bodies to swell the appropriation for nursery and fruit stock inspection and insect pests, without informing yourself. Yours truly for unadulterated facts."

But to get back to the Massachusetts situation again. Up to that time, 1890-1900, \$1,175,000 had been spent by Massachusetts for the suppression of the gipsy moth, when it was allowed to lapse during five years. But in 1905 the situation became so serious and appeals for assistance so urgent that the Massachusetts legislature again took action in the matter.

In the meantime the area of infestation had increased from 359 sq. miles to 2,224 sq. miles and had also spread into Maine, New Hampshire, Rhode Island and Connecticut, so that the Federal Government was also appealed to for assistance. Since 1905, when the work was resumed, until 1910 nearly \$4,000.00 have been expended jointly by the Federal Govern-

ment, the infested states, and by cities and towns and private parties in those states. During that time the State of Massachusetts alone expended over \$750,000 annually; and the fight is still on and every state in the Union is endangered. It is, furthermore, now no more a question of eradication but one largely of control and keeping the gipsy moth from spreading. This simply means that Massachusetts, by allowing the eradication work to lapse at the critical moment, has saddled a perpetual expense upon all industries dependent upon the growing of trees. Neither will it be necessary for me to point to the moral. It is simply a case where a body of men, the Massachusetts Legislature, entrusted with the welfare of their state, preferred to take advice from a committee of men who were fitted neither by training or experience to pass judgment on matters about which they were ignorant, in preference to heeding the reports of such men as Dr. L. O. Howard, C. L. Marlatt, and the late Dr. John B. Smith, three of America's foremost entomologists.

#### SPREAD OF CITRUS CANKER, OTHER DANGERS AND CONDITIONS.

That nursery stock is the principal agency by which such disease as citrus canker is distributed is unquestionable. Only after an infection had become well established in a locality do we find evidence of its being further spread by other agencies. In Dade county evidence has been adduced that canker was further spread on grove or nursery implements, men's clothing, vehicles, and what not; in fact anything from a hoe to an ice wagon.

Insects and birds must also be carriers, since it is otherwise impossible to explain infections starting in the tops of trees. Wind storms and rain storms may also explain its spread locally. I am not aware, however, that any of these agencies have spread it any great distance.

But when it comes to carrying infections long distances we find, in every instance, that they came about by means of nursery stock. Was the canker infection not brought from Japan to the United States on nursery stock? Was it not carried from state to state on nursery stock? Was the infection not brought to Florida on nursery stock? and were the fifteen or more infections in Florida, outside of Dade county, not carried on nursery stock? And finally, the great majority of the 201 infected properties in Dade county were infected by means of infected nursery stock.

It is evident, therefore, that in order to forestall the introduction of these pests into Florida, and to limit the spread of those already in Florida, whether of citrus and other fruits, whether of garden vegetables and farm crops, all stock intended for planting or propagating must be carefully inspected upon its arrival in Florida, or if grown in Florida, before it is allowed to be sold. In order that this may be efficiently done it will require more than one inspector and more than \$3,000 per annum, for which the Nursery Inspection Law of 1911 only provides.

But that is not all. Florida has a very long coast line, with many harbors, at which ocean going vessels may land. Passengers will land at these places from Ber-

muda (where the Mediterranean fruitfly has ruined the fruit industry), from Mexico (where they have the Mexican fruitfly or Orange Maggot), from the West Indies (where they have the Pink Mealybug of sugar cane), from Central America, Brazil and other South American countries, where, who knows what unknown pests exist! Did any one know that canker existed in Japan? No, but it was brought here just the same. The opening of the canal may sooner or later result in vessels landing passengers and cargoes at Florida ports coming directly from the Orient, where a new disease of corn has recently been discovered. What will these passengers bring with them? It is only natural that a traveler should wish to bring home some new plants, budwood, fruits, seeds, and what not. In California a State Inspector accompanies the Customs Officers on board vessels and all fruits, plants, seeds, etc., that are under the ban are confiscated. It is reported that a California Inspector will take an orange from a crying child's hand. California also has a comparatively long coast, but few ports, so that their problem is less difficult than ours. But Florida must solve this problem of protection itself against careless tourists. Would a capitalist owning a \$200,000,000 industry, and the citrus industry has been estimated at that, hesitate to spend a couple hundred thousand dollars to protect it? That would be only one-tenth of 1 per cent on the investment.

But, says Mr. Trucker, that is all right for the grove owners. I am not a grove owner; let the grove owners tax themselves, that is proper. I was no loser

when the freeze destroyed the citrus industry in 1895, in fact, that was the beginning of my industry. But, Mr. Trucker, let me tell you: Do you not know that you are in danger? Do you not know that the Mediterranean fruitfly, already in Bermuda, likes beans, peppers, and strawberries as well as citrus fruits? and that the melon fly of Hawaii is a possibility when that vessel with a few melons in cold storage lands at Tampa?

Yes, Mr. Trucker, and this applies to some citrus growers. So long as every thing goes well we look wise and smile a self-complacent smile. But let a bug appear, let a few leaves wilt, and most of us are as helpless as the proverbial bump on a log. Then we telephone, telegraph, write, or jump on a train for Gainesville to get help from the Experiment Station. We are like the fellow who did not believe in "them there germs theory," and then blamed the doctor that he was no good because he could not cure him, when, as a matter of fact, common sense and prevention should have prevented the disease. Did the President of this Society not sound a warning at DeLand in 1912, as to what might happen to Florida? Did it not happen? Had it not already happened. But none of us knew then that canker was already in Florida.

But, Mr. Merchant says, why should I be taxed for protecting the citrus grower or the trucker. The writer was told while at L., Florida, several years ago, that certain store rooms in a large brick block there had, before the freeze in 1895 had destroyed the citrus industry, rented for \$100 per month, but were now renting at \$20.00 per month. The answer is so

self-evident that I have hesitated to raise the question.

But we have one more objector, namely the general farmer. But the same argument answers him that answered the trucker. Just recently a new disease of corn has been discovered in Java and India. Mr. General Farmer, who may be here, do you want this disease introduced into Florida? Would you not prefer never to learn anything about it? Then you need protection as well as the other fellow and you should see that you get it. And not only that, your prosperity depends largely upon whether or not the grove owner and the trucker are prospering.

The answer to the whole proposition is that it is the duty of the state at large to provide proper protection for the industries upon which its prosperity depends. In Florida it is the agricultural and horticultural industries that promise permanent prosperity.

For the sake of illustration permit me to discuss the canker situation at Monticello and at Silver Palm in relation to the amount of inspection provided under the law of 1911. The Monticello infections, while of longer duration, were nevertheless discovered in time, and being in isolated nurseries, have caused very little trouble. The infections were discovered before any stock had been sold, were burned, and that has apparently ended it. But in the Silver Palm section canker was not discovered in time to have headed off all sales from the infected nursery. A year and a half had elapsed between the time of its introduction and the time of its discovery. One inspection of the

nursery had been made during that time, namely, in July, 1912, or about six months after the seedlings infected with canker had been brought from Texas. If any canker spots were seen at that inspection they were passed by supposing them to be scab. But it is more probable that none were seen as the inspection was not row by row but block by block, according to the time available, so that any small infections present could readily be passed over. The general practice in inspecting has been to give as much time as was available, which for the larger nurseries was about one day, seldom more. The general practice, furthermore, was to walk around a block between the outer rows and then several times through the block. That was not efficient inspection but all that could be given. Sufficient perhaps under ordinary circumstances, but not sufficient to assure finding any new infections until such infections had become widespread in the block. And that is just what happened; the infection was discovered at the next inspection, a year later, when it had become wide spread. But during that time approximately 500 sales and shipments of stock, not all from the Silver Palm Nursery, but in conjunction with stock from other nurseries, belonging to the owner in Dade county, were made.

The remedy against such a condition

recurring in the future, consists, on the one hand, in prohibiting importations from without, which has been done, and very carefully inspecting and watching all importations that are permitted; on the other hand, in providing a sufficient inspection system so that every row of stock in the nursery can be inspected and every tree seen by the inspectors three or four times yearly, and then a sufficient law providing for the eradication of all dangerous and new diseases found.

#### A SYSTEM OF INSPECTION

I have tentatively outlined a force of inspectors and employees that I wish to present for your consideration:

One Chief Inspector; 1 Chief Assistant Inspector; 6 or more Assistant Inspectors;\* 6 or more Port Inspectors; 2 or more Grove, Orchard or Field Inspectors;† 2 or more Railroad Inspectors, to look after shipments of nursery stock coming to Florida on the railroads; 1 Consulting Entomologist; 1 Consulting Pathologist.

\*Based on actual time required by Inspector to make 100 inspections. It is planned to inspect each nursery four times per year. There will probably not be less than 200 inspections to make from now on. Since July, 1914, over 200 inspections have been made.

†These may serve as Nursery Inspectors, when needed, or vice versa, and should start crop pest survey of state.

## NATURE AND CAUSE OF CITRUS CANKER

H. E. Stevens, Gainesville, Fla.

### INTRODUCTION

Probably no plant disease or insect pest has ever aroused so much interest in Florida as citrus canker has. The cotton boll weevil is gradually spreading over the western part of the state where cotton is grown, but has caused no general alarm. The dreaded Mediterranean fruit fly has been in the neighborhood of our southern limits for a number of years; still there has been no concerted effort to effectually guard against the danger this enemy threatens to the state at large. The whitefly came, and has been accepted as an unavoidable evil, and is a constant drain on the citrus industry. Citrus scab, foot rot and other plant diseases have been liberally donated by our neighbors or foreign countries; and the Florida farmers have accepted these with a forbearance that is remarkable.

With the introduction of this new disease—citrus canker—there has been an awakening, especially among the citrus growers, and this awakening has resulted in a growing sentiment in favor of putting the citrus industry on a higher plane, especially in regard to protection against diseases and insects. This sentiment is not confined wholly to the citrus growers, for many farmers, and those having interests closely allied to agriculture, are beginning to realize that adequate protection is necessary to prevent the enormous losses that occur annually to the agricultural products of the state through the

agency of insects and diseases. This is a question that concerns the state as a whole, and not only certain classes or individuals. Whatever seriously affects one important industry in the state will affect, in some degree, the others. In citrus canker the citrus-growers have had a warning, in concrete form, of the danger they are continually exposed to. The vegetable-growers have many serious pests to contend with at present, and there are others more serious that may come later. Even the general farmer has his share of trouble with plant diseases and insects. Thus the fight against such pests is a common cause which should be supported by the combined efforts of all concerned, with the view of obtaining more and better protection against these enemies.

The fight that Florida is making against citrus canker is a heroic one, especially in Dade county, where the disease first appeared. The growers of this section and their loyal supporters are to be highly commended for their untiring efforts and determination to wipe this disease out of existence. They have labored against odds, against opposition, and in face of many obstacles that have seemed almost unsurmountable. But their efforts have not been and will not be in vain. Other states are watching with interest the campaign against this disease. If the growers succeed in completely eradicating canker from the infected districts, they

will have achieved one of the greatest undertakings in the history of plant diseases. This will mean a great deal to the state of Florida, and will be an object lesson to other states.

Activities against this disease are not confined to Florida alone. In some of the other States where the disease is found our example of complete eradication is being followed, and it is to be hoped that in the near future citrus canker will be eliminated from the United States. Then with the co-operation and support of the Federal Government, which is now taking an active part in the work, and adequate State crop-pest laws, neither citrus canker nor any other similar pest will again be able to establish itself in Florida.

#### NATURE AND SYMPTOMS

In considering the nature of citrus canker the following features illustrate the more prominent characters of the disease. It is very infectious and spreads easily and rapidly from infected to healthy trees. It is capable of infecting all parts of the tree at any stage of growth. Canker once formed on the tree are persistent and do not disappear naturally. The disease does not respond to the ordinary methods of control.

Usually the disease forms a typical spot by which it can be easily recognized. These spots are generally circular in outline, brown in color, very much thickened, with one or both surfaces broken, exposing an inner mass of spongy dead cells. The spots may vary in diameter from one-sixteenth to one-fourth of an inch. Infections are most evident on the leaves, young

shoots, and fruits; although, as already stated, the disease may attack any part of the tree and at any stage of growth. Fruits, leaves, young shoots, the bark on larger branches and trunks, and even the bark on exposed roots, have been collected showing infections. The young and tender growth is more susceptible to attacks than the old and more matured growth. Mature cankers formed in the bark of the larger branches and trunks are usually more irregular in shape and larger than the spots on leaves. The specimens and photographs I have at hand will give you a better idea of the appearance of the disease than any written description I may attempt.

#### VARIETIES ATTACKED

Practically all the well known species and varieties of citrus are attacked by the disease, with the possible exception of the kumquat. So far, the disease has not been reported on the kumquat in Florida. It attacks the grapefruit severely, and here the growers have suffered the greatest loss. *Citrus trifoliata* is attacked as severely as the grapefruit. This, however, is not so important, for if the disease was confined to Trifoliata alone, we would have a much easier problem to handle. While the disease is apparently not so severe on the other citrus varieties, the effects are injurious enough to warrant our taking every precaution to keep the least susceptible varieties free from attacks. Attacks on the sweet orange may be mild now, but in the course of a few years the disease may perhaps become as severe on this variety as it is on the grapefruit at present.

According to the observations of Dr. Berger and Mr. Frank Stirling, aside from the grapefruit and trifoliata, the other citrus varieties are susceptible to the disease about in the order named: Key Lime, Navel Orange, Sweet Orange, Satsuma, Tangerine, Mandarin, King Orange and Lemon.

#### CAUSE

(Note: A few days after this paper was read, new facts regarding the cause of citrus canker came to light, and in order to avoid confusion and bring the information on this disease up to date, it seems advisable to omit that part of the original discussion relating to the cause and substitute instead our more recent information on this subject.)

Recent experiments of my own and the work of Miss Hasse, of the Bureau of Plant Industry, show that citrus canker is caused by a species of bacteria rather than by a fungus.

In the paper as read before the Society the writer gave as the cause of this disease a species of fungus which was classed as one of the Phyllostictas. Some infection experiments of my own in which typical canker spots were produced from a single spore colony of the fungus (Fla. Expt. Sta. Bul. 124, p. 39), and the work of Dr. F. A. Wolf and A. B. Massey of Alabama (Ala. Agri. Expt. Sta. Cir. 27, pp. 99 and 100), formed the basis for this opinion. The constant association of this fungus with canker infections, collected from widely separated areas, has also added weight to the fungus theory.

I have pointed out, however, that most of my infection experiments have given negative results and in only a few cases have I been able to produce typical canker spot with cultures of this fungus. This

difficulty finally led me to suspect that bacteria were probably concerned in the development of the disease. Some experiments were made to determine this a few days previous to the meeting of the Horticultural Society in Tampa. Some small citrus trees in pots were inoculated with spores of the fungus, a combination of the fungus and bacteria isolated from a canker spot, and the bacteria alone. The trees thus treated were examined on Saturday following the Tampa meeting, and the results were convincing that bacteria were primarily the cause of the disease. Where the bacteria were used alone and in combination with the fungus, typical canker spots were developing. The following Monday information was received from the United States Department of Agriculture to the effect that Miss Clara H. Hasse had some time previously discovered that citrus canker was caused by a species of bacteria which she had described and named as *Pseudomonas citri*. A short account of the work and a description of the organism was published in the April number of the Journal of Agricultural Research.

Infection experiments are being continued with this organism and in every case so far young citrus foliage that has been inoculated with cultures of the bacteria have developed canker infections. The work has not progressed far enough at present to permit of any detailed report.

I regret that my discovery of the cause was not made sooner, however, this new information does not change the canker situation in the least. The fact that citrus canker is caused by a species of bacteria rather than by a fungus does not make

any material change in our present method of handling this disease. Any practical method of control other than eradication, seems as hopeless now as before, for bacterial diseases do not yield to any treatment except complete destruction of the infected parts.

Just why this particular fungus should occur so generally in the canker infections is rather difficult to explain. It is probable that it plays a secondary part in the development of many canker spots. Further investigation will determine this.

#### DISSEMINATION

Warm humid weather favors a rapid development of the disease, and thus it is more destructive during the rainy season. It is active, however, for the greater part of the year, especially in the southern part of the State where weather conditions are more favorable. It is spread mainly by some carrier. Insects, birds, other animals, and man, coming in contact with infected foliage that is wet with dew or rain, may easily carry the disease to healthy trees.

#### INJURY FROM THE DISEASE

The injury from this disease may be considered as two-fold. The most apparent injury results from the spotting of the fruit, making it unsalable. Since the disease spreads so rapidly and may attack the fruit at any age, practically all fruits on a badly infected tree would soon be reduced to culls. Canker does not cause a rotting of the fruits, or affect the interior of mature fruits, other than opening the way for rot-inducing fungi which may enter and cause decay. Fruits that are badly

attacked when young are apparently stunted and fail to develop.

That the disease injures the tree seriously is evident. What the ultimate effect of the disease on the tree might be we do not know at present, for we have not had badly infected trees under observation long enough to tell. Our observations show that where trees are badly attacked there is a falling of the younger leaves and a perceptible stunting of the young twigs. Continued defoliation by the disease would finally result in the death of the tree, or soon render it worthless.

The serious nature of citrus canker can not be doubted by any one who has had experience with it, or who has seen its work. There has been some difference of opinion regarding the drastic methods of treatment employed against it, but since we are dealing with an unusual disease, drastic measures are necessary to stamp it out. This is by far the most serious disease of the grapefruit that has ever appeared in the State, and it will shortly ruin the industry if allowed to spread. Let us examine some of the reasons why it is more serious than some of the other citrus diseases.

*First:* It attacks all parts of the grapefruit tree, the leaves, fruit, young shoots, and bark on larger branches and trunks, and even the exposed roots.

*Second:* It does not yield to treatment with any of the known fungicides or any other so far as we know.

*Third:* The disease is able to grow and spread throughout the entire year.

*Fourth:* It is impossible to locate and remove all the infections that occur on the larger branches and trunks of dis-

eased trees, so pruning and cutting out of diseased parts are not practicable.

*Fifth:* The rapidity with which the disease spreads during favorable weather makes it difficult to handle even when the infected trees are destroyed.

*Sixth:* The persistent nature of the cankers in the bark of trunks and larger branches forms an ever-present source from which the disease is spread.

#### CONTROL

The most effective method of controlling this disease at present may be summed up in the one word, *eradication*. Citrus canker does not yield to treatment with any of the known fungicides, and the ordinary methods of combating fun-

gus diseases will not apply to this one. Since the disease is so dangerous, it is folly to temporize with it. Being confined to comparatively small areas of the citrus section, the most logical thing to do is to completely eradicate it while it is possible to do so. A few months or a year of delay may mean that the fight is lost. Eradication will call for the complete destruction of all infected trees within the State. This will cause considerable loss to many growers, and probably no little expense to the State, but the amount spent now for the eradication of this disease will be nothing in comparison to the losses it will cause a few years hence, if it becomes generally distributed over the State.

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### ON THE FIRING LINE BEFORE CITRUS CANKER

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Frank Stirling, Miami, Fla.

*Mr. President, Ladies and Gentlemen:*

After nearly twelve months of constant endeavor, day by day, in touch with the situation, we, who have been "on the firing line and in the trenches before citrus canker," are compelled to acknowledge that we are up against a foe well worthy of our steel.

The story, how it has been and is being handled, should certainly be interesting to the Florida growers of citrus fruits. The facts now known regarding this plant disease show it to be so virulent, so subtle and insidious, that one is almost led to believe it to be The Father of Evil himself and eleven months' experience with it in

the field teaches us that it can be conquered only by using the most heroic methods. (Note Bulletin 124, Fla. Expt. Sta.).

We still have just as much, possibly more, respect, or fear, of this disease as we have ever had. With some, the impression has prevailed that the disease was due to weather and soil conditions and would soon disappear of itself and hence was not worthy of serious attention. Some folks have said that this alarm, which has been sent out by the Inspector of Nursery Stock and the Florida Growers and Shippers League, was uncalled for, that canker would turn out to be of a far

less serious nature, that it could be classed with other pests and diseases such as scab red spider, melanose, etc., and could be as easily controlled as they are, but even those diseases are not easily controlled.

The possibility of controlling this disease by the introduction of chemicals or immunizing substances directly into the tree has long been a fascinating ideal, and while the basal idea may be sound, the method has been discredited by the number of "fake" remedies supposed to be applied in this way. But why look for a remedy of that kind, when we do not expect to need it, when eradication is possible. If canker is not eradicated, then there will be plenty of time to try control measures.

A large number of experiments have been carried on by the growers, state department officials and others. There has been for several months, and is now, a plant pathologist stationed in the canker-infected territory, carrying on experiments, and from this work some very valuable scientific results may be expected, whether his findings become of practical importance or not.

The one thing we do now know is that fire is the only sure cure, and those who have tried out other remedies have in the end given up and have burned their diseased trees. With this knowledge at hand we have put forth every effort to keep up with and destroy every cankered tree as fast as it was found. We considered this the only way to retard its spread, but to do this many obstacles have had to be met and overcome. While almost all of the growers have co-operated with us, there have been some few who objected to this

method of treatment, and we have been put to all manner of inconveniences from those who did object. We have been regularly refused admittance into certain groves, some have permitted inspection but have refused to have the diseased trees burned, and in one or two instances some of us have been arrested for trespassing, at which time "public opinion" and not law saved the day.

As so much has already been said about the technical, practical, historical, and financial side of citrus canker, you will probably be more interested in knowing what has been done and is being done in this canker fight in Dade county, where the prevalence of the disease is more to be noted than anywhere else, and where we are making the great effort toward eradication.

The actual work in the field is carried on by inspectors employed by the local growers' organization and the Florida Growers and Shippers League, a committee of three having full executive power. This committee outlines the plans for the work of inspection and eradication. In Dade county there are now one hundred and twelve men employed upon the work of inspection and eradication, half of which are employed in the southern or Redland section, and half in the northern or Miami section. An inspector-foreman is in charge of each of these bodies. The foremen lay out the territory to be inspected by each squad and see to the necessary details. The whole force of men employed upon the citrus canker work, dressed in their inspection suits and equipped with burning outfits, etc., going to work each morning, may be likened to

an artillery command, and the discipline under which it works may be very much the same.

The men are divided into squads of four inspectors each, each squad having a certain number of groves or properties to inspect each week. The squad leaders are supplied with blank forms which are filled in each day, giving the number of trees inspected, the number of properties, names of owners, if any infections are found, and also if any other injurious insect pest or plant disease is found. These reports are turned in each day to the foreman and a record is kept of the status of each property. From these reports a condensed weekly report is made out and sent to the Inspector of Nursery Stock at Gainesville, The Florida Growers and Shippers League at Orlando, and to the United States Department of Agriculture at Washington. The men are all supplied with linen suits as a protection against their coming into contact with the diseased trees. The suits are dipped in a bucket containing a disinfectant solution of mercury bichloride. As the report from each squad shows where any canker has been found, the fire wagon is at once ordered to the infected groves and the trees showing canker are burned. Where only one or two small trees are to be burned the small hand outfit is used, the fire wagon going where there are large trees or larger numbers of nursery trees. For this purpose a mixture of kerosene and fuel oil is used, and up to the present time nine thousand seven hundred and sixty gallons have been bought and used at a cost of \$1118.00. This oil is used

in a burning spray under about one hundred pounds' pressure.

There are in all in Dade county some twelve hundred groves or properties which must be inspected each month. This is the number of citrus plantings in the county. They range in size from five acres up to seventy acres, and contain in all approximately ten thousand acres. About forty per cent of these are bearing and sixty per cent non-bearing. The number of grove trees is between seven and eight hundred thousand. There are besides this approximately 3,500,000 nursery trees to inspect. In order to cover all of this ground once each month, you can readily see requires a lot of work and a large body of men. Besides this, we inspect once every week those properties where any canker has ever been found, and it is in these properties where we now find almost all of the canker. A total of 201 properties have at one time or another had canker. The men attending to these diseased properties do not go into the groves that have never shown any canker; we do this to avoid every possible chance of the men carrying any spores or germs into clean groves.

Our work in Dade county has not by any means consisted of an unbroken chain of triumphs. As I have said before, we inspect each week those groves where canker has ever been found; many of these groves have shown canker week after week; some have gone past several inspections and have again showed infections. We have thought that after a grove had gone over twelve weeks without showing infection that it might be clean, but in a few instances some groves

have again shown canker even after that length of time. This shows how very tenacious the disease is. We may think that a grove has been clean but it may not be so. However, the groves that have passed twelve weeks, or twelve successive inspections, without showing disease very seldom show canker again, and of the 201 infected groves in the county some ninety have been clean over twelve weeks, and the number is slowly increasing, which encourages us to believe that eradication is possible.

In these diseased properties we have found and destroyed by fire, since we first began our campaign of eradication, 5750 grove trees and 388,063 nursery trees. The total cost of this fight in Dade county up to the present time has been \$26,903.29. This includes what the United States Department of Agriculture has expended up to April 1st, but does not include what The Florida Growers and Shippers League has expended, neither does this include the volunteer work given by the growers themselves which, reduced to dollars, would be some \$2400.00. Assistance from other interests will amount to over \$1,000.00.

An important feature of this canker fight in Dade county has been the noble effort put forth by the women of the Redlands. When funds were low and things looked discouraging, the Womens Citrus League, some sixty-one strong, came to their financial and moral assistance. the relief of the work by contributing Money was raised by giving entertainments, suppers, etc., and in this way they raised over six hundred dollars, which has been turned over into the canker fund.

They have also saved for the Association over one hundred dollars in making inspectors' suits, or uniforms, which otherwise would have had to have been bought outright.

It's a difficult matter to get exact information as to the actual loss to the growers whose property has been destroyed. A large number of the trees burned were small ones, which have been planted not over a year or two, the loss of these is not large; however, some of the trees which have been burned were capable of producing from ten to twenty boxes of fruit per year. For instance, we burned one tree which last year netted its owner about fifty dollars. A conservative estimate of the loss of the burned grove and nursery trees would be nearly fifty thousand dollars. It would be impossible to estimate the losses otherwise sustained, since, for instance, a grove where canker is known to exist will not sell for any price, whereas before it would have brought thousands of dollars.

One of our greatest troubles has been trying to prevent the spread of this dread disease. Regarding the virulent parasitism of citrus canker, there is no possible question. It is easy to demonstrate this by making artificial inoculations upon healthy trees, especially when there is abundant new growth. Past investigations have shown that the spores are ejected during and after a rain. Whether these extremely small bodies are blown about by the wind or not is not absolutely known. It is conceivable, however, that they may be blown about by the wind as far as rain or spray is blown. We do know that they are constantly being

washed out by the rain down the trunks of the trees, where they may become lodged in the cracks and crevices of the bark and develop mature cankers, even on exposed roots. That the disease is carried for great distances on diseased nursery stock, that the spores may become attached to the various forms of animal life, insects, birds, dogs, etc., is a demonstrated fact. Another danger of carrying infection is by grove hands and trespassers who do not realize the virulence of the canker. We have evidence of its being carried by wagons, farm tools and automobiles. When the spores have once been carried to a previously uninfected tree, they may develop in any sort of wound or injury in the bark, leaves or twigs that is reasonably moist and there produce a canker. The new growth seems to be especially susceptible. No evidence has adduced up to the present time to show that a tree with reduced vitality is more susceptible to infection or that the cankers develop more rapidly in such a tree than in a perfectly healthy and well nourished tree; nor has any evidence yet been adduced to show that soil conditions within the present range of the disease exert any appreciable effect upon it, beyond the fact that plenty of moisture favors the distribution of the spores.

How long the spores remain alive upon the ground under the diseased trees is not yet known. It appears safe to state, however, that they will remain alive after

two months, and should they be carried up to the new growth produce cankers there. We have found in every instance, if the ground is not burned over at the time that the tree is destroyed, that the shoots which grow up from the old stump become reinfected.

With the disease known to be so very virulent, it is almost needless to add that with the present outlook, citrus groves within the diseased area are a poor investment, and because of this fact there is considerable discrimination against setting out citrus.

After passing through the past year of the canker fight, with so very many odds against us, knowing, as we do, the deadly nature of this disease, it is certainly idle to attempt to prophesy what will be the future course of the canker, but whatever the outcome, we may be sure that the results of our work in fighting it will in the end justify all present efforts. We may be sure that this is not the last devastating disease of Florida's fruits and vegetables to appear, and in the future we shall need all the knowledge and experience that has been gained from fighting this malady. With the rapid development of extensive groves, methods which have heretofore been deemed impracticable for controlling citrus diseases will come into regular use and the practicable methods of the future can only be developed by just such scientific research and field work as we are now passing through.

## SOME WAYS OF SPREADING CITRUS CANKER

A. M. Henry

*Mr. President, Ladies and Gentlemen:*

It is hard to comprehend the ease with which citrus canker may be carried. If some one had made the statement a year ago that as much care would be exercised in handling citrus trees as the surgeon exercises in performing a major surgical operation, he would have been smiled at, yet such is the case today with the groves in the canker-infected districts.

When the grower, upon waking in the morning, hears a mocking bird singing outside the window, he wonders if it has flown from the infected grove across the road. The grower, on going out to feed the mule before breakfast, finds that it has kicked the barn door down and wandered through his neighbor's infected grove, and then decided the grass at home is better. Has he brought some cankerous spores back with him? In the morning, when the grower goes out to work in his grove, he notices that the insects are flying with the wind from the nearest infected grove. How many spores of the disease do they carry on their feet and mouth parts? In the afternoon a friend visits the grower, and after he is shown over the grove with a nice crop of young fruit on it, the friend innocently remarks that he hopes there is no danger, as he has just been looking at canker in the grove of Mr. Jones, where the inspectors have just found it, and it looks as if it might be a bad thing to have in a grove. The friend manages to get away without

serious damage, if he is lucky. After supper, when the grower sits down to enjoy a quiet smoke, he hears a yellow cur chasing a rabbit through the canker-infected grove across the road and then through his. He gets out his gun and takes a chance shot, hoping that the rabbit in his haste left all canker spores. Finally the grower lies down to sleep, but a cricket so persistently chirps outside of his window that he dreams canker has been carried into his grove by crickets, and twenty-seven trees burned. Woe is the grove owner in the canker-infected district.

As examples of the ways in which canker has been spread, the following are characteristic. From grove to grove: An ice wagon spreads canker to several groves along his delivery route from one infected tree that rubs the wagon. A flock of blackbirds are responsible for the scattering of canker to the yard trees in a small village. A wagon in which canker-infected nursery stock was hauled held spores for several days until some clean nursery stock was hauled in it, which later developed canker. A cow in the habit of following a path through two groves spread the canker along her trail from the infected grove to the clean grove. Important is man in the spread of canker by carrying it. "Typhoid Mary" has nothing on "Canker John," who while himself not affected by it, yet seems saturated with it. In actual life "Canker

"John" is a budder who has strewn canker in his trail for the last six months, being employed in budding small nurseries for a number of persons. Every nursery he has budded, and every grove he has cut bud wood from has developed canker. In spreading canker from tree to tree in a grove the most important agents are insects and men, particularly by cultivation and fertilization. In this connection two groves are known in which chickens spread it broadcast. In spreading canker over a tree after one infection gets on it, insects, ants, and rain are the most important agents.

Unless you are acquainted with the conditions, the precautions taken by the inspectors will appear useless and amusing. As an example, let us take the inspection force of South Dade County, where 65 men are employed in the inspection work. The whole force is under a committee of three from the local growers' association. Directly in charge of the men is a foreman and squad leaders. The foreman has direct charge and general supervision of the inspection. The inspectors are divided into thirteen squads of five men each, of which one is a squad leader, who is responsible for the work of the squad, and has complete authority over it. Some of the general requirements of the inspectors are that they shall be residents of the district, members of the local association, either grove owners or the sons of grove owners, and shall be vouched for by two grove owners not related to them. The following are instances of some of the

things an inspector has to do; wear a linen suit that completely covers his clothing, which has to be disinfected in mercury bichloride every time he comes out of an infected grove, and on quitting work in the afternoon, if he has not been in an infected grove, disinfecting shoes, leggings, hat, hands, etc., in addition. The following are some of the things that he must not do: touch any part of a citrus tree with his hands or clothing; when it is necessary to turn over a leaf or fruit of a tree use a stick, which must not be carried from that tree; not talk unnecessarily; not pass any suspicious spots without showing them to his squad leader; not carry any leaves or fruit, whether they have canker on them or not.

In this district there are about 900 groves in which no infections are found, and these are divided into five districts covered by five squads called advance inspection squads, who never go into an infected grove. There are 168 infected groves in this district, which are divided into two classes, those in which no infection has been found for three months, and those in which there has been. There are six squads assigned to the latter class that cover every grove in it once a week. The groves once infected, but clean for three months, of which there are 69, are divided between two squads that cover each grove twice a month.

In conclusion, the ease of spreading citrus canker causes workers with it to take as great precautions as physicians in an epidemic of bubonic plague.

## CANKER INSPECTION

F. M. O'Byrne

Mr. Poole can vouch for the fact that I did not want to be put on the citrus canker committee report this afternoon. He has three letters from me on file, protesting against it. I assured him that there was nothing that I could add to the information presented; that there were already enough on the program and that every one would be tired out before I had a chance to talk. But they were obdurate, so here I am. Now that I am here, I am determined to have my say; you people have all been given an opportunity to escape and those who have remained must take their medicine. If you people are as sleepy as I am, I will have to adopt Billy Sunday methods to get you interested, so here goes.

We will let this flower pot represent the imaginary line between Dade and Palm Beach counties. Four miles north of it is Pompano, where the Marshall grove is located. This is a twenty-acre grove, having 2000 trees in it. By estimate, 1800 of these 2000 trees have citrus canker. Mr. Marshall has always treated us courteously, but has been firm in his refusal to allow his trees to be burned. He is trying to eradicate the disease with a spray. He has tried four or five different formulas, but is keeping them secret. Unfortunately, this spray is very hard on the trees; it knocks off leaves, kills the twigs, and, most unfortunate of all, the canker is coming out on the new growth.

About twenty miles north of Mr. Mar-

shall's grove is Boynton, where the Percy Collins grove is located. We destroyed sixty-three grove trees and two hundred nursery trees at the time of the first inspection. The trees were literally covered with canker. On re-inspections we have found and destroyed ten more trees. There are now forty-five left in the original grove of one hundred and nineteen trees. On the last four inspections, there has been no canker found. I am very hopeful that this grove has been cleaned up.

About thirty-two miles north of Boynton is North Jupiter Island. Mr. Isaac Weishuhn, who lives there, received a shipment of one hundred trees from Dade county, and fifty trees from a local nursery, and he planted a nursery of his own in his grove. At the time of our inspection, eighty-five of the grove trees had the canker, and practically all, certainly three-fourths of the trees in his own nursery, were covered with it.

Mr. Weishuhn is a very poor man who has homesteaded a place and earns his living as a fisherman, and had hoped to build up an orange grove upon which he could retire. But he realized that his grove was a menace to the people in his vicinity, and that re-inspection would be very expensive, so he allowed us to burn up every citrus tree in his grove. I consider that man a hero, and one of the greatest gentlemen in the State.

Going about fifteen miles north, we

come to Palm City, near Stuart. There one tree was found in a grove belonging to Mr. Harry Wilhelm. It was destroyed at once, and we have never found any more canker in that grove. That shows what can be done by prompt action.

In three other groves located at Palm City, there have been a number of cases found, but the last few inspections have failed to show any canker. I am very hopeful that Palm City has been cleaned up.

Now we come to the south end of Brevard County, where an infection was found at Micco, and eight or ten trees were burned. On the last few inspections, the property has been clean. It is too early to declare Micco clean, but we are hoping.

About twenty miles north of Micco, we come to Tillman. Two properties are located here which showed a few trees infected with canker. The property had not been worked; almost neglected. We burned the infected trees at once upon discovery and have never found any canker on any re-inspection since that time.

About thirty miles north of Tillman is Cocoa, where an infection was found. It was on a high sandy ridge, and there actually were cases, proved by microscopical examination to be canker, on the stems and no canker at all upon the leaves. This was extraordinary. Realizing that we were up against a very serious proposition in having canker on the stems and not on the leaves, we finally decided it was best to burn the entire shipment coming from Dade County, which was done. We feel sure that Cocoa is also free.

I would like to say a few things further

about the criticisms and pitfalls that a canker inspector has to look out for and avoid. Our lives are not a bed of roses. We not only have to work hard, but we are criticized to our faces and behind our backs. People are always watching us suspiciously, as though they thought there was something crooked about us.

There are some people who are very hard to convince. I have in mind a jury in my home town, after the town had voted dry. A number of blind tigers opened up and did an active business. Finally a case was brought before a jury in which the evidence proved conclusively that a certain man had entered one of these blind tigers, ordered whiskey, the seal was broken off the flask, the whiskey was handed to him in a glass, and the man had taken it into his mouth. But they acquitted the man, because they could not prove that he swallowed the whiskey.

Some people are as hard to convince as that. I have in mind one salesman, who talks a good deal with various growers, and in conversation with me he has shown a very skeptical disposition. He said, "Well, you must admit that you canker inspectors going from one grove to another and back and forth, certainly must scatter the canker germs broadcast through the east coast section." I told him there was no danger of that, and explained how our linen suits were carefully sterilized and disinfected. "Well," he said, "you could carry it on your feet." I explained to him how our shoes were disinfected upon coming from an infected grove. "You might carry it on your hat." I told him we did not wear hats, or, if we did, they were disinfected. "You might

carry it in your hair." I told him how carefully we disinfect our hands, our face and hair. "Well," he said, there is a chance for you to get it inside your clothes and spread it that way."

I told him that Mr. Henry and I had been in hundreds and hundreds of properties up and down the east coast, and found canker in less than one per cent. of the property we had inspected, and that on no occasion had it developed after any of our visits. That seems to be conclusive evidence of a practical nature.

Next, he branded the fire treatment as being a failure. He had found in Dade County one nursery where the trees had been burned and where the sprouts that came up showed canker. He forgot the 99 per cent. that had come up clean and remembered the 1 per cent. that showed canker. He said, "That proves that the fire treatment is a failure."

I met his argument with this: in Dade County the canker is scattered all over; active cases are coming up all the time, and there is quite a possibility of the canker being carried back into this nursery. If you come into our territory, which, on the whole, is clean, you can draw fair conclusions, *and in not one single case where the trees have been burned and the new sprouts come up have they showed canker.*

In Palm City, in Mr. Fournier's grove, late one afternoon, I found four cases of canker. It was quite late and I did not have my torch with which to burn the trees (we usually burn them within ten minutes after they are located). So I tagged the trees and told the owner of the place to burn them the next morning.

It seems that a man who was planting trees nearby for a nursery company had had quite a good deal of experience with canker in one of his employer's nurseries. He had been talking about the injustice of the inspectors, and their habit of finding canker where none existed, etc. So the owner of the infected grove went over and asked this man to come and look at the trees.

The man looked at the first tree and said, "There isn't any canker on that tree." Then he looked at the second, and said, "There isn't any canker on that tree." And so with the third suspected tree. When he reached the fourth tree, he was about to pass that up when the gentleman who owned the place pointed out the leaves that were infected, and he had to admit there was some canker on that tree. Then the owner went back himself and together they examined the other trees, and they found canker on all four of them.

Now, half of that story was told to me at one time by a prince of knockers. He said, "Why, of course you fellows will find canker there, because you are getting a nice salary for it and traveling up and down the east coast like tourists; of course you will continue to find canker as long as the money lasts." (He forgot I had walked two miles up to his place.) And he quoted the case where the canker inspector had found four trees which he had pronounced canker, and the man with so much practical experience had said they did not have canker. I said, "Say, it is only a few miles to that grove; we will go down there and see for ourselves." We started down there, and then he

brought out the second half of the story. So, of course, there was no use of our going down.

As a result, we have been forced to adopt a very unusual practice, one that just by luck we have carried out in all our

work on the east coast, and that is: never burn a citrus tree that has citrus canker, without a witness. No matter if there isn't a man within two miles, we hunt him up and show him the canker before we burn the tree.

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## WHAT REMAINS TO BE DONE BEFORE WE ARE FINALLY RID OF CITRUS CANKER

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Wm. J. Krome, Homestead, Fla.

*Mr. President, Ladies and Gentlemen:*

I have not prepared any paper on the subject which has been assigned to me, knowing that the gentlemen who have preceded me with addresses on the history of citrus canker and the work that has been done towards its eradication would tell you practically all the facts that have been ascertained in regard to the disease up to this time. It has been left to me to present to you some ideas as to what is going to happen in connection with the disease hereafter, and I have felt that a paper prepared along these lines would be very liable to be discounted by the facts presented beforehand. As my colleague in the Dade County work has just said at the end of his paper, "It would be idle for any one to attempt to prophesy what might come to pass." That, as you know, would have taken the wind out of anything which I might have prepared. (Laughter.)

There are a few facts, however, which bear particularly on the work ahead. From the various papers which have been presented this afternoon, you must have

read between the lines and gathered the correct inference that the law of the State of Florida, or rather the lack of a proper law, permitted canker to enter the State. Then it was lack of a proper law that was responsible for the lapse of so great a length of time before we became aware of the existence of the disease. And again it was through lack of a proper law, after the disease was found, that we had not the proper means with which to combat it. We had not a dollar, you might say, with which to fight it. This is a cardinal point which must receive attention; before we can make an accurate guess as to what is going to happen to the citrus industry, we must know positively what is going to happen in the way of a law. There has been a law prepared and we believe it is such a law that it will take care of this case and all future cases of a similar nature which may come up from time to time. That law is now before the legislature and you have been asked at a previous session to lend your aid in the form of telegrams to your representatives urging the passage of the bill.

It has been a number of years since a warning was first sounded to the Florida State Horticultural Society in regard to the menace which was hanging over us from the Mediterranean fruit fly and the Mexican orange maggot. A great many of us were worried about those things years ago, but our worry was not sufficient to goad us into seeing that we secured a proper law to keep them out. We have not those pests as yet, but while we were worrying over the Mediterranean fruit fly and the Mexican orange maggot we got citrus canker and it is yet too early to tell whether or not we have something worse than the things we were worrying about.

However, unless we get rid of canker, the fruit fly and the maggot need worry us no more, as far as our citrus industry is concerned. Those of us who have lived with the canker for the past year have not the slightest doubt that until the last leaf of the last infected tree is destroyed—absolutely eradicated—the man who plants an orange tree or a grapefruit tree in Florida is simply throwing money away. There is no doubt of it. And it is not what General Hancock called the tariff, "a local issue."

We have been unfortunate enough in Dade County to draw the big end of the fight, at least we hope no country will have anything to contend with such as we have had. But let me tell you, there is not one citrus producer in this State but should feel that this is an issue that affects him directly and personally.

In presenting the case before the Seminar at Gainesville last September, I stated that Dade County was going to get rid of

the disease, but what we most feared was that it would break out in some other part of the State and come back to us. I was young and inexperienced and had known citrus canker only three or four months. There has hardly been a week since that time but I have felt quite sure that I had made a mistake and that Dade County was *not* going to get rid of the disease. But as the case stands now, I believe, personally, though I might have a hard time proving it, that Dade County *is* going to get rid of the disease, providing we get the law, providing we get the funds that must go with that law, providing, further, that we get from one source or another the right man to go with the law and the funds, and providing, still further, that behind that law and those funds and the man who administers them, we have the united backing of the citrus industry over the State. Without all these provisions I would hate to venture a guess. It has been an uphill fight so far.

When I reported to the Seminar I stated that we had something like seventy-five or eighty active infections. We worked steadily all fall and about the first of the year we took an inventory. We had spent something like \$12,000 in South Dade County and we had started four or five months previously with seventy-five known infections. After working all those months and spending all that money, we had one hundred and twenty-five active infections!

Our trouble was that we had not sufficient men in the fall to hunt for the new infections. Where we had known infections and funds to properly handle them we had succeeded in eradicating the dis-

ease, but the situation was staring us in the face that soon we would not be able to look after even the known infections.

We decided that we were wasting our money like pouring water into a rat hole and that to make the work effective we must double or treble our force. We gave the people of our district in South Dade one week to decide. We had to have real money—we had any amount of subscriptions on paper but we didn't have the cash. During that week the National Government gave Florida an appropriation of about one-half of the funds necessary, hardly that. But with that incentive, our people in South Dade raised sufficient funds to carry the rest of the work through until the first of July, not in paper or in promises but in actual cash. So in South Dade our campaign is financed for the immediate future. If by July first the State has not made provision for carrying it on further the work will stop, there is no other way out of it.

Our community is a country of small groves and the majority of the groves are not producing. A census taken about a year ago in the Redland district showed that only about nine per cent. of the citrus properties were bearing. In a new country where we have no wealthy populace, the financing of this campaign has come as a very heavy burden, and though at times on the actual scene of trouble it has been unpleasant, on the whole I feel proud of the people of Dade county for the way they have supported this fight. They have responded time and time again and those who could not give actual cash have given labor. Of course there have been some instances of men who were

able who have not done their part but these have not been frequent. There has been some feeling through our part of the country that the growers over the state were not doing their share. Our people felt that we were having to carry nearly the whole burden of financing the fight and it didn't look fair. But we appreciate the fact that the growers of the state at large have not been fully informed of the danger that confronts them. It has not been brought to them as a personal issue. The growers over the state have felt sympathetic toward those of Dade county but heretofore they have not realized they were in the same boat and threatened with the same disaster that has overtaken us; that if the end of the boat extending into the Redland district sunk, the bow of the boat in which they were riding would not be comfortable.

We think that through various means such as Mr. Tenny has mentioned, of a moving picture film and other publicity work, it has now been brought home to our sister counties that this is a state-wide fight, and if they had realized it sooner, we think we would have obtained what we needed and the burden upon us would not have been so heavy.

There are some lines along which we must have help from the growers over the state at large, if we are to finally succeed. There are about eight counties besides Dade, maybe nine, where infections are known to have occurred. How many others there are and at how many other points in those counties there are active infections right now, is simply guess work. When we know that every flying, walking, creeping animal can carry canker

as far as it goes it is mere idle talk to say that citrus canker is confined to any one known spot. With over two hundred infections in Dade county, with probably one hundred and fifty of these active infections, with the migratory birds flying to and from these groves to other parts of the state, traveling workmen going from one part of the state to another, families moving from one place to another, it would be remarkable indeed if the disease can be confined to a few localities. I would not be at all surprised sometime during the next month or so, during the time the trees are putting on their spring growth, if in other parts of the state there will be reports of the disease breaking out.

I said at the Gainesville meeting that the growers there were not representative growers and one might say that the growers in this Society are not representative growers. Perhaps you are in a way, but you are representative of the intelligent, up-to-date and active class of growers. If all the growers were in your class, the fight over the state as a whole would be much more easily won. It can be taken for granted that property owners who are members of this Society, who attend these meetings and attend the Seminar meetings will be well enough informed to know when the canker breaks out in their groves and will realize the dangers which will come if the disease is permitted to develop unmolested. But there is an element that does not belong to the Horticultural Society, that does not attend meetings or read bulletins, who are just as liable, and perhaps more liable to get citrus canker than you are. If canker

breaks out in some of your localities with this element to deal with, it is to the members of this Society we will have to look for leadership in the fight against it. You must take the lead and see that there is no trifling, for you have been warned, and forewarned is forearmed.

A year ago, possibly half a year ago, one might have been justified in experimenting with different methods or attempted cure; there is absolutely no justification of that now. The only course to take now is absolute destruction of infected trees. The only excuse for hesitating to apply this Spartan remedy is ignorance and we trust the presentation of the case of citrus canker which has been made this afternoon will go a long way to remove any ignorance on the subject.

In Dade county we have had considerable experience in combating this disease and we consider that we are fairly well educated in that line now, but it has been an expensive education and if that education had to be repeated all over the state in each citrus district there would not be much hope. The virulence of the disease has been brought out by every speaker this afternoon.

The fact that where canker is known it can be eradicated is our only encouragement. Six months ago we could not say that. Mr. Burbank has stated in his paper that we have no ground for stating absolutely that a large bearing grove, once infected with canker, could be cleaned up. I believe he is correct. I do not remember of a single instance where the disease has infected a large bearing grove that it has been completely eradicated as yet, but in smaller groves we have demonstrated that

even in the worst cases we can eradicate it.

One grove I recall had as bad an infection as we have known, a forty-acre grove of young trees. At the end of the first week's inspection we burned two hundred and eighty trees. For weeks we burned upwards of one hundred trees a week. We finally burned one-third of it, possibly a little more, but for several weeks now we have found no canker there and we believe we have won the fight in that grove. We believe we can win in other similar cases but if there is anything that interferes, anything that causes delay in burning the trees, even for a short time, our chances are greatly lessened.

For that reason we must have a law. We will get nowhere without it, and the law without the money and power to operate it will be almost useless. With the law and with the money six or eight months ago we might now be able to make a very much better report.

We know what the law is that has been offered; it has been thrashed out by a number of our growers who know our needs in that line. We know what the appropriation is that we have asked for, and we know we are going to need within the next two years every cent of it. We have not asked for anything more than we ac-

tually require. We have asked for an appropriation of \$125,000 and we have not expected that it is going to be cut down to \$50,000 or \$60,000.

One of the other provisos that I mentioned in stating that I believe we are going to get rid of canker, was the man who will administer the law throughout the state. On the selection of the right man for that work a great deal of the efficiency of the law is going to depend. It will be an extremely disagreeable position to hold. We must have a man who, in the first place is remarkably intelligent. He must have a broad training and then if we can perform some surgical operation on him and doubly reinforce his backbone it will be a very good thing. Then we should perform another operation and remove his heart. When we have a man with a reinforced backbone and with no heart at all, we will have found the right man for the place. (Laughter.)

To keep from entering into a dispute with the gentleman who said it was idle to prophesy, I will have to confine myself to personal ideas and state that it is in my opinion *possible* to get rid of citrus canker. Now whether it is *probable* that we will do so depends upon the provisos I have mentioned.

## CITRUS CANKER IN NORTH DADE COUNTY

M. S. Burbank, Miami, Fla.

*Mr. President, Ladies and Gentlemen:*

It will be a difficult thing to present to the members of this society, a paper on citrus canker, that will at once make them realize the seriousness of the disease, and the danger that threatens the citrus industry, not only of Dade county, but of the entire state.

When we commenced the eradication work in the north part of Dade county, last summer, we realized that we had a big job on our hands to find out how much canker we had and how widely it was distributed, but we had no idea what the eradication work would mean.

We began the work of hunting for canker about the middle of August, and worked with a comparatively small force for five months, covering nearly all of the territory of our association, consisting of 216 square miles, with about 414,000 grove trees to inspect. It took us nearly six months to make the first inspection, and this showed up 39 different infections of canker, nearly all of these being around the two originally infected nurseries.

The results of the second inspection have shown that the first inspection was a pretty careful one, as we have found only eight new infections.

Fifty-four men are doing inspection work in gangs of six. Each gang with a foreman.

We have a total of 47 groves that have shown canker sometime since last August,

but we believe that over one third of these are now free of the disease.

The inspection has been carried on with every possible precaution being taken to prevent the inspectors themselves carrying canker on their clothes from one grove to another. They wear a one-piece cotton suit, made for this work, that covers them from head to foot. In finishing the work in one grove they do not go to another until they have put on a clean suit, and sprayed their shoes and leggings with bi-chloride. The suit that is taken off after finishing each grove is dipped in bi-chloride, and hung up to dry.

The men are divided into two groups, doing two kinds of work, one doing what we call the advanced inspection, that is inspecting the groves that have never had any canker, and the other doing the re-inspection work, or inspecting the infected groves.

The men on the advanced work never go into a grove that is known to be infected, and when they do find canker they go no further, but leave that grove immediately, and one of the gangs doing re-inspection work in diseased groves is put in there to finish the inspection and burn the trees.

This is done to lessen the chances of the men themselves carrying canker.

When canker is once found in a grove, that grove is put on the infected list, quarantined as far as possible, and carefully inspected once a week, and all cankered

trees burned immediately on being found, the once-a-week inspection is kept up for several weeks after the last canker is found, and then the period between the inspections is lengthened.

Twenty of the infected groves have developed no canker for over three months, and some of these for a much longer period. In eight groves where we have found only slight infection, we hope no more canker will be found. We have nineteen groves on the active list, in which canker has been found and in which we believe canker still exists.

We have traced the source of infection in almost every instance, either by the location, or by the agent that carried it. Of the forty-seven infections in our territory, seventeen are at Larkins in the immediate vicinity of one of the originally infected nurseries. Nineteen are in the Miami section, and are in the vicinity of the other originally infected nursery. Eleven infections are north of Little River, at four different points about three miles apart, and, incidentally, are every one of them in groves set with trees from infected nurseries.

Twenty of our infections have been in groves where trees from one of the infected nurseries were set. Twenty-five are in the immediate vicinity of the two originally infected nurseries. And two of the infections we have been unable to account for, but strongly suspect the birds, but can't prove it.

We always try to trace the source of infection, so that it will teach us what to avoid in handling the work.

There are a number of cases where we have reason to believe that the disease

was brought in by men who had been working among cankered trees. One case where a calf got loose and wandered about in a grove, that afterwards developed canker. The calf was brought home and turned loose in his owner's grove, where he did a good job in distributing canker. Another case within the city limits, is where the ice wagon is held responsible for spreading canker. We have had three cases of canker on trees along paths through groves, where men who had worked among diseased trees, traveled to and from their work. Loose horses feeding about in cankered groves have in several instances been the means of distributing canker. Birds are also blamed, where canker has been found in the tops of trees, and grasshoppers have carried it from tree to tree in groves already infected. Anything that moves about in a cankered grove, and that comes in contact with the trees is liable to spread the disease.

We supply posted notices and ask all grove owners to post their lands, and to let no strangers in their groves, and, when putting a new man to work, to be sure that he has not been working in a diseased grove. These things we ask of all the grove owners. To those who have canker in their groves we request, that all work in the grove be stopped, and that no one be allowed in their groves except the inspectors. In many instances, with the young groves this has been done, but in the bearing groves most of the owners have picked the fruit from trees not affected with canker.

In trying to eradicate the disease, we have found that the use of the ordinary

sprays do no good, and they were given up early in the work. The only method we know of to get rid of canker is to burn the diseased trees, and this is done by a most unusual method. An ordinary spraying outfit is used as a huge torch, using a mixture of kerosene and crude oil as fuel, and the burning spray consumes canker, tree and all.

We have had three cases where the owners would not let us burn the entire tree, but only that part that had canker on it. Our experience of attempting to rid these groves of canker, has proved beyond a doubt that such a method is a very great mistake. In one of the worst infected bearing groves the owner wanted to try to save the trunks of the trees, so we wrapped them with wet burlaps and burnt the rest of the tree. We did this last fall and the growth that these stumps have made during the past three weeks has developed canker. This looks as if canker had been carried over on the heavy bark on the trunks that had been protected with the burlap. In another instance where the owner wanted to save all that he could of his large bearing trees, that were only slightly infected, we were allowed to burn only that part of the tree where canker had been found; the result being that canker has appeared on other parts of the trees and has spread to other trees in the grove.

There has only been one instance where we have not been allowed to burn the canker that we have found; and that is in a nursery, where the owner is burning according to his own methods. Although in the two cases mentioned we were not allowed to burn as we thought best, we

are confident that within a short time these owners will say to us go ahead and burn as you wish.

The work of inspecting groves is very monotonous and especially so when among small trees, where there is no canker. To select men who have good eye sight, and who will keep their minds on their work and their eyes on the trees has not been an easy task. How to judge a man's work and tell whether he has done proper inspection or not, can only be shown by an inspection later on, and it was on this account that we waited with great concern the results of our second inspection, and we are very glad to say that this was very satisfactory, as we found only eight new cases. Part of our territory has been inspected a third time and part a fourth time, and no canker has been found by the third or fourth inspection. This has shown that our first inspection was carefully done, and has been very satisfactory to our manager and chief inspector.

In order that the men who are working on the advanced inspection and do not have a chance to see canker very often, may keep up their knowledge of canker and not lose interest in their work, we have changed them from districts where no canker has been found to cankered groves for a few days, and then put them back in the advanced inspection work again. Another thing that has been hard for us to determine is how many trees should a gang of men inspect in a certain time. When the reports showed that a gang had inspected eight thousand trees in a week, and another gang had inspected sixteen thousand, we did not know which gang had done the

better work and whether one gang needed pushing or the other slowing up. We could not tell by going out and looking at the groves, so we watched the different gangs, and learned what to expect from each.

There has not been much spreading of canker in this territory during the past six months, although we have continued to find it in the groves that were badly infected when we began our work. It is apparently impossible to take a badly infected grove and clean it of canker in a few months. It has happened that the owners of some of our infected groves have hampered our work to some extent, in one way or another, and we feel if we could have had our own way at all times we should be nearer the end of our work.

Canker started before we did, and got well established in certain places before we began our work, and it is in these places that it continues to appear, week after week, in spite of our destroying it as fast as we find it. We will burn all the canker in these groves, and go back the next week and find a few infections, and then the following week find much more. Sometimes a grove will go several weeks and not show much canker and then it will break out again, and this will be repeated from month to month.

Eleven hundred thirty-six grove trees and about thirty-five thousand nursery

trees have been burned on account of canker in the territory of this association.

Let canker once get well established in your bearing grove, and I would not give much for the grove. We have not proved as yet, that a bearing grove can be freed of the disease, after it has got a good start.

There are several cases where we have destroyed the first infection and have found no more, but we have not a single instance of where we have been successful in cleaning out a bad infection in a bearing grove, although we are finding less and less, and most of it is young canker on the new spring growth.

We have had a hard time raising money to carry on the work. It has been very unfortunate for the work, that at this time fruit has been bringing in so little money, as we have not received from the growers the contributions that we expected. Our own sources of revenue are about exhausted and we shall have to cut our force down.

There is no disease of citrus trees that will in so short a time ruin a crop. It spreads more quickly on the young fruit than on any other part of the tree and covers the fruit with what looks like spots of tar and sand. It is this that we have been fighting and it is this that we must eradicate if the citrus industry of Florida is not to be wiped out.

## THE RELATION OF THE FLORIDA GROWERS AND SHIPPERS LEAGUE TO THE CITRUS CANKER WORK

Lloyd S. Tenny, Orlando, Fla.

In this paper Mr. Tenny outlined the relation of the League to the canker work up to the present time. As a state-wide organization of a protective nature, it was the natural thing that this work centered with the League until at least the state had provided the means for carrying on the work.

The finances for carrying on the canker work by the State League have been secured largely by a committee, consisting of Mr. D. C. Gillett; Mr. J. C. Chase; Mr. L. D. Jones; Mr. Jefferson Thomas, and Mr. B. L. Hamner. The money that has been expended by the League has largely been used for inspection for canker throughout the state

outside of Dade County. Only \$1,600 of the state money was contributed for the work in Dade county. The League has made a careful inspection on the East Coast north of Dade county, and several citrus canker infections were located in that district. The central part of the state has been inspected, and practically no infections have been found in that territory. A good deal of money has been spent inspecting in West Florida, and upon the West Coast; and in that territory some infections were found. The League has received for the canker eradication work a total of \$15,753.22. Up to April 1st, 1915, there had been a total of \$14,912.07 expended, leaving a balance on hand at that time of \$841.15.

## ANNUAL REPORT OF THE FLORIDA GROWERS AND SHIPPERS LEAGUE

Lloyd S. Tenny, Secretary-Manager, Orlando, Fla.

*Mr. President, Ladies and Gentlemen:*

The past year has been one of great activity and great development for the Florida Growers and Shippers League. Matters of vital importance have arisen, and the necessity of maintaining such a protective association as this has been proven beyond a doubt. The citrus and vegetable interests of the state have developed so greatly within recent years, and the problems affecting every grower and shipper have become so numerous and of such

great importance that it has become imperative to maintain a strong organization to handle all such problems.

### ORGANIZATION.

The League is governed by an Executive Committee of nine people. For the purpose of selecting this committee, the state is divided into three geographical divisions: a northern district, which shall consist of all those counties lying north of Citrus, Sumter, Lake, Seminole and Brevard counties; a southern district,

which shall consist of all those counties lying south of Hillsborough, Polk, Osceola and Brevard counties; a middle section, which shall consist of all the counties lying between the northern and southern districts.

The members of the Executive Committee are elected for a term of three years. Three members, one from each district, are elected at each annual meeting. The committee elects its own officers. The committee with the officers elected for the past year has been as follows:

L. B. Skinner, Dunedin, President.

Dr. J. H. Ross, Florence Villa, 1st Vice-Pres.

H. C. Schrader, Jacksonville, 2nd Vice-pres.

J. C. Chase, Jacksonville.

Z. C. Chambliss, Ocala.

J. R. Davis, Bartow.

A. F. Wyman, Bradenton.

H. E. Heitman, Fort Myers.

T. V. Moore, Miami.

#### MEMBERSHIP.

The membership reported last year was 1,027. These included all the names secured by Mr. Hamner, and all those secured after the first of January, 1914, prior to our meeting of last April. In the formative period many persons joined whose interest was small, but who were willing to pay one dollar to see a new thing started.

The paid up membership on April 1st of this year was 1,153, a net gain of 126 over a year ago. While the gain has not been great, yet the present membership represents a much more substantial support than we had last year.

#### FINANCES

The accounts of the League have been audited recently by Charles Neville & Co., Certified Public Accountants, of Savannah, Ga., and Jacksonville, Fla. The fiscal year of the League ends with August 31st. From January 1st, 1914, to the end of our fiscal year, the total receipts were \$6,495.98 and the total disbursements \$6,197.74, leaving a balance on hand of \$298.24. From Sept. 1, 1914, to March 31, 1915, the receipts, together with balance on hand Sept. 1st, was \$3,450.23. The disbursements were \$3,224.84, leaving a balance on hand March 31st of \$225.39.

#### STANDARD PACKAGES.

Because of certain legislative matters in the national government, and in more or less of the states, and to simplify our rate structure, it is going to be the advantage of the state, and especially to the vegetable industry, to reduce the number of different sized crates and other packages which are used. I believe the time is not far distant when those packages that remain in use will become by law "Standard Packages," and it would not surprise me greatly if the use of packages other than the standard one would be prohibited.

During the last hours of the recent Congress, the first of these bills was passed, fixing the standard for barrels and also for one-third, one-half and three-quarter barrels. The barrel that has been made the standard shall be of the following dimensions: length of stave, 28½ inches; diameter of heads, 17 1-8 inches;

distance between heads, 26 inches; circumference of bulge, 64 inches, outside measurement; and the thickness of staves not greater than  $4\frac{1}{10}$  of an inch, provided, that any barrel having the capacity of 7,056 cubic inches shall be a standard barrel. The use of any other barrel for fruits (other than cranberries), vegetables and other dry commodities, is absolutely prohibited. The law becomes effective July 1st, 1916.

#### PURE FOOD REGULATIONS

A subject closely related to the last is legislation pertaining to pure food regulations. These laws may relate to misbranding, artificial coloring of fruit, labeling of packages containing fruits and vegetables, etc. On March 3, 1913, Congress passed an amendment to the Pure Food Act, which was far more reaching in its effect than was generally supposed. This amendment went into effect September 3, 1914. Some of the regulations of the Department on this matter read as follows:

"Except as otherwise provided by this regulation, the quantity of the contents, in all cases of food, if in package form, must be plainly and conspicuously marked in terms of weight, measure or numerical count, on the outside of the covering or container usually delivered to consumers."

"The quantity of the contents so marked shall be the amount of food in the package."

"If the quantity of the contents be stated by weight or measure it shall be marked in terms of the largest unit contained in the package."

As I interpret these regulations, there is no question that the majority of the packages shipped out of Florida containing fruits and vegetables come under the regulations, and a shipper failing to mark the contents upon the package is liable to prosecution under the law. There is a misunderstanding in the minds of many that it is necessary for the Department to state specifically that a certain package must be marked in a specific manner. The law, however, does not provide for any such arrangement, and I cannot see how a shipper could use this as an excuse for failing to mark his packages properly. The League has used its best influence to have certain modifications made. With the present law, however, and with its enforcement left to the Bureau of Chemistry, there seems little hope for any change in the interpretation of the law.

There will be constantly more and more of such laws passed by the national government, and by the different states. Undoubtedly the League will have to devote considerable time in keeping itself informed as to these laws, and in seeing that the interests of its members are properly safeguarded.

#### REDUCTION OF PRICE OF GRAPEFRUIT ON DINING CARS.

Some of our members asked us to see if the railroads and Pullman company could not be persuaded to reduce the price asked for grapefruit on their dining cars. Letters were sent to all the principal Southeastern lines, calling their attention to the matter. The Seaboard Air Line was the first to respond favorably, re-

ducing the price to ten cents per half and fifteen cents per whole fruit. The following lines have also agreed to a reduction: Atlantic Coast Line, The N. C. & St. L., the Mobile & Ohio, the L. & N., and the Pullman Company on its buffet cars.

#### THE CITRUS CANKER WORK.<sup>1</sup>

By far the biggest undertaking of the League has been in connection with the canker work. In my last annual report I called your attention to the presence of a new citrus disease in the state, and emphasis was laid upon the fact that it would take strenuous efforts on the part of the entire industry to keep the disease from spreading over the whole citrus belt. After the discussions of this afternoon little further need be said. The position of the League in this work, I believe, has been made clear. It has cost a lot of money to fight the disease up to the present time, but the state as a whole has lost a trifle in comparison to what the growers in the diseased area have suffered. The state must continue the work, and the majority of you can well afford to carry on the fight in a far section of the state, rather than to allow the disease to come nearer home.

A total of \$15,753.22 was paid to the League up to April 1st, 1915, for the citrus canker eradication work. Checks drawn on this account up to the same date total \$14,912.07, leaving a balance on hand of \$841.15. This covers only the amounts handled through the Orlando office of the League, and does not include the large sums expended through the local associations of the League in Dade

county; neither is the appropriation received from the United States Department of Agriculture included in this total.

The citrus canker fund has been handled entirely separate from the general funds of the League, which has been made necessary because of many contributions received from those who were not members of the League. Great credit should be given the Finance Committee, which has received the greater portion of the pledges to carry on the work. This committee has consisted of the following well-known men: D. C. Gillett, J. C. Chase, Jefferson Thomas, B. L. Hamner and L. D. Jones. Among the large contributors have been the railroads operating in Florida, marketing organizations, crate, paper and fertilizer manufacturers, manufacturers of packing house equipment, development companies and many large growers.

A suggestion was made a little time ago that the League have prepared, if possible, a moving picture film, showing the work of eradicating the canker, and bringing out perhaps some other features that might be of interest and value to the industry. The introduction of canker into Florida presented such an excellent illustration of the ease with which a disease or insect pest may come to us from another state, or from a foreign country, that we felt this weakness on the part of our state should be emphasized, and brought to the attention of the farmers and fruit growers everywhere. There are other diseases and other insect pests even more serious than we now have in Florida, and the League feels that our people should be thoroughly aroused to the

dangers that confront us, and the members of our Executive Committee thought that a moving picture film, shown in different parts of Florida, would present this in a more forceful manner than could be done by writing, or even by speech.

There is also a constant danger that some infections of the canker have been missed in the state. The moving picture shows, very much enlarged, diseased fruit, leaves and twigs, and the photographs are so true to nature that we believe any citrus grower seeing this film would immediately recognize the disease if he had it upon his property.

#### THE CROP PEST BILL.

The so-called "Crop Pest Bill" is a measure for which the farm people of the state have been asking for several years past. The majority of the states in the Union are spending considerable sums of money in keeping out of their states new diseases and insect pests. Florida has been doing practically nothing along this line. The more progressive growers have realized the danger for some time. The movement was started in the Horticultural Society. During the past year the League has co-operated with the Horticultural Society and its officers in the work—first, of arousing public opinion to the need of such a bill—second, to the drafting of a bill that seems to meet our needs, and third, to informing the Legislators of the State of the provisions of this bill, and of the great need there is to the entire state for such a measure. I believe I am safe in saying to you that we have not left many stones unturned to secure the passage of a Crop Pest Bill that

will be adequate, and that will have sufficient finances back of it to have it properly enforced.

#### APPROPRIATION FOR CITRUS CANKER WORK.

Another bill that is now pending before the State Legislature, which has the support of the League, is an appropriation bill to carry on the canker eradication work. When the whitefly was introduced into California, their Protective League met the emergency, and was the means of financing the work until their Legislature met. When that time came their Legislature provided for the further continuance of the work, and also reimbursed the League for the money already spent. We do not believe that public sentiment is strong enough in Florida to justify us in asking for reimbursement for money so far expended. We do feel that the citrus industry is of such great importance to the State of Florida that the state as a whole should carry on the further eradication work, and to that end the League has favored an appropriation of \$125,000, which is to be expended during the next two years for this work.

#### THE GRAPEFRUIT SITUATION.

The League is not unmindful of the changing situation with regard to the grapefruit industry of the state. During the past, the supply has not equaled the demand, and as a result, the prices have been good. An immense acreage has been set, however, during recent years, and a changed condition has been brought on. The fact remains, however, that grape-

fruit is not in general use, especially in many sections of the country. We believe it is going to be necessary during the next few years for the growers and shippers of grapefruit to carry on a popularizing campaign over the entire country. To that end, the League is attempting to interest the transportation companies in co-operating in this movement. On March 18th, a conference was called by the League at St. Augustine, which was attended by the authoritative representatives of practically every railroad in the Southeastern territory, and also by a few growers and shippers. The League presented facts and arguments to show that the grapefruit industry was a comparatively cheap one, and that the railroads could afford to separate this commodity from other citrus fruits, making a lower rate apply thereon. We feel that the situation is a very critical one, and that the transportation lines realize this, and will therefore grant a substantial reduction.

#### HANDLING CLAIMS FOR MEMBERS

Apparently, it is not clear to some members as to the character of claims which the League has undertaken to handle, as several times we have been requested to intercede in the collections where the produce has been consigned to a dealer, who failed to make returns. That is purely a marketing phase, which is not embraced in our program, and we cannot handle such matters. However, we are having much success in the adjustment of claims against the railroads and express companies for overcharge in rates and loss and damage to shipments. For this work

a small fee is charged so as to defray the additional expense involved in bringing about settlements, and it is not designed to realize any profit whatever therefrom. We do not make a charge unless we are successful in getting the claim settled. We have recently obtained settlement in several instances where the shipper filed claims direct and the same were declined. Any member desiring service of this kind should communicate with the Traffic Department.

#### GETTING CITRUS FRUITS OUT OF "POCKET MARKETS."

This is one of the first subjects undertaken upon the addition of our Traffic Department, and I am pleased to say that same has just been handled to a very successful conclusion. Every concession that was asked of the railroads in this connection has been granted, and as a result we will no longer be imposed upon by unscrupulous dealers located in these so-called "pockets," as under the arrangements that have been perfected, cars may be back-hauled at a very nominal charge in connection with reconsignment to more profitable points. Merely to give you some idea of what a task a general subject of this character constitutes, approximately 125 communications were exchanged with our members and the transportation companies in this case alone.

#### COMPLAINT OF CITRUS FRUIT RATE TO LINEVILLE, ALA.

Formal complaint has just been filed with the Interstate Commerce Commission, praying for the establishment of a

just and reasonable rate and refund of excessive charges applied on a car shipped by a member in December, 1914, to Lineville, Ala. The delivering railroad based its charges on the through rate from shipping point to Talladega, Ala., which point is 29 miles beyond Lineville, Ala., plus an interstate class arbitrary back to destination, thus making a through rate of 75.6 cents per box—7.6 cents box higher than rate from shipping point to Chicago, Ill., that was established a few years ago by the Commission. Reparation to the extent of \$76.80 has been asked for, and if this is granted, it will mean a net profit to the grower of approximately 11 cents a box. It will cost the League at least \$50.00 to handle this case to a conclusion, and while on the surface it may seem unwise to some, the fact should not be overlooked that a favorable decision would carry with it the establishment of a reasonable rate by which further business may be had at the point in seasons to come. It is worth while mentioning here that had not the rate been so unreasonable the shipper could have disposed of several more cars.

PUBLICATION OF THROUGH RATES ON  
FRUITS, PINEAPPLES AND VEGETABLES,  
ALSO REFRIGERATION CHARGES, FROM  
FLORIDA SHIPPING POINTS TO TEXAS,  
OKLAHOMA, ARKANSAS AND LOUISIANA.

This is a matter that has been agitated for years, but we are still without through rates on account of inability of the railroads to reach harmonious understanding as to by whom they will be published. We all know of the great difficulty ex-

perienced in successfully marketing our products in that rapidly developing southwestern section, and that our apparently slow progress has been due to our complex rate facilities. The railroads themselves admit inability to quote the through rates correctly at all times. The simplicity of the rate arrangement from California has enabled that state often to take orders which our shippers should have had. The League, in conjunction with the traffic departments of some of the marketing agencies, has been conducting an extensive campaign during the past four months for publication of through rates in a simple way so that everyone will be in a position to determine rates when desired, and as a result we feel almost certain in saying to you at this time that the rates will be available for next season.

RATES, CITRUS FRUITS AND PINEAPPLES  
TO WESTERN CANADA.

Prior to last fall through rates to a limited number of markets in this section were being published in Florida Orange-Pineapple Tariff. Those rates, however, represented nothing more than sum of the rates to St. Paul-Minneapolis and the local beyond. By reason of a controversy between our lines and the western Canadian roads, through rates were eliminated from the tariff on December 5th last. We handled this matter with both interests and were able to have rates established to all the markets in Alberta, Saskatchewan and Manitoba that are approximately 40 cents per box less than those formerly in effect to a limited number of markets. We arranged with the Florida lines to

obtain permission from the Commission so that the rates were made effective on short notice.

#### FREIGHT RATE GUIDE.

In making a comparative study and detailed check of our various rates an opportunity is being afforded us to simultaneously compile a Rate Guide for the information of members and other interested parties—an idea conceived by the Traffic Manager before coming with the League. This rate medium or service should prove an invaluable asset to the organization, as it contemplates placing before you at all times the freight rates from every shipping point in Florida to approximately 3,000 markets, in such a simple manner that you will have no trouble in determining your own rates. The Executive Committee at its last meeting authorized that the task be proceeded with, and at this time it is about half completed. The service will be ready for inauguration at the beginning of next season, and before we adjourn here I want to have an opportunity of presenting this matter more in detail for your consideration.

Were I to attempt to explain in detail the many corrections we have been able to point out to the railroads, all of which have been due more or less to errors in tariff compilation in years past, it would require an indulgence on your part which I don't want to ask. The important ones have recently been announced through the press over the State, and will hereafter be included in our periodical bulletins as well. However, I do want to bring to

your attention, by way of illustrating the benefits to be derived from a careful check of the tariffs and a study of our rate structure, just a few representative corrections we have had made in the past week—briefly as follows:

Texarkana, Ark.-Tex., citrus fruit and pineapples, carloads, when from stations on the F. E. C. Ry., reduction of 48 cents box, taking effect April 23.

Newport, Ark., citrus fruit and pineapples, carloads, when from stations on the F. E. C. Ry., reduction of 2 cents box, taking effect April 23.

Harrisburg, Pa., tomatoes and other vegetables, carloads, when from stations on F. E. C. Ry., reduction of 6 cents crate, effective April 23.

Deadwood, S. D., citrus fruit and pineapples, carloads, from all Florida, will be reduced 12 cents per box, effective with issuance of next supplement to Florida Orange-Pineapple Tariff No. 4.

Crawford, Neb., citrus fruit and pineapples, carloads, from all Florida, will be reduced 9 cents per box, effective with issuance of next supplement to Florida Orange-Pineapple Tariff No. 4.

Ogden, Utah, citrus fruit and pineapples, carloads, from all Florida, will be reduced 4 cents per box, effective with issuance of next supplement to Florida Orange-Pineapple Tariff No. 4.

El Paso, Texas, citrus fruit and pineapple rates, carloads, taking effect April 30, will be made clear in the tariff so there will be no difficulty in determining same, and especially avoiding over-charges which have been made on practically every car heretofore.

## CONCLUSION

While the foregoing traffic matters have consumed a large part of the time of our Traffic Manager, considering that not unfrequently he has had to attend rate hearings and conferences away from headquarters, they by no means constitute all the work that has been undertaken. Your interests are being watched in many matters to which I have not made specific references. We are not unmindful of the development of perishable traffic from California through the Panama Canal, nor the advantage in low water rates to New Orleans and New York City that is causing a most wonderful development of pineapples and grapefruit in Porto Rico, Isle of Pines and Cuba. These are things with which in time we must reckon. We are looking forward with keen interest to the reconstruction of all rates throughout the entire southeastern States, which the traffic officials have been working on for months and will continue throughout the summer, in order to bring the rates in

harmony with the long-and-short-haul provision of the Act to Regulate Commerce. Many important changes in our rates must necessarily follow the completion of such a gigantic task. In all matters of common interest we have the co-operation of other organized bodies, such as the National League of Commission Merchants, the International Apple Shippers Association, the Western Fruit Jobbers Association of America, the National Industrial Traffic League and the California Citrus Protective League.

Many of the matters on which we have reported are only under way. The field of work is very great indeed. We want the support of every member. We need more members. We need a larger financial support. The possibilities are almost unlimited. We thank you for your past support, and we trust that the personal relations between officers, Executive Committee and members may continue as friendly and cordial as they have been in the past.

## Bright Fruit Symposium

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This portion of the program was kindly conducted by W. W. Yothers, and the following papers and discussions were presented:

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### BRIGHT VERSUS RUSSET FRUIT\*

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W. W. Yothers, Bureau of Entomology, Orlando, Fla.

It is well known that the various grades of fruit in the State are not standardized nor are they uniform. The first grade of one packing house or one community may be only equal to the second or even third grade of another packing house. Within certain limits every grader has more or less an idea as to what should be placed in the respective grades. Although such is the case, there are certain factors which are almost universally taken into consideration in the grading of fruit. Generally speaking, an orange which has an orange color, the proper shape and texture of skin will be considered as first grade fruit. Those oranges which have minor blemishes, such as a tinge of rust mite injury, will be graded as seconds, and those fruits which have much rust mite injury, are misshapen in size, and have other blemishes, will be placed in the third grade.

It certainly is surprising to figure up the percentages of these respective grades throughout the State. In the year 1914, out of a total of about 20 cars or 6054 boxes, there were 181 boxes, or 3 per cent

of first grade fruit; 3680 boxes, or 61 per cent, of second; and 2193 boxes, or 36 per cent, of third grade fruit. A conservative estimate would be 10 per cent first grade fruit, 50 per cent second, and 40 per cent third. Since coming to Tampa, I interviewed Mr. Shelby, sales manager of the Citrus Exchange, and he gave permission for me to state that the Exchange would not ship more than 10 per cent "Blues," 50 per cent "Reds," and about 40 per cent "Yellows," thus corroborating my estimate. Although these figures may not be absolutely accurate, they certainly are not far from the truth.

It is to take into consideration the facts concerning this situation and the methods for raising the grades of fruit that this hour has been set apart.

One of the main factors which lowers the grade and appearance of the fruit is the russetting which follows the injury of the rust mite. It is a matter of much interest to know that not more than 10 per cent of the fruit in this State receives any

\*Published by permission of the Chief of the Bureau.

treatment to control this pest. As a matter of fact I am only able to figure up about 5 per cent and the other 5 per cent is added in order to make allowances for omissions. Since it has been known for 30 years how to control the rust mite and there still remains 90 per cent untreated, there must necessarily be a very great difference of opinion in regard as to whether or not this pest is of sufficient importance to demand remedial measures.

In the first place one should consider the prices which russet oranges bring compared with those which are brought by the bright. There is practically no difference of opinion regarding this matter if the oranges are placed on the market before the holidays. Every packer or orange dealer to whom I have ever written or with whom I have talked admits that bright oranges not only brought more money before the holidays but were in much greater demand than russet fruit. The reason for this demand for bright oranges in preference to russet oranges before the holidays could be ascribed to the fact that bright oranges color up earlier in the season and perhaps are therefore more marketable and also to the fact that a bright orange appeals to a person's sense of the beautiful. The consumer wants his fruit to appear in the best possible manner. Holiday attire might express it.

In regard to the prices which these two classes of fruit bring after the holidays there seems to be a very great difference of opinion. There seems to be a general impression that other things being equal the two classes of oranges bring about the same price. There are, how-

ever, many well known orange men who claim that the bright oranges bring more than russet oranges throughout the year. I have examined the returns of many cars of fruit, and always found a difference of from 10 to 70 cents a box between russets and brights. I am inclined to believe that if the question of the market price of russet and bright oranges was taken up in an exhaustive manner for the entire State the same differences would be found during the spring as during the fall.

There is also a general impression over the State among packers that the russet orange has much better shipping qualities than bright fruit. If this is the case, it is possible that the supposedly superior shipping qualities of the russet orange might outweigh any advantages which bright fruit might possess. Several prominent shippers, however, have stated that they have never been able to detect any difference in the carrying qualities of these two classes of fruits. This question was taken up with Mr. H. J. Ramsey, who has charge of the transportation of fruit investigation. Owing to the shortness of time available before this meeting, he was unable to go over the results of his shipping experiments to determine this particular point. He was under the impression, however, that no difference existed. I have also heard one packing house manager who was very emphatic in his statement that russet fruit did not carry as well as bright. In order to throw some light on this matter several small experiments or tests were made this spring with both grapefruit and oranges. It is not considered that these tests are final but they certainly are worthy of consid-

eration. When these experiments were undertaken we believed russet fruit was a better shipper than bright and we approached the subject to a certain extent in favor of the russet. The results are totally unexpected.

Test 1: Grapefruit: On January 30, 24 brights and 24 russets were picked and placed in the laboratory. These were examined from time to time and on April 7 there were 46 2-3 per cent of the bright fruit had decayed and 58 1-3 per cent of the russets. The lot of bright fruit also lost 4 7-10 per cent in weight by evaporation, while the russets lost 13 6-10 per cent.

Test 2: 51 grapefruit each, of brights and russets, were picked on the same day as the preceding and placed in the laboratory. On April 7, 49 per cent of the brights had decayed and 75 1-2 per cent of the russets. The bright lot had lost 5 9-10 per cent in weight and the russet lot 9 1-2 per cent. If these two tests are combined the results will be 46 2-3 per cent of the bright fruit had decayed and 70 6-10 per cent of the russets. The bright lot lost 5 1-2 per cent in weight and the russet lot lost 10 8-10 per cent.

Test 3: Oranges: One box of bright oranges and one box of russet oranges each containing 200 fruits were purchased at the packing house March 9. These fruits were picked from the same grove. On April 7 the bright oranges showed 48 1-2 per cent decay, while the russet oranges showed 59 per cent. The loss of weight by evaporation was about the same in both instances.

Test 4: One box of brights and one box of russets containing 160 oranges

each were placed away March 9. On April 7, 29 3-10 per cent of the bright had rotted and 30 6-10 per cent of the russets. The loss by weight was 10 4-10 per cent for the bright fruit and about 15 per cent for the russet.

Test 5: One box each of brights and russets containing 150 oranges each were placed away March 3. On April 7, 50 per cent of the bright fruit had decayed and 66 per cent of the russet. The brights lost 14 8-10 per cent by evaporation and the russets 17 9-10 per cent.

Test 6: One half box each of brights and russets were placed away March 3. On April 7, 54 per cent of the brights had rotted and 74 per cent of the russets. The bright fruit lost 17 4-10 per cent by evaporation and the russets 21 per cent.

It will be noticed that in every instance the russet fruit showed a greater percentage of decay than the bright fruit. The percentage of evaporation was also greater in every instance except one and in this case the percentages were about equal. It is very difficult for the reasonable mind to understand how it is possible for fruit, the skin of which has been attacked by millions of little creatures which have withdrawn many of the substances in the rind which nature intended to preserve the fruit from the elements, could possess better shipping qualities than fruit which is normal in appearance and whose skin contains all the elements that nature intended for the preservation of the fruit.

In regard to the relative sizes of bright and russet fruit, there are very few packers that have not observed that the russet orange is somewhat smaller than the bright orange. Several people have made

the statement that they are about one size smaller. In figuring up 42 cars of oranges for the season 1913-1914, it was found that the percentage of difference of russet and bright fruit in the same car ranged from 4 to 16 per cent. Several instances are known where fruit was as much as 25 per cent. Unfortunately the figures obtained from commercial packs are not reliable since the grading is not done solely on russets and brights. Every orange that is misshapen or that has other blemishes, regardless of what they may be, are usually placed in the third grade.

Since it is a fact that there is less than 10 per cent of first grade fruit shipped from this State, something should be done to raise the grade. Since the prices for bright and first grade fruit are usually better than for other grades of fruit, it makes it more necessary that the citrus growers should do something to reap the best prices for their product. If it is considered that first grade fruit is about one size larger than other grades and also that there is a strong probability that bright fruit has better shipping qualities than russet fruit, it is imperative that all reasonable methods should be applied to make the industry reap the greatest financial rewards.

In order to give specific and concrete cases to show what can be done the records of several groves which have been sprayed are here given.

Grove A: This grove in 1913-14 had no blues. It was not sprayed at all during that year. This year he expended at the rate of 9 cents a box which, by the way, is the most expensive spraying I have ever known. As a result his pine-

apple oranges graded 60 per cent blue, 35 per cent red, and 5 per cent yellow. The grapefruit graded 30 per cent blue, 67 per cent red, and 3 per cent yellow.

Grove B: This consists of 65 acres of grapefruit, the trees of which have a bearing capacity of about 8 boxes. In 1914 10 cars graded 2 7-10 per cent first, 15 3-4 per cent seconds, 50 1-2 per cent thirds, and 31 1-2 per cent fourth. This grove was sprayed under the direction of this office in 1915 and the methods will be considered in another paper on this program. This year, out of a total of 13 cars, there was 41 2-10 per cent first, 50 1-10 per cent second, 8 per cent third and 7-10 of 1 per cent fourth. On trees located in the middle of the grove left unsprayed throughout the year a car graded no firsts, 3 1-3 per cent seconds, 90 2-3 per cent third and 6 per cent plain. To produce this difference it cost about 6 cents a box.

Grove C: This grove was sprayed by this office. No records for the grades for last year are available. This year it was sprayed on the 30th and 31st of July with a combination of 1 per cent of oil and soda-sulphur solution (regular formula) 1-50. This fruit was purchased by one of the dealers in Orlando, for which he paid the highest price for any fruit that had come to his packing house during the entire year, and this packer said that this was the finest fruit he had packed this season. It graded about 95 per cent bright. If this spraying had been done about three weeks sooner much better results would have followed.

It is also well known that spraying will increase the yield from year to year, and

when we consider the benefits to be derived in increasing the yield, raising the

grade, and greater prices, it seems that the case for spraying is conclusive.

## AMMONIATED OR DIEBACK MARKED FRUIT

B. F. Floyd, Gainesville, Fla.

No symposium on Bright Citrus Fruit can be complete without a discussion of "ammoniated" fruit. While no official estimate has ever been made, there is no doubt but that the percentage of culls caused by dieback is large. Many complaints have come to my desk from packing-house managers, stating the large percentage of culls induced by this cause, and asking help for the growers. And the quantity of such fruit brought into the packing house does not represent the total loss, for much was left in the grove as drops.

"Ammoniated" fruit is the name that has been given to those fruits which have been marked by the diseased condition known as dieback or exanthema. The origin of the name is in the fact that the disease is favored or induced by feeding the trees with excessive amounts of certain sources of ammonia. However, the name is a misnomer, for it gives rise to the false impression that all sources of ammonia are favorable to the disease; whereas, it is only the organic sources, such as cottonseed meal, and various animal excrements and products, that are accused of inducing it. It would be much better to speak of such fruits as die-back-marked fruits. However, the name is an established one, and is doubtless the one that will prevail.

### APPEARANCE

"Ammoniated" fruit is characterized by an apparent gum-soaked condition of the outer rind, in spots and irregular areas. This appearance is due to the fact that the cells of the epidermal and sub-epidermal tissues are filled with a gummy mass. The spots and areas are very little raised, and the surface is often cracked in a criss-cross manner. The color of the markings varies from a light to a dark brown.

Splitting and dropping are common, but not constant, characters. The line of splitting develops in the marked areas. This method of splitting is so characteristic that the grower recognizes such split fruits as being distinct, and speaks of them as "die-back splits."

The markings on the fruit may develop at any time from that when the fruit is of walnut size until it is nearing full size. If the condition is severe, splitting and dropping may persist until there are but few fruits.

There is no particular arrangement of the spots and areas, excepting that a spot or area often occurs at the blossom end of the fruit, in which a split may develop.

Another character of "ammoniated" fruit, although it is not a constant one, is the development of clear gummy masses in the angles of the segments. Oc-

casionally, the seeds are found floating in this gum.

"Ammoniated" fruit may or may not be characterized by the development of a thick rind and abundant rag. The flavor of such fruits is often insipid.

#### CHARACTER OF DISEASE

It must be kept strictly in mind that "ammoniated" fruit is not a disease in itself, but is one of the symptoms of the disease known as dieback. The other characteristic symptoms of this disease are (1) pockets of gum between the wood and bark in the young terminal stems; (2) double-convex to more or less rounded excrescences of gummy tissue on the bark of the older stems or twigs; (3) a staining of the bark of terminal stems in spots and irregular areas similar to that on the fruit; and (4) the presence of multiple buds.

In severe or chronic cases, all of these symptoms may be present on the tree and plentiful. In less severe cases some one or more of the symptoms may predominate, with others scarce or even entirely absent. It frequently occurs that the only symptom, or the predominant symptom, is the ammoniated fruit.

It is thus seen that dieback is a disease that is characterized primarily by the production of gum in different tissues of the tree and at various stages of growth.

#### CAUSE OF DISEASE

The cause of dieback is thought to be in the soil, and there are numerous conditions that are known to be favorable to its development. Of these the ones that

are probably responsible for the most of the "ammoniated" fruits that are brought into the packing house are: (1) feeding the trees with excessive quantities of organic sources of ammonia; (2) excessive or improper cultivation; and (3) irregular moisture conditions in the soil.

#### PREVENTION OF DISEASE

As is the case in a number of other diseases, once the marks have been developed on the fruit, they cannot be cured. Therefore, the methods of control must be those of prevention. The "ammoniated" fruit can be prevented by determining and preventing those conditions favorable to the dieback. In some cases where the trees are left alone and nothing is done to them, they grow out of the disease. It is only in chronic cases that the disease persists year after year.

In the feeding of citrus trees with organic sources of ammonia, it is difficult to foretell the exact conditions under which they may be used with safety, and the quantities that can be used without doing harm. Generally speaking, they should be used with great care on low, damp or heavy soils and for bearing trees.

Many of the complete fertilizers offered on the market contain organic sources. When these are used in moderate amounts and in locations and under conditions not favorable to the disease, they are not sufficient in themselves to induce the disease. But when they are used either in excessive quantities, or on trees that are inclined to dieback, marking of the fruit is pretty sure to result.

The same applies to the growth of leg-

umes in the grove. Under average conditions, and with an average amount of growth, no injury is likely to result. But under conditions favorable to dieback, and with a very rank growth of the legumes, the disease may appear. I have seen numerous groves where a rank growth of beggarweed was coincident with an active dieback condition of the trees.

Excessive cultivation, and deep cultivation at the wrong season of the year, are factors that are favorable to the disease. I recently saw a grove on high pine land, in the central portion of the State, which was excessively cultivated one year ago this spring in order to rid it of a sod of Bermuda grass. The prompt development of dieback during the summer and fall, with an absence of other factors known to be favorable to the disease, indicated a relationship. Many similar examples may be cited. Plowing the grove during the late spring, or during the summer, is favorable to the disease and is a practice to be avoided.

Many severely affected groves, particularly on the high pine lands, have been induced to grow out of the disease by the "let alone" policy of non-cultivation and light feeding.

The prevention of the disease by the prevention of the conditions favorable to the disease is necessarily a slow method. It usually requires from one to two years for the average trees to entirely recover.

When there are indications of the fruit becoming marked, or there is reason to believe from the history of the grove that it will become marked, spraying the trees with Bordeaux mixture will often save

the particular crop of fruit and be an aid in ridding the tree of the disease.

Some unpublished data of experiments conducted by Prof. Rolfs of the Experiment Station showed very positive benefits from the use of 3-3-50 Bordeaux mixture in preventing the marking of the fruit, and in controlling the dieback.

In using Bordeaux, it should be applied first when the fruit is less than walnut size, and again about one month to six weeks later. These times would ordinarily be in May and June. The strength to use is 3-3-50. In applying it, the spray should be directed from above downward in such a manner that only the fruit and the upper surfaces of the leaves catch it. The spray should be kept from the stems and the under surfaces of the leaves as much as possible.

As is well known, the Bordeaux mixture kills the friendly fungi that hold the whiteflies and purple scale in check. Unless precautions are taken, the purple scale is likely to increase in such numbers as to do much damage. These precautions should consist: (1) in so directing the spray as to protect the stems and under surfaces of the leaves as much as possible (this leaves a stock supply of the friendly fungi to replace those killed by the spray); and (2) inspecting the trees frequently for any development of the scale. If they are seen to be increasing in numbers, spray at once either with whale-oil soap or with an oil spray.

If any spraying is to be done for the whitefly, it is a good plan to use the Bordeaux mixture two or three weeks before. The oil spray used for the fly will thus serve the dual purpose of holding both

the flies and scale in check, giving the friendly fungi a chance to gain the ascendancy. It is probable that lime-sulphur, 32 degrees Baume, of strength 1 to 50 or 75, would be a good spray to follow the second application of the Bordeaux. This should be used from two to three weeks after the Bordeaux and will serve the dual purpose of killing both the purple scale and the rust mites.

In conclusion, the essential points to bear in mind are: (1) that "ammoniated" fruit is one of the symptoms of the disease known as dieback; (2) that this disease is favored by certain feeding conditions in the soil; (3) that the disease is to be prevented by righting these conditions; and (4) that Bordeaux mixture used as a spray is a good preventive for the marking of the fruit.

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## PERMANENT AND TEMPORARY DISCOLORATION OF CITRUS FRUITS

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John R. Springer

Discolorations of fruit may be divided into two classes: those which are temporary and may be removed by washing or rubbing, and those which are permanent.

Discolorations which are removable are caused chiefly by the sooty mold and the purple scale. The sooty mold, a fungus which grows on the honey dew secreted by the larvae of the whitefly, blackens the fruit, and by its light-proof nature, results in uneven coloring. The washing necessary for its removal often results in mechanical injuries to the fruit, and thence blue mold decay.

The oil sprays and the friendly fungi control the whitefly, and no fly, no mold, is a safe inference. The scale tends to delay coloring of the fruit, and it sticks so tight, the ordinary washing will not remove it. The same treatment for the whitefly applies to the scale.

The permanent russetting is, however, more of a problem. First taking up the russetting done by the rust mite: This

mite, so small that it is only discernible to the naked eye when found in large numbers, causes great loss each year to the fruit growers of this State. The russetting resulting from the attacks of this mite not only make the fruit less attractive and therefore less salable, but the hardening of the skin caused by the extraction of the essential oil normally found in the rind, prevents complete growth and the result is smaller fruit. This alone often cuts from 20 to 25 per cent from the estimated crop. The grower should not wait until he sees his fruit covered with the mite before he starts to spray, but using a popular expression, "beat them to it." In the spring the mite is found on the older growths. It migrates from here to the new wood, after it has hardened a little, and later on to the fruit. If the season is dry, special attention should be paid, as the mites develop rapidly in dry weather. If the mite is found in any considerable numbers early in the season, the first

spray should be some time in the latter part of April, again in June, and possibly in October. The sulphur sprays are the most effective in its control, the oil sprays have considerable effect in control, but are in no sense equal to the sulphur sprays.

A theory has been advanced that the mite multiplies in the soil, as well as on the tree. This theory is based on the fact that trees on land which is frequently worked have darker fruit than trees on land infrequently cultivated; as trees on lawns, etc. It is claimed that the stirring of the ground brings the mites to the surface and affords a chance for them to travel to, and on to, the trees. It is an established fact that the mite is capable of traveling considerable distances in a few hours. The theory at least opens a field for some experimental work.

Another fact worth mentioning is that of the effect of the oil and sulphur sprays. Even if the oil sprays are used in a sufficiently concentrated form to kill all mites, the fruit is nevertheless darker than where sulphur sprays are used. The reason for this may be the action of a secondary agent, that of a fungus. If this be true, sulphur sprays having a fungicidal action destroy the fungus as well as the mite, therefore leaving the fruit brighter than the oil sprays which possess no such property.

Thrips are often blamed for the irregular, silvery colored markings found on citrus fruits. It is doubtful, however, if this can be definitely proved.

Of the several fungi causing the russetting of fruit, the most important is probably melanose. This fungus develops most rapidly when the weather conditions

are warm and moist. Melanose causes reddish brown spots, which, scattered over the fruit, give it a most unpleasing appearance, and for this reason prevents its ready sale. The fungus develops in the dead wood. If this is kept pruned out and the trees sprayed with sulphur compound just after the blossoms fall, and again in from four to six weeks, the grower will have very little trouble from fruit being discolored with melanose. The methods used for the eradication of melanose also serve to prevent stem end rot. It has been conclusively proved that this rot is caused by the same fungus as that causing melanose, so that anything tending to eradicate melanose, will to the same extent prevent the development of stem end rot.

The russetting resulting from the wither-tip fungus is quite characteristic and is known as tear-streaking. It is a debatable subject, if spraying with fungicides is advisable. Pruning out dead wood and proper fertilization are the best methods of control. Anthracnose, another form of the wither-tip fungus, causes considerable loss from dropped fruit and spotting of fruit after it is picked. Any methods of control used for wither-tip also proportionately lessen losses from anthracnose.

Citrus scab, also known as lemon scab, is caused by a small parasitic fungus. It produces dark brown, corky projections, which make every affected fruit a cull. Pruning out all affected growth and spraying with sulphur solution shortly after growth starts are the most approved preventive methods.

Scaly bark or nail head rust is also

widely distributed as many of the other fungal diseases, so its results to the State in general are not as serious. The fruits affected show sunken spots, brown in color. The pruning out of all dead wood and diseased branches is important in its control, as new infection takes place from the spores developing on the fungus in the dead and infected branches.

Ammoniated fruit is not due to any organism, but is caused by improper methods of fertilization. Its name is somewhat of a misnomer, as one would be led to believe it was caused by too much ammonia, whereas it is caused only by certain forms of ammonia, organic in nature. Ammoniated fruits show a shiny brown color, the size of the spots varying from

ones the size of a pin-head to those covering a large portion of the fruit. The larger markings are usually raised and the surface is often irregularly cracked. Affected fruits are worthless for shipment, as they are unsightly, thick skinned, and insipid. Treatment should begin by removing the cause. If this is an excess of organic ammonia, use only inorganic forms. Discontinue all cultivation for a time, and if the tree has been heavily fertilized, greatly reduce the applications. If the grove is underlaid with hardpan or has poor drainage, remedy these conditions as they aggravate the disease. Bordeaux has been found in some cases to be beneficial, as it produces a stimulating effect, thereby aiding the tree to regain its health and vigor.

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## PRUNING FOR MELANOSE

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H. E. Stevens, Gainesville, Fla.

I have been asked to present a short paper before this Symposium on Pruning to Control Melanose. Melanose is one of the citrus troubles that is pretty generally distributed over the State, and most of the growers are familiar with the disease and have had more or less experience with it. Many are already familiar with the cause and habits of this disease, and I will not go into details concerning these, other than to state that melanose is caused by the fungus, *Phomopsis citri*, which also causes stem end rot of citrus fruits. This fungus lives chiefly in the dead twigs and branches of citrus trees, and this dead

wood is the source from which the disease is spread and forms the medium of carrying the fungus over from season to season. Since dead wood in citrus trees harbors the cause of melanose, it would seem that the most reasonable way to prevent injury or loss from the disease would be to remove this cause. In other words, prune out and destroy all dead wood from bearing trees. It is not possible to remove every particle of dead wood from a tree, but by pruning each year with a reasonable amount of thoroughness this can be kept down to a minimum.

Experiments have been conducted the

past two years to ascertain whether or not it was possible to successfully control the disease by careful pruning. These experiments were carried out in a grove that had suffered severely from attacks of melanose for several seasons past. From the viewpoint of the experiment the conditions were ideal, for the trees had not been pruned for two years preceding the experiment, and there was an abundance of dead wood. Fifty-six trees were included in this experiment and they were divided into blocks of twelve and sixteen trees each. Block No. 1 of 12 trees was left unpruned as a check. Block No. 2 of 16 trees was pruned in January and again in June. Block No. 3 of 16 trees in January and block No. 4 of 12 trees in June. With the exception of a few trees in block No. 3, the pruning was done by ordinary day laborers under careful supervision, and an effort was made to remove all visible dead wood. Some dead twigs were missed, but on the whole the pruning was rather thorough. All prunings were burned.

When the fruits were picked the product from each block was carefully examined and classed under the following grades: brights, seconds, and russets. These grades applied to melanose spotting only and no account was taken of the russetting or staining produced by other agencies. Under brights were classed all fruits entirely free or showed less than 1 per cent of the surface spotted. The seconds included all fruits showing from 1 per cent to 25 per cent of the surface spotted. Fruits showing more than 25 per cent of

the surface spotted were classed as russets.

The result from each year's pruning I will give in tabulated form showing the percentage of the different grades from each block.

#### PRUNING IN 1913. RECORD OF FRUIT

| Block<br>No. | No. of<br>trees | When<br>pruned | Percentages of<br>brights seconds russets |    |   |
|--------------|-----------------|----------------|---|----|---|
| 1            | 12              | check          | 22  | 74 | 4 |
| 2            | 16              | Jan. and June  | 48  | 51 | 1 |
| 3            | 10              | January        | 43  | 55 | 2 |
| 3*           | 6               | January        | 60  | 39 | 1 |
| 4            | 12              | June           | 35  | 62 | 3 |

#### PRUNING IN 1914. RECORD OF FRUIT.

| Block<br>No. | No. of<br>trees | When<br>pruned | Percentages of<br>brights seconds russets |    |    |
|--------------|-----------------|----------------|---|----|----|
| 1            | 12              | check          | 13  | 75 | 12 |
| 2            | 16              | Jan. and June  | 40  | 59 | 1  |
| 3            | 8               | January        | 45  | 59 | 1  |
| 3*           | 8               | January        | 61  | 38 | 1  |
| 4            | 12              | June           | 51  | 48 | 1  |

\*Carefully pruned by the writer, care being taken to remove the smallest dead twigs.

These results are very favorable to careful pruning and show a decided increase in bright fruit where all the dead wood was removed. While these experiments have hardly been carried through a sufficient period of time to draw very definite conclusions, the following conclusions may be drawn from the results obtained.

That careful pruning will greatly increase the yield of bright fruit. Even where the pruning was done by ordinary laborers, the percentage of bright fruit was increased from two to four-fold over the unpruned.

A thorough pruning once a year will probably be sufficient to keep the disease in check.

SPRAYING FOR BRIGHT FRUIT

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J. A. Stevens

At Mr. Yothers' suggestion, about a year ago I began co-operating with him in some spraying demonstrations in Mr. Knight's grapefruit grove near Safety Harbor; there had been a good deal of trouble with rust and what we call shark skin. As a result, Mr. Yothers came over at our request, looked the grove over and suggested an outline of spraying. He inspected the grove and told us along about the first of April we had better begin about the middle of April, so we began spraying the trees with a lime sulphur spray, giving the first application the middle of April last year. We sprayed the trees again about the middle of June. The third spraying was done the last week in July.

These three sprayings were all that was really necessary to keep the fruit bright, but we did spray the fourth time, the second week in September, hoping it would help to color up the fruit, because one of the difficulties had been the fruit did not want to color, but remained greenish until late in the season.

The spray that was used was sulphocitrol, at a strength of 1 to 100. This spray was used on nearly all of the grove.

Soluble sulphur was also used in one section of the grove of about five acres. The results of both sprayings were satisfactory, so far as bright fruit was concerned.

We found that the cost of spraying each time, was an average of 7.8c per

tree. The total cost of the four sprayings was 31.2c per tree. The average production of the trees was  $6\frac{1}{2}$  boxes; therefore, the cost per box was 4.8c; the total cost of the spraying.

When this fruit was gathered and shipped, it was graded into four grades; the names of these grades were *fancy* for the first, *bright* for the second, *russet* for the third and *plain* for the fourth. The *plain* represented that fruit which had a greenish tinge. We did not want to put the greenish fruit in with the bright and fancy fruit, so we made a fourth grade.

Mr. Yothers had stated to us in the beginning that it was difficult in co-operating with the growers, to get them to leave a check plot large enough to get definite deductions. He asked us to leave a part of the trees unsprayed all through the season, to see what the results would be; consequently we set aside four rows of trees. These four rows each contained forty-one trees. We left twenty-one trees in each row unsprayed all through the season; twenty trees in each row we sprayed; this gave us eighty-four trees not sprayed and eighty trees sprayed in the same four rows. These four rows of trees all had the same treatment in every way; the same fertilizer, the same cultivation; all just alike except in the matter of spraying.

When Mr. Yothers asked me to prepare a short talk on this subject, we planned to pick two cars of fruit, hoping

that we could get them into market, and know something of the selling value of the two kinds of fruit, sprayed and unsprayed, in time to report at this meeting. Unfortunately, we were not quite quick enough. The fruit was shipped last Saturday.

The car of unsprayed fruit contained 300 boxes, graded as follows: Fancy, none; bright, ten boxes; russets, 272 boxes; plain 18 boxes. This car contained 14,740 grapefruit, an average of 49.1 fruit per box.

On the same day and in the same train and going to the same market, we shipped a car picked from the sprayed rows. This car contained 143 boxes of fancy; there were none in the other car; 119 boxes of bright, as against 10 in the other car; 19 boxes of russets, there were 272 boxes of russets in the unsprayed car; and 19 boxes of plain (greenish) against 18 plains in the unsprayed car. This sprayed car contained 12,842 grapefruit; an average of 42.8 fruit per box, as against 49.1 in the unsprayed. It was larger fruit.

Sixty-seven trees out of the 84 unsprayed, picked and packed an average of 6.09 boxes per tree. Seventy-seven sprayed trees picked and packed an average of 6.75 boxes per tree; a difference of .66; two-thirds of a box per tree.

If the average crop nets 60c per box on the tree; this increase in the number of boxes would be about 40c per tree. The cost of spraying was 31.2c per tree, so that the spraying not only paid for itself but gave a profit of 8.8c per tree, in increase of crop alone.

When we picked the fruit from these four groves of sprayed and unsprayed,

we picked the entire crop of two adjoining trees in the same row; one sprayed and the other not sprayed. There were 3½ boxes packed from the unsprayed; 7½ from the sprayed tree. The number of fruits was about the same on each tree. These eleven boxes were sent over to Mr. Yothers and are on exhibition out in the hall. These represented the entire crop from two adjoining trees, one sprayed and the other not sprayed. There is quite a contrast between the two. As to what the difference in value would be, we are not prepared to say, because we did not get the fruit to market in time. We did, however, write to the man who sells the fruit, asking his opinion. Having sold fruit for over thirty years, we felt he was qualified to give an opinion. In answer, he writes this letter:

Hastings, Fla., April 10, 1915.

Mr. J. A. Stevens,  
DeLand, Fla.

Dear Sir:

Referring to your letter of the 8th inst., in regard to the relative selling values of sprayed and non-sprayed fruit, will say that as the writer is now in Florida and the time is so short before the meeting of which you speak, and I have no means of referring to our books in Boston and getting absolute figures, that I am afraid any information I may give you will be simply of a general nature and more in the nature of personal ideas.

Our observations are that the difference in selling values between sprayed and non-sprayed fruit show quite a wide range, probably the extremes would be from 12½c to 75c a box. These ex-

tremes are caused by the different selling values in different seasons and also by the extent to which the fruit may be injured by not spraying. Fruit that is only slightly affected by insect ravages might sell within  $12\frac{1}{2}$ c per box of a similar lot of fruit that was sprayed, but other crops that were more affected by insect ravages would sell from 25c to 50c per box less than the sprayed fruit in an average season. In a season of extreme high prices, the sprayed fruit would in many instances sell as high as 75c per box more than the non-sprayed.

In regard to your question regarding the value of a car of sprayed and unsprayed fruit, arising from the difference in size which spraying has demonstrated that sprayed fruit will average larger than unsprayed fruit, will say that I don't think the value of one car of each would be a fair comparison. The comparison should be made on whole crops, for, while for the last few seasons the smaller sizes like 64's to 80's have sold higher than the 36's to 54's, still when we bear in mind that we get more cars of the sprayed fruit, one can readily see that a fair comparison would be very greatly in favor of the sprayed fruit.

As a suggestion, we would say that we do not think it can be too strongly impressed upon the grower that he cannot afford to spend his earnings and good money in making a grove and bringing it up to a high state of efficiency and then in any way neglect the making of the best quality of fruit possible to put onto the market. We feel that when the grove has been brought up to a good state of bearing, that it would be very unwise to then

neglect any part of the future work of making a crop of the highest selling value, and we believe that judicious and timely spraying is very essential in making such a crop.

Trusting these few observations, ideas and suggestions may be of value to you, I beg to remain,

Very truly yours,  
F. M. LEONARD."

Now, if we have made a profit of 8c a box just in the spraying alone, then any difference that the sprayed fruit may bring over the non-sprayed, is velvet.

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#### DISCUSSION.

Mr. Yothers: Any discussion of any of these questions?

Mr. — —: I would like to ask if the spraying overcame the shark-skin on the lemon.

Mr. Stevens: There are only a very few lemon trees, but the spraying in both cases benefited the condition of shark skinning.

Mr. Hollingsworth: What variety of grapefruit was that? It wasn't the seedless?

Mr. Stevens: No, this fruit in some respects resembles the Walters. We know that all the trees are of one variety, but we do not know just what variety.

Mr. — —: I noticed those two piles of fruit you referred to, and it appears that those trees were badly infested. How did the fruit on the trees in the next row compare?

Mr. Stevens: They are still on the trees. But there is, in our observation, a

marked difference all the way through, between sprayed and unsprayed fruit.

Mr. Skinner: Somebody here wants to know whether that was soda sulphur or lime sulphur?

Mr. Stevens: Most of the spraying was done with sulpho-citrol, which is a lime-sulphur spray, at one to one hundred. There were seven rows, about five acres, sprayed with soluble sulphur, and there was a check made there, also. The soluble sulphur kept the fruit bright.

Mr. Brown: Let me ask how many pounds of the soluble sulphur you used to 100 gallons of water.

Mr. Stevens: I cannot be really positive, but the first spraying we used 50 per cent stronger than the printed recommendations; that is, I think, three pounds to a hundred. After that, it was two pounds to a hundred. With the first spraying, we hoped to control the melanose. We have had none this year to speak of, anyway, so it did not make much difference.

Mr. Hollingsworth: Did you ever use air slacked lime for the same purpose on the land?

Mr. Stevens: Yes, a portion of the grove has been limed. Where we used the lime we had more rust this year. But we did not lay it to the lime.

Mr. Stevens: The tree from which that pile of unsprayed fruit was taken was a healthy tree; not diseased. In fact, the four rows were not diseased. As I have stated in the beginning, the whole crop of fruit was badly infected with this shark skin. The spraying we did simply eliminated the shark skin. Now every tree of the 84 has fruit just like that, and I believe that if we had done no spraying

this year, 90 per cent of the trees would have been affected this year.

Mr. — —: I have owned a small grove for five years, and it has never been sprayed and we never had any such fruit as that. It is as good as the other, but not so bright.

Mr. Yothers: I had some of that fruit at the Orange county fair, and about 20 per cent of the people said it was a fake exhibition.

To my mind, that experiment is decisive, and I really feel that my work in that respect is done. But of course, we have to continue with that line of work. I also had the good fortune to co-operate with one of the very best growers in the state, Mr. Williams, of Crescent City. So far as I know, he is not here.

In my own opinion, this work at Crescent City was one of the very best and most clear cut demonstrations that has ever been conducted in the state of Florida.

We left one row unsprayed for two years and on both sides of this one row the rows were sprayed. When the fruit was picked, 1915, we got about five boxes of fruit from the unsprayed row, and approximately sixty boxes from the rows twenty-five feet away. The fertilization, cultivation and pruning was all the same for all trees. I am sorry that Mr. Williams is not here, because I feel if he were here to tell you those things himself, it would make considerably more of an impression. It should be remembered that the beneficial fungi were present on both sprayed and unsprayed trees.

Mr. Skinner: Mr. Yothers made this statement up at Gainesville, and gave an

outline more fully than he has done here of what the plan of spraying was which he recommended and the plan of spraying he practiced on that grove. I went home; it was about time to do spraying. My grove was full of scale, whitefly and smut; it had not been so bad for years. I went home and sprayed my trees according to his recommendation, and I give you my word, it was worth thousands of dollars to me, and I want to express my appreciation of the work Mr. Yother's is doing.

Mr. Hollingsworth: Is it a spray to sell, or do we get a formula?

Mr. Yother's: I have nothing to sell. It is a government formula and can be had for the asking.

I would like to hear for a moment what Mr. Borland has to say.

Mr. Borland: All I can say is exactly what Mr. Skinner has said. I was at Gainesville; I had exactly the same condition he had in my grove, and I went home and did exactly the same thing. I did not have quite so much faith, and stopped when I was about half done. The fruit is on the trees now, and there is a marked difference in the trees and the fruit.

With Mr. Skinner, I think we owe Mr. Yother's a debt of gratitude. Right there is the fruit to show that the unsprayed fruit does not look like the fruit that was sprayed.

Mr. Hicks: I do not know that I can give any report. I sprayed with Schnarr's Insecticide twice last year, and the result is I have had very little whitefly. Last year the man in charge of the packing house, said it was the worst case of whitefly he had ever seen; this year there

is hardly any. Last year there was a good deal of scale which would not wash off. This year there is not a bit of scale. I sprayed in July and left about half my grapefruit unsprayed, but in October when I sprayed again, I sprayed the whole thing. The result is that there is about ten times as much scale on the unsprayed part as on the other trees.

Mr. Yother's: A great many growers who have tried the experiment, would bear out your statement.

Mr. Hart: It is necessary to get very decided results in this pruning, to make it pay, especially if the trees have been standing for a few years without much pruning. I have put in most of my spare time pruning, since last July. I find if I get over four or six trees a day, I have done well. If a party has a hundred acres, he has a pretty big job ahead of him. I have gone partially over my grove, and I think it will do another year.

I will say that my grove was out of my hands for a couple of years, so that the dead wood accumulated more than if I had been in possession.

As I understand it, a twig as large as a darning needle may infect considerable fruit; therefore you must look carefully and thoroughly.

Mr. Kepper: What did Prof. Stevens put on the cut after he pruned.

Mr. Stevens: I did not use anything but carbolineum, full strength.

Mr. Yother's: Our time is about up. I would like to have Mrs. Prange say a few words. When she closes, my part of the program will be over.

Mrs. Prange: Mr. Yother's asked me to speak this afternoon, but he does not

know what I am going to say. I am not going to talk about bright fruit; I am going to talk about his splendid work on the rust mite this last year, and in appreciation of his work, I suggest that we give him a hearty cheer.

. (Mr. Yothers is given a rising vote of thanks.)

Mr. Yothers: I have always tried to co-operate with you, and I much appreciate the expression of gratitude.

I have recently co-operated rather intimately with several packing companies.

We feel very friendly towards the various companies and shippers in the state, as well as individuals. I appreciate your sentiments.

Mr. Hume: In this respect, I might call your attention to the very excellent paper that was presented by Mr. Yothers last year. I believe we are waking up on this subject a little bit. But we need to wake up more than we have done. Our fruit will bear a good deal more style.

Mr. Hart: In one of the papers just read, there are two varieties of fungus

mentioned. There is one I find is more universal than either of the two named. It is in every grove, it is on nearly every orange produced in the state, and that is the fly-speck fungus. It does not discolor to the same extent as sooty mold, but it does discolor so that it makes the fruit very unattractive in appearance, if it is not washed. I would have that mentioned as one of the most important; even where there is no sooty mold and no scale, you get the best appearance by washing it off.

Mr. Skinner: In pruning young trees my idea is to take out the dead wood and practically nothing else, unless the limbs are lying on the ground. If they are lying on the ground, they are likely to become infested with scale, but I would want the ground shaded as much as possible for young trees. The tree will take care of itself if you keep out the dead wood and let it shade the ground as much as possible. These trees that stick away up in the air; I have no use for them.

# Insects and Diseases

## SYSTEMATIC SPRAYING PLANS

S. F. Poole, Winter Haven, Fla.

Nearly three years ago Florida passed through a period of excessive rains lasting about a year. The trees were in good condition and carrying good crops up to the close of the rainy period. That fall complaints were heard from almost every section that the fruit was undersized. Still later in the season a gread deal of frenching appeared, much of which accompanied withertip.

Why some groves should show such exhaustion has been a problem over which I have pondered a good deal. In my notes reference is made only to groves that have come under my direct observation, though I presume that conditions such as were found existed in other parts of our State. Withertip is a disease that gains entrance into the tissues of a tree when its vitality has been lowered by neglect or starvation. But you could hardly say that these groves had been neglected. They were cultivated and fertilized as they had been for years. On the other hand, some groves in the same neighborhood did produce large crops of fruit of normal sizes, and did not reveal unusual withertip conditions.

A close inquiry into conditions revealed practically the same cultural methods for both, but there was a wide difference in the purposes of fertilization, as well as in the sources from which the fertilizer ingredients were taken. The former peo-

ple had been applying fertilizer twice or at the most only three times a year. The ingredients were fairly soluble. The other people made four and even five applications of a fertilizer that was not entirely or even readily soluble. The latter people had a food in the soil that was not easily dissolved and washed away by a period of excessive rains. With the former system of two or three applications of a readily soluble fertilizer the trees were subjected to periods of starvation. The soil, at least in one respect, is like the human body in needing reserve energy in order to afford trees a continuous supply of food. The man who consumes all his bodily energy as fast as it is produced will soon need a doctor, so the soil that receives only two or three applications of a fairly soluble fertilizer will be unable to sustain trees at the close of an unusually wet period. Consequently the appearance of frenching as a forerunner of withertip. The present spring may result in fresh inroads of withertip, especially in young trees. The growth has been interrupted many times by cold weather and undoubtedly weakened.

Last summer there appeared in and around Winter Haven what seems to be a new disease. Fortunately, it is very slowly contagious, though it may make quick work of a tree when once fastened on to

it. Young twigs, not the youngest, but the next to the youngest, are first attacked. Its first appearance is shown by a yellowing of the bark. Several of these spots, which soon become slightly depressed may appear on the twigs. As the disease progresses the outer layer of the bark turns brown and finally ashy-gray in color. The diseased areas are now spotted with fine black specks. These may be the fruiting bodies. At this stage of the disease the only part remaining alive in the affected part is the inner or growing part of the bark. Even this cambium layer is interrupted and has the appearance of new bark that is being formed over a cut. When the twigs are girdled the leaves turn yellow and finally ashy-gray in color and drop off. Even leaf stalks may show separate infections. By this time, especially if the infection in the top is considerable, the bark in the region of the crown roots is found to be rotting away, and sloughing off from the tips of the small roots. At this stage of the disease it is practically impossible to save the tree. In the earlier stages cutting back to the second large leader and painting cuts with carbolineum has checked the progress of the disease and apparently effected a cure. I have under observation two three-year-old trees standing adjacent to each other in a grove where the disease had advanced far enough to partially girdle the trees at the top of the ground. All of the diseased tissue was removed and burned. Likewise the entire top was removed and burned. All cuts were painted with carbolineum. These trees now seem to be recovering. New bark is growing over the affected area about the

crown roots, and a new top is being formed. Professor Stevens has made repeated cultures of the affected twigs. So far he has isolated only the withertip fungus. This, however, does not prove that the disease is withertip, though in some respects the two diseases are similar. This disease seems to single out vigorously growing trees. Prof. Stevens also said this same disease appeared when Prof. Fawcett was in the State and from the same localities where it is now appearing.

I have appended data to show that a systematic plan of spraying pays not only in increase of price received, but in the quality of fruit gathered from the trees. These two groves last year produced grapefruit that was badly scarred with lemon scab and shark-skinned, to say nothing of the rust mite action. The following figures speak for themselves.

Grove A for the season of 1913 and 14 on  $2\frac{1}{2}$  acres of grapefruit produced as follows:

|              | No. Boxes | Per cent<br>each kind |
|--------------|-----------|-----------------------|
| Blue -----   | 2         | .607                  |
| Red -----    | 79        | 24.012                |
| Yellow ----- | 194       | 58.966                |
| Plain -----  | 54        | 16.413                |
|              | 329       | 99.998                |

For the season of 1914-15 the production was as follows:

|              | No. Boxes | Per cent<br>each kind |
|--------------|-----------|-----------------------|
| Blue -----   | 293       | 27.430                |
| Red -----    | 721       | 67.509                |
| Yellow ----- | 54        | 5.056                 |
|              | 1068      | 99.995                |

The cost to spray for bright fruit per box was \$0.0607. The blue grade netted the owner 30 cents more per box than the yellows and the red grade netted owner 16 cents more per box than the yellows. Cost of spraying was \$64.89.

Grove B produced for the season of 1913-14 as follows:

|              | No. Boxes | Per cent<br>each kind |
|--------------|-----------|-----------------------|
| Blue -----   | 00        | 00.000                |
| Red -----    | 92        | 13.670                |
| Yellow ----- | 441       | 65.527                |
| Plain -----  | 140       | 20.800                |
|              | 673       | 99.997                |

Season of 1914-15:

|              | No. Boxes | Per cent<br>each kind |
|--------------|-----------|-----------------------|
| Blue -----   | 144       | 12.41                 |
| Red -----    | 848       | 73.103                |
| Yellow ----- | 168       | 14.482                |
|              | 1160      | 99.995                |

Cost to spray for bright fruit per box was \$0.0728. Blues netted to grower 39

cents more than the yellows, and reds netted 17 cents more than the yellows. Cost of spraying for bright was \$84.47.

In 1914 grove A was sprayed as follows: March, oil spray; April, lime-sulphur; June, lime-sulphur; July, lime-sulphur; August, oil and soluble sulphur; October, lime-sulphur; December, oil.

In 1914 grove B was sprayed as follows: February, Bordeaux; March, Bordeaux; April 3, soluble sulphur; April 22, soluble sulphur; May 8, soluble sulphur and oil; June, lime-sulphur; July, lime-sulphur; August, soluble sulphur and oil; October, lime-sulphur; December, oil.

*Note*—Grove A was sprayed only once in April, while grove B was sprayed twice in the same period. This is probably due to the fact that on grove A lime-sulphur was used, while on grove B soluble sulphur was employed as a rust mite and scab preventative. I understand that this agrees with Mr. Yother's experience. On the other hand, the soluble sulphur makes a very effective combination when mixed with an oil spray.

## THE ORIGINAL OR PRIMARY CAUSE OF MAL DE GOMA

Dr. T. G. Julian, Clearwater, Fla.

I do not approach this subject as an iconoclast; to destroy and pull down any previously accepted theory or explode any notion or opinion that anyone may have entertained as to remedies, how and when to cure, but ask you to add to or build one step farther as the primarily immediately contingent to what we see in the mani-

festations of this dreaded disease, no cure or remedy, but the cause.

The only way I can ask you to forbear and appreciate how I arrived at my conclusions is to outline a history of my experience, as some are pleased to call 'Julian's Theory,' and fifteen years ago it was 'Julian's Theory' and I will relate

to you my experience and observation during that time, which I think beyond a reasonable doubt establishes a fact.

Truth and fact are homely and unattractive and always unpopular, but they are unalterable, stubborn things and will prevail. They are seemingly repugnant to the human mind and the plainer and simpler they are the more repellent they become.

So, now, I am here, not to upset any of your previously accepted theories but in very plain phrases to tell you of the things I have seen, and my experiences in the last fifteen years in successfully combating this dread disease known as mal de goma or foot rot, which disease to mention in connection with an orange grove meant sure death and the value of whole groves all but wiped out to such an extent that you could hardly get a grower to even talk about it for fear some one would conjecture he had the dreaded disease in his grove and it would 'pass along the ways.'

Sure enough, when Mr. Wright, the editor of the Grower was over in our county, he spent some thirty or forty minutes in my grove and wrote a very intelligent description of what I showed him as to my labors in this line, and the only criticism elicited from any one was from Mrs. Marian A. McAdoo, who said some doctor up in the state somewhere who had a great deal of trouble with foot rot, had an idea, just an idea, that it was from lapping of the roots, etc., etc.

Now, the facts are that I have no more trouble than anyone else with the same number of old, bearing seedling trees. I can say that my work has been exceeding-

ly interesting, if not a pleasure, when from symptoms well recognized even at a distance, I knew the cause and had a definite idea what to do to bring relief.

Right here I want to impress upon everyone connected directly or indirectly, or in any way interested in the sustained prosperity of South Florida, that orange culture is *first*, even before the much bolstered and flickering 'climate.' When you allow all the old seedling orange trees to die, to go by the foot rot route, you part company with the best and catchiest phrase the state ever had "Sweet Florida Oranges" the fruit for which the world offers nothing in comparison.

When I came to Florida some score of years or more before the freezes of December, 1894, and February, 1905, I heard from more than one source that a seedling orange grove was next to worthless and not to be desired, as you would spend many years in raising them and as they would come into bearing, they would die from foot rot. The very next winter season the two freezes occurred and even in the most favored localities of the state practically all of the groves that were left were the seedlings, and subsequent winters added proof to show their great immunity from low temperature.

Then it fell to my lot to go into the orange business and to choose between disaster of freeze and ravages of mal de goma. The latter offered me at least a few days of grace, so I bought the seedling groves and determined to fight the foot rot, but as is usual with all new buyers, I was very careful to buy groves not affected with the disease, as it was held in great fear, as one tree showing

signs of it, it mattered not the extent of the grove, it was generally passed by and not to be considered at all. It so happened that upon the third place I bought (excellent in many ways) there was one tree badly affected with, as they all term it, "foot rot," and I was advised by my venerable old friend, who spent nearly half a century raising orange groves and working in them, to dig this one tree up and haul it out in the woods and burn it, taking the dirt around it too because the dirt was contaminated with a fungus which had produced the disease of mal de goma in the tree, and there was no cure. All of which I promised to do.

Further, it would permeate the whole group and infect all of the trees of the grove. For some reason I did not get to do this as early as I had expected and in the following spring, while fertilizing the grove I made a personal investigation, and, in digging I found two large roots, rotten and gone, but enough of them left to show that they crossed one another very close in or almost immediately after leaving the body or trunk of the tree. Getting back a few feet you could readily see, at least I thought at that time that I could see, following directly up the fiber of the trunk of the tree to two or more large limbs, which also were dead. It appeared to my mind that this case of foot rot was certainly local as to this tree and was the fiber of the trunk the connecting link between the dead roots and the dead limbs that showed a variation from the generally accepted theory of encircling the trunk at crown roots.

Upon further digging and cutting away of rotten wood and seeing the havoc

wrought to that once great fine tree, I was in a frame of mind to deny nothing, the germ theory, the fungus theory or the sour sap theory, as any child could see that they were all present, in fact abundance of evidence was there that every evil influence in nature was present and had left their devastating mark upon this once monarch of the grove, the production of which counts or is equivalent to a generation of man.

I never thought of a remedy, it seemed past all remedial agencies, so near death. It did occur to my mind that back beyond all this destruction was certainly a mal-factor of constitutional formation. Here the proposition confronts you, *the cause*. The effect is plain and can be seen not to be denied, but the cause, "there is the rub." The proposition is, has been and will be to the end of time, to *divine the cause and define the law*.

As to the sour sap and fungus theory, both evidently present but here burrowing between the bark and the wood in the rich carbonated sap, the course of which would be the way of least resistance, and this, inversely, would allow it in the weakest part of the circulation of the tree. Thus it manifests itself at the change from the perpendicular to the horizontal plane or where a free flow of sap is restricted, as in the crotch of roots and limbs. But here the question is: how did either or both get in there, (in their well protected berth) and I don't believe anyone at all acquainted with modern, scientific research would deny that there is a way or reason for their entrance, as the fundamental scientific principle which so well established this point is:

That there must be connection (actual contact) before infection.

At the same time we know that sour sap is a fermentation and the nature and very inertia of fungus growth the very lowest order of vegetable life. The way—an opening—an abrasure—to allow either to enter into the very life blood of this highest type or order of the vegetable kingdom must have been open, because the bark, by nature, is designed to protect from outer influences, then the cause of this abrasion or break in the bark could only be determined by the collection of many specific cases to determine the one general type or factor as the cause. I say unreservedly that in every case there was plainly to be seen generally a small root overlapping and binding (as cording a limb or finger of the human body) the large and rigid root, thereby stopping, impeding the natural flow and circulation. Now it behooves you to conceive of the force exerted, not by a normal flow of sap, for the law of compensation would adjust such conditions, but an abnormal flow produced by over ammoniacal application of fertilizer and cultivation followed by heavy rains, and it is easy to conceive the great force to be exerted at any given point under such conditions to produce the break or abrasion, thereby allowing the entrance of these foul enemies to their well protected berths to despoil upon the very life blood of the tree unto its death.

Now, I am here to say that, of many cases, dozens of them and covering a period of fifteen or sixteen years, there was present in each and every case, this

binding, cording of larger and rigid roots by very much smaller ones, (even to the size of a pencil) and upon closer investigation, readily to be seen that the contact was the beginning and seat of the trouble. You can readily see that every contributory cause, taken in connection with our coarse and porous sandy soil that suffers the tree to the excesses of the seasons, when it is dry it is very dry, until it endangers the very life of the tree, and then in a few days the reverse nature would take care of those conditions if there had not been applied the rich ammoniacal fertilizer to help sustain the tree and bear the fruit during these ordeals of drouth, and vacillating between the two extremes is where the danger lies and the abnormal conditions arise.

Now, you cannot make a seedling tree or grove be as remunerative as a budded tree or grove unless you treat and push them with highly ammoniacal fertilizer. There is the paradox; unless the cause is removed, and in removing the cause you have a preventative.

I think there is enough difference to warrant separating into three classes:

First, where it affects the crown roots, near the surface and the ordinary cleaning the dirt from the crown roots will efface the trouble and this embraces the majority of cases, but if you do not find the conditions present on the major crown roots, and there of course you must exercise your judgment as to whether you have reached the seat of the trouble, if not keep digging and come to the second class.

Second, where it affects the roots be-

low the crown, from six to twelve or fifteen inches deeper.

Third, where it affects the tap root, thereby rendering a very complex proposition, hard to get at or determine when you are at the seat of the trouble.

Now, I know nothing of "Wilt" and have never seen a case, but have seen several that others have termed "wilt" and in each case turned out to be mal de goma of this last or third class, which seems to affect the whole tree simultaneously.

In a general way take into consideration all of the conditions contributing to mal de goma, resetting too low, below the level of the surface, along with mulching heavily, either or both superinduces a multiplicity of rootlets too close to the tree that in after years are sure to cause trouble. Cow penning in spring months to be followed by the rainy season of summer, or the use of too much nitrate of soda in commercial fertilizer, or any other source of nitrogen that all becomes available under the same conditions, excepting only sulphate of ammonia, which is considered to become available more slowly as if by contact.

As cures or relief, to clear the dirt away from the crown roots, which if done properly, will relieve those causes as described on class one, secondly, stop cow penning and cultivating. Pull down fences and let grove revert to natural conditions, thirdly, apply ground sulphurous acid promiscuously to kill fungus, and fourthly, still another marvelous cure is to put a stick or charge of dynamite under the tree. If the patient survives, it is a cure. This is in line with the old custom of boring a hole through the trunk and

with a block and tackle raise the tree six or eight inches, as the origin of the trouble was deep re-setting, but in fact, in doing so perchance, altered the position by breaking it loose and relieved the condition which was the cause of the trouble.

In doing this you followed a well recognized custom and beaten path as old as the hills. *Prune the roots.* That is all, except that you do it with the single idea of removing the smaller roots that have the binding effect on the large ones, or soon will have, exercising ordinary good judgment.

I want to mention that roots of a china berry sprout produced one case.

Care is needed, especially when you are to protect a small and limited area extending twenty or thirty inches out from the tree as further the —— of the roots lessens and therefore lessens the danger of the bind.

I have never used any of the usual remedies such as lime sulphur and carbolineum, but simply removed the offending root and scrubbed clean the wound, then the disease disappears and the tree becomes healthy and regains its normal vigor, in two or three instances in a year or so after becoming affected, in some other roots so I believe it for the second time.

I neglected one so long that all of the roots and all of the limbs were dead, just the latent life left in the trunk or body of the tree, and now it has had four or five crops, good sized tops and bearing surface. Other trees losing a part or even half of the top are now filled out symmetrically with the balance of the tree and

you would not suppose that any trouble ever existed.

So, from my experience and observation to allow an orange tree to die of mal de goma or foot rot seems neglectfulness and indifference to self interest (I won't mention the real cause, as it is a failing of the human race, especially in Florida.)

When you have protected a seedling orange tree or grove from this one malady, you have a real tree or grove, not scrub and brush, and is more suited to more different kinds of soil and repellent to more trouble than budded trees seem affected by, and it would improve the quality of the budded tree if it could be used as budding stock.

## NURSERY INSPECTION

F. M. O'Byrne, Gainesville, Florida.

*Mr. President, Ladies and Gentlemen:*

For the past six months I have been serving in the dual capacity of citrus canker inspector for the East Coast territory north of Dade county and deputy nursery inspector for the same section. In the performance of the duties of these two offices some things have come to my attention which may be interesting at this time.

To put the matter clearly before you I will state at once some of the conclusions which I have reached and which I will try to demonstrate, in the course of my paper.

First. That the Nursery Inspection Department is as much for the benefit of the nurserymen as for the grower.

Second. That some nurserymen feel that the nursery inspection law was passed at the instigation of the larger nurseries of the state to eliminate the small nursery man from the field.

Third. That all nurseries require inspection, no matter how small and carefully tended they may be.

Fourth. That there are a great many nurseries operating in the state without inspection or certification.

Fifth. That the present nursery regulations are discriminatory, placing a hardship on small nurseries and this leads to evasion.

I do not presume to speak for the rest of the state but I suppose that the East Coast is representative and that conditions prevailing there are indicative of what we may expect in the state at large.

The law requires that nurserymen \*\*\* shall register their names with full description and location of their nurseries and stock with the Inspector of Nursery Stock on or before the first day of July in each and every year and apply to him for inspection and certification. Naturally therefore the duties of a nursery inspector only call him to the properties of those who have so registered. An inspector is not supposed to be a detective to hunt down those who are evading the law. My duties as canker inspector and nursery inspector combined, however, called me into

all properties. It was in this way that I found the true state of affairs on the East Coast and the following is a fairly accurate statement of the case:

A great majority of the larger growers and a good many of the smaller ones who have been in the business for a long time, have planted out small nurseries designed primarily for their own use. Generally, however, they plant too largely and as a result they have a few buds to sell, averaging from 500 to 5,000 per year.

It is not within my province to discuss the relative merits of the large and small nurseries. Both have their own advantages and disadvantages. The fact remains that the small nurseries are quite a factor in the citrus industry as a whole, for they make up in numbers what they lack in size and in the total their output is immense. As a factor in the industry they demand our careful consideration.

Comparatively few of these small nurseries have been inspected. In some cases the owner is honestly ignorant of the law while in others he thinks that the law should apply only to the large nurseries and that *he* should be exempted. Such a nurseryman will say that he planted his own seed, took the bud wood from trees on his own place, does all the work in his nursery himself and has received no trees from an outside source in years. Therefore he reasons that there is no chance at all of his having any disease in his nursery and that he should not be asked to go to the expense of an inspection.

The fallacy in this reasoning is at least three fold:

First. The nurseryman's knowledge of

diseases and insects is generally so limited that he is not in a position to say that his grove is free from disease. For instance one nurseryman such as I just described who stated he had been in the business twenty years, pulled off a leaf covered with purple scale and asked what it was. And yet this is our most common insect pest.

A candidate for life insurance is not allowed to decide whether he is in good health or not. Why should a nurseryman be allowed to say whether his nursery is free from disease.

Second. Diseases and insect pests have a way of springing up without any apparent reason right in the middle of a grove or nursery. I have in mind a grower located 40 miles from the nearest whitefly territory who suddenly found some of the insects in the very middle of his grove. Spray as he might, he could not exterminate them and they spread to his nursery and he soon had a whitefly-infected nursery despite the fact that he planted his own seed and used his own bud wood.

Third. Visitors coming into the nursery may carry insect pests or fungus diseases in, or on their clothing. For example I cite the case of a nurseryman who was operating without certification. He was positive that his nursery was clean because he had planted the seed and furnished his own bud wood from his own grove. But on inspection I found a couple of trees covered with snow scale (*Chionaspis minor*). The infection had evidently been carried in by a visitor for the only trees in his whole place that were infected were along the walk entering his

property. He promptly cut them down and burned them gladly. He would not have sold those trees for anything for it would have ruined his reputation as a nurseryman, and yet he would have sold them through ignorance had I not called just when I did. It is for such reasons as these that I say that the nursery inspection is as much for the benefit of the nurseryman as for the grower.

Another illustration: one man, who has a small nursery planted in his grove, but from which he is not yet selling, asked me to look at some trees that were sick. I found the two trees on each side of his entrance gate badly infested with the California red scale, evidently carried in by visitors. This is the most serious pest with which California has to contend and while Prof. Watson advises me that it has been reported in Florida at several points and has always yielded to treatment, he adds that it is not an insect with which we can afford to temporize. The owner of whom I speak cut off the tops of the infected trees, burned them and scrubbed the trunk thoroughly with a soap solution. He is now spraying his entire grove as a precaution. An examination of the nursery from which he purchased his trees, which was operating without a certificate, by the way, showed it to be free from the California scale, so that the infection must have been brought in on the clothing of a visitor.

One reason that some of the small nurserymen are inclined to dodge inspection is because they feel that they are discriminated against in the matter of charges. And it is true that the inspection charges amount to much more per bud for the

small nurseryman than for the large one. To make this clear let us illustrate: Under the present rules and regulations a nurseryman must pay a fee of \$5.00 plus 25 cents per acre to have his nursery inspected and must pay the traveling expenses and maintenance of the inspector. For illustration, we will compare a nursery of 38 acres with 300,000 buds with a nursery of one acre having 8,000 buds. The traveling expenses and maintenance of the inspector would probably be the same in both cases, amounting to, say, twenty dollars. This may be a little high, but it will do and will serve as an illustration. Then we have the following charges: Traveling expenses, \$20.00 each; inspection fee, \$5.00 each; per acre fee, 25 cents for small nursery; \$9.50 for the large nursery, giving a total charge of \$25.25 for the one-acre nursery and \$34.25 for the 38-acre nursery, a charge of only \$9.00 more for the large nursery than for the small one. In other words, if it costs them both twenty-five dollars and a quarter to have their first 8,000 buds inspected, it costs the larger nursery only \$9.00 more for the inspection of the balance, consisting of two hundred and two thousand buds.

Or, if you pro-rate the amount charged per bud, you will find that, roughly speaking, it costs the small nurseryman one-third of a cent per bud to have his trees inspected, while it costs the large nurseryman only one-one-hundredth of a cent per bud. For each penny the small nurseryman only has three trees certified, while the large nurseryman has one hundred. This discrepancy has not been overlooked

by the small nurseryman and he feels the discrimination keenly.

Some of the small nurserymen have heard it said that the present nursery law was passed at the instigation of the larger nurseries and we can hardly wonder that they jumped at the conclusion that the large nurseries chose this method to force them out of the business.

According to my information, however, the present order of things was brought about by an entirely different motive. It seems that other states passed laws requiring all nursery stock coming into their territory to bear a tag stating that the stock had been duly inspected by an expert, and was apparently free from insect pests and diseases. The Florida nurseries found their market greatly curtailed because their stock was no longer accepted in States having such an inspection law. They therefore petitioned the State Legislature to have a State nursery inspector appointed, who was to so inspect and certify their nurseries. When the objection was raised that this would be expensive, these nurseries offered to help bear the expenses of the work themselves by the payment of reasonable inspection fees. In reality, they had nothing to do with fixing the size of the fees or the method of collection, which was done by the Board of Control.

Be that as it may, the fact remains that at present the inspection charge per bud is much higher for the small nurseryman than for the large nursery. Moreover, he can ill afford to pay the difference, for he generally has to sell for less than does the large nursery, and often the small nurseryman is a person of limited means.

So long as this discrepancy remains, just so long will the State put a premium on evasion of inspection by the small nursery. The State Nursery Inspector can not be asked to act as a detective as well as a nursery inspector. Are we not to a great extent nullifying the beneficial effects of the nursery inspection law by the present system of inspection charges? A certain set charge per thousand buds could be made. This would eliminate all uncertainty and would make the charge the same to all, no matter what the size of the nursery. Is it fair to charge a man an especially high price just because his nursery is in an inaccessible portion of the State? Such a system of charges as has been proposed would eliminate the excessive charges caused by high traveling expenses incurred when a small nursery is located off of the main lines of travel.

But why should there be any charge for inspection at all? We do not have to pay for the service of the State Board of Health, nor for the services of the State Veterinarian. Even hog cholera serum has been given free to the farmers. Why should not the services of the nursery inspector be given free as well? It would be expensive. Granted. But is it not worth it to us? Not only to the nurseryman, but also to the grower, banker and business man; in fact to every citizen of the State it is worth many hundred times the small amount it would cost us in our taxes to know that our interests were being thoroughly and efficiently safeguarded.

By discovering canker when he did, the Nursery Inspector saved the State of Flor-

ida enough money to pay his salary for the next twenty-five years. By making possible the campaign against canker the Growers and Shippers League has saved us an equal amount. By seeing to it that all nursery stock moved in the State is adequately inspected before it is moved we will save ourselves a similar catastrophe in the future.

From a sense of fairness to the small nurseries, the nursery inspection charges should be revised. To make the service of the inspector free would place it in line with our other public institutions. With free nursery inspection the excuse for evasion would be removed and I believe that the small nurseryman would be willing and glad to have his nursery inspected and certified.

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#### DISCUSSION

Mr. Skinner: I am afraid we are getting away from our idea of having discussion from the floor this year. Our program seems to be so full that we can hardly get through with it as it is. I think it is a mistake. I imagine there is a good deal of information right down here on the floor, and I would like to get some of it.

Now, in my opinion, citrus scab is the most serious thing we have to contend with, except the canker. If you have a little of it in your grove, get busy and get it out.

I have a block of about 1500 trees of grapefruit, and under the recommendation of Prof. Rolfs last year I pruned it very severely, endeavoring as far as possible to get rid of every bit of scab. In doing

that, I had to get rid of about four thousand or five thousand boxes of grapefruit and throw them away.

It started from one little corner of the grove. I had heard some one recommend sulphate of iron or bluestone, and I was fool enough to try it, but we did not know much about scab at that time and I excuse myself on that account. But from that little corner of the grove, from trees which I had bought from a nurseryman whom I will not name, it spread all over the grove in the shortest possible time. There was a block of about 1500 trees of the most vigorous nature, and it seemed almost in one night the scab attacked them; it appeared that every leaf on that block of trees was affected.

It is a serious thing. I tried last year a strong solution of soluble sulphur; it is no good, so far as I am concerned. I do not know what experience other people may have. I tried this year one-to-thirty solution of lime sulphur. So far as I am concerned, it is no good. I tried Bordeaux on another block; I don't know yet whether it is any good; whether I will be able to save the fruit or not.

I am not talking about shark skin; I am thoroughly convinced the sulphur solution will control shark skin, because of its fungicidal properties.

Prof. Stevens told me a very interesting thing about this scab. I asked him—I have been in the State thirty-two years and I have seen sour trees alongside of my trees without a particle of scab, and yet suddenly without any apparent reason, here comes a whole lot of scab. He said there was probably one spore of the fungus that was stronger and more virile,

perhaps, than the rest, that lit on a grapefruit and liked it, and there was born another family. He said the orange may get it, and it may not. So, I tell you it behooves us to stamp scab out.

Mr. Rolfs: If Mr. Sampson is here, he probably had the first experience of any of the citrus growers in fighting the scab successfully. If he is here, I would like for him to tell you. As he does not seem to be here, the short of it is this: they used Bordeaux Mixture and ammoniacal solution of copper carbonate, spraying just before the spring growth came on and just after the spring growth. It was then discovered for the first time that Bordeaux Mixture would be followed by an extremely heavy attack of scale insects. We were all in the dark about that part of it. But it turned out very successfully. Some years the grapefruit was scarcely affected at all; we thought grapefruit was practically immune and the spreading of the scab from sour stock and lemons to grapefruit has occurred since that time.

So we have a very serious and difficult enemy to deal with. That is the sum and substance of the work as it was done twenty years ago. It was very successfully and emphatically carried out with the lemons.

Mr. Skinner: Do you think lime sulphur is good?

Mr. Rolfs: It has been tried many times, and no positive results obtained. Different forms of lime sulphur and soda sulphur have been tried, and so far we have obtained only definite, positive results by using the Bordeaux, which is the old-fashioned bluestone and the ammoniacal solution of copper carbonate.

Mr. Skinner: How about its entering the bloom this time of the year?

Mr. Rolfs: Spray before the bloom, and then follow with another spraying after most of the fruit has set.

Mr. Skinner: I sprayed with copper carbonate and sprayed that right into the bloom.

Mr. Rolfs: You will not hurt many of the bloom when you spray toward the end of the bloom. There is considerable danger of knocking the bloom off, of course. Now, in the case of withertip getting into the bloom, it is a good thing to spray into the bloom, knowing that you are going to knock off 10 per cent of the bloom.

In regard to the investigational work, Prof. Fawcett started very carefully and worked it up, but you will realize that where so much work has been done in a technical way, it is a very difficult matter to get positive advance information; new and available information in advance of what we did know. It is a subject which has been worked up so many times that the investigator will have to use a great deal of patience and time to work out and bring forward something entirely new.

One point further, and that is with regard to the matter of pruning out the scab. I believe if you have a young orchard in which the scab is appearing, pruning is the best way to handle it. In a large orchard, I doubt whether it is practicable in all cases.

Mr. Skinner: The results I obtained from pruning were very good.

Mr. Rolfs: You were satisfied as far as putting down the scab was concerned,

but you felt it a hardship to lose the fruit.

Mr. Skinner: Yes, of course; but it was scabby fruit. My work was only partly done. Now this spraying, as I understand it, has to be done every year.

Mr. Rolfs: As to that, you will find the old scabs will form on the leaves and the leaves will live for one or two years, and the old leaves, so long as one of the old sores is left, is a source of infection.

All of us who have new groves coming on, should be most vigilant in keeping the fungus eliminated from the grove.

Mr. Skinner: It is very interesting. There was quite a large young grove planted near our place this spring and a grapefruit grove near it. Every week these trees would put out new leaves and they were covered with scab. It must have been in the bark. I have known cases of that kind where it was thought to be due to improper cultivation, or something of that kind. That has nothing at all to do with it.

Mr. Rolfs: In my own case, where I have only 800 or 1000 trees, in that small orchard I am able to keep the scab completely suppressed by merely pruning-out methods, but that is a small proposition. Where you come to 40 or 80 acres, or more, the proposition is quite different. I had scab started vigorously on account of some lemon stock I had bought for propagating purposes.

I want to raise a note of warning to those who are starting in with citrus. Make it one of the rules to keep this scab out if you can possibly do so; keep it out. It is a bad thing. We have lost over 100,000 boxes of grapefruit this year from scab. Of course, grapefruit has not

brought a big price, so the loss has not been great, but if the price had been good, there would have been a large financial loss this year on that account. I have been in packing houses this winter where over 80 per cent of the culls were due to the scab, and I have talked with people who worked in the packing houses and who have paid attention to it, and they will back up these observations.

Mr. Gillette: I would like to ask and have somebody answer who knows, whether they have noticed any scab whatever on the second growth. Are you troubled at all with it after the first spring growth?

Mr. Skinner: Yes, on the growth that comes in the summer time, if the conditions are right. It may come any time.

Mr. Gillette: I am a little bit "scabby" myself. My knowledge of it extends back farther than some of the others here.

I think the first time I saw scab to recognize it was about 1881. I was north that summer. We had a nursery at that time at South Lake Weir, Marion County. My brother, who was in charge of the nursery during my absence, wrote me that something was happening to the seedlings. At that time we had nothing but sour stock. He said they were looking yellow, the leaves were twisted and knotty and he was much exercised about it. I thought he was unduly alarmed, and when I came back I went to examine the nursery. I was amazed at its appearance. Up to that time the sour stock was as bright and green as the orange or the grapefruit. I was satisfied that what had happened was something serious.

At the time the seedlings were planted,

in looking them over, I had noticed that a little bunch of them seemed to have this appearance to a slight extent, but I had not paid much attention to it at the time. My recollection was that the seedlings had been planted where stumps had been burned and the ashes left, and considerable potash was left from the ashes. I noticed the condition in the seedlings when they were turned up and thought it was due to being planted among the ashes left from the burned logs. Then it occurred to me maybe that was the same thing I had seen in the seed bed.

Without an exception, every seedling had this disease on it. I inquired around to see if anybody else had it, and I found everybody who had a sour seedling had discovered it.

Up in my grove I had one tree in which the bud had died. I had left that tree to get sour oranges from. I said, "Let's go up and look at that tree and see if there is any trouble with it." It was absolutely covered with it. How it got there, I do not know, because it was entirely isolated; whether it got there through being carried by birds or insects, I do not know, but it was there.

I was very much interested by that time, and I investigated and found practically everybody in the State had the trouble. From that time it began to grow.

We knew nothing about the rough lemon stock, but we found when we began to utilize it, that it had the same trouble, even worse than the sour and the grapefruit or the orange was infected.

This has been going on for years, and keeps getting worse. This season, in my nursery, I have treated it with Bordeaux.

I started in before the trees started the spring growth and gave the Bordeaux, and as soon as they got a little up, I gave them another dose, and followed that up with lime sulphur, and I think I have gotten the thing under pretty good control. I do not think it is conquered, but I have never had my seedlings in as good shape.

Of course, as soon as you begin to apply Bordeaux, you are laying trouble for yourself with scale insects, and you must follow that up with scalecide.

I want to follow this up for two or three reasons. In Winter Haven, we have hundreds of thousands of seedlings of sour stock. Then in my own groves—the oldest grove I have there is four years old—the first growth that comes out in the spring we have more or less trouble with scab, but in the fall there is absolutely no scab on the older growth. I never have pruned those trees; I am a good deal like the shoemaker, his children go barefoot. I have not paid much attention to the groves. But in this four-year-old grove I have never sprayed but twice and that was with Schnarr's Insecticide and lime sulphur. I think that is as pretty a four-year-old grove as you will find in the State, and there has been scab in it for the last two or three years. I was alarmed about it and thought the grove was in bad shape, but just as soon as the hot weather comes on in our district, any fungus disease appears to disappear. During the dry, hot weather, the scab disappears. The second growth that comes out on our trees is as bright as a dollar.

When it comes to fruit, of course the

fruit is infected. The fruit is bumpy and troubled with scab, but where we have been able to spray with lime sulphur—my practice has been to give them iron insecticide or some of the oils using that in connection with the lime sulphur, we have been able to keep the fruit in fairly good condition. We feel that we have it fairly in hand with the lime sulphur.

We all have it, more or less, around the Winter Haven district. Mr. Cochran has used nothing in the world but lime sul-

phur, and he has the best and brightest fruit I know of. I have felt that faithful spraying with lime sulphur will do the work. I think he has sprayed seven times during the season. He may have used Schnarr's insecticide once or twice, or something like that. His trees are as clean and bright as anybody could wish for. I think the results of the sales of the fruit from Winter Haven and Florence Villa will indicate that the fruit is pretty free from scab.

# Committee Report on Vegetables

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## PROFITABLE POTATO GROWING

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E. S. Hubbard, Federal Point, Fla.

*Mr. President, Ladies and Gentlemen:*

The members of the standing committee on vegetables will submit individual reports, thereby covering a wider field and presenting more varied sidelights on the numerous problems of the industry.

The profitable expansion of vegetable growing in Florida is limited by freight and express charges and the costs of marketing. If the costs of transportation were cut in two so Florida early vegetables could come into more general use at lower prices among the people of the North who work for a living, there is no doubt there would be five to ten times as great production as we have at present.

As matters now stand profitable vegetable growing is largely restricted to certain localities where there is sufficient quantity production to load refrigerator cars with perishable products, for instance, the lower East Coast and Webster for tomatoes, Sanford for celery and lettuce and Coleman for cabbages. Many ventures in promising localities have failed from this fact for all profits from shipments by ex-

press in cool weather were more than offset by losses when the weather grew warm from shipments that arrived in bad order and sufficient quantity was not produced to use refrigeration.

In the section where I live, which extends from St. Augustine to the Tomoka river and from the St. Johns river to the ocean, the main winter vegetable crop is Irish potatoes.

Other vegetables grow equally well on these soils, which are mainly flatwoods underlaid with clay, but the Irish potato is more easily followed with corn, hay and other summer crops. The crop goes out by train loads at the heaviest shipping points without refrigeration. It is handled largely by distributing firms or associations, f. o. b. buyers are numerous and the whole auxiliary business of finance, fertilizers, seed, barrels and supplies has developed around this one crop.

It is not a bonanza crop compared with the fabulous returns sometimes gained from other vegetables, compared with the average net returns it is an expensive crop to put in. Some people never are ultimately successful and some seasons in some places the

average results for all the growers do not show a profit.

And yet it is an easy crop to put in, is cultivated in a wholesale way by horse power and farm machinery, is harvested in one operation and after that the suspense as to profit or loss is soon over. I do not expect to give an essay on this subject, but rather to indicate some of the "don'ts" as well as "hows" connected with this business, which are usually acquired only by long and costly experience.

Personally, I try to average the probable extremes of future climatic conditions. For instance: when to plant. The man who plants about Christmas or New Year is seldom hurt enough by blight to pay for spraying, but is in more danger from frost. The man who plants around the first of February is not in much danger of having his crop curtailed by frost and usually gets a larger yield at lower prices, but he must spray for blight and if his drainage and other conditions are not good, spraying may not be of much benefit.

Without good drainage in wet seasons success is problematical, the loss of fertilizer alone by leaching and consequent reduced yield being enough to eliminate profit. Rotten seed and the expense of replanting usually results from poor drainage at planting time and standing water between the rows often damages the roots and the plants are an easy prey to diseases. Muck lands for these reasons are avoided, and in addition the trade recognizes the potatoes do not have as good eating and keeping qualities. Some growers at

Hastings have put in gasoline pumping outfits to free their fields of rain water as fast as it falls. Surface irrigation in dry spells from artesian wells is available with the clay subsoils over most of this section, but artesian water, if it stands between the potato rows under a hot sun, is as damaging as floods of rain water. The potatoes are planted in ridges about three feet four inches apart, the fertilizer being applied two weeks before planting, by various distributors, at the rate of one ton per acre and covered preferably in sharp ridges to prevent leaching. The fertilizers used are mostly special mixtures, often mixed at home. The original Hastings formula of Clarence G. White—if I remember rightly—being 1,100 lbs. bright cotton seed meal, 600 lbs. acid phosphate and 300 lbs. high grade sulphate of potash to the ton.

500 to 600 lbs. blood and bone is now very generally used in place of a similar amount of cotton seed meal and some use 100 lbs. of nitrate of soda in place of a similar amount of cotton seed meal or blood and bone, or say 500 lbs. cotton seed meal, 500 lbs. blood and bone, 100 lbs. nitrate soda, 600 lbs. acid phosphate, 300 lbs. high grade sulphate of potash. Good yields have been made from 1,700 lbs. of fertilizer, but over 2,500 lbs. with the average vicissitudes of seasons is not considered profitable. 2,000 lbs. per acre is the usual amount of fertilizer.

Which is best, Maine or New York seed, Spalding's Rose 4, being about the only variety planted. New York seed, while firm and vigorous, has lat-

terly shown most dry rot. Maine seed may ripen the crop slightly earlier, but often is not so well matured seed as New York, and sometimes arriving slightly chilled, the grower has a poor stand. The growers generally cut the seed in as nearly square pieces as possible; they feed better in the planter and have the minimum cut surface. The seed is planted by machine 11 to 14 inches in the row as quickly as possible after being cut to heal over the cut surfaces in the ground.

Nobody practices spreading and lining seed to dry the cut surfaces.

Quite a variety of tools are used in cultivating to attain the same general results—killing of grass and weeds as they sprout, aerating the soil and producing a well shaped ridge. It is generally conceded that after the plants are large enough to show blossom buds and send their roots into the furrows, the use of a disk cultivator on the sides of the ridges or a middle burster in the furrows is detrimental to the plants and crops. The tubers grow slowly till the crop is 80 to 90 days old from planting, when the vines change color from a bright green to a leaden shade and in the next 10 days the tubers make most of their growth. The early plantings are dug while the skin still slips on the

potatoes, the rows being barred off with a light plow and the potatoes raked out by hand. No horse digger has yet been found that will handle the green tops without leaving too many potatoes covered in the soil.

The crop is shipped in double head, eleven peck barrels packed tight with a heading press, as they would be so skinned and bruised as to be almost unsalable in sacks. Chain belt graders are coming into quite general use.

Three sizes or grades are made—No. 1's, No. 2's and No. 3's or culls. It only pays to ship the culls with the earlier crops and later they are kept for fall plantings or stock feed. Yields have ranged from 120 bbls. per acre to not enough to pay for digging, and prices for No. 1's from \$8.00 per barrel in Northern markets down to \$3.00. Forty barrels per acre is considered an average yield and as it costs \$80 to \$100 to grow and ship an acre you can figure for yourselves what the average net account sales should be to give a fair profit. I have cleared as high as \$150 per acre on part of a crop, but one year after paying for fertilizer, seed and barrels, I had to turn all my pockets inside out to find the change for growing and digging the crop.

## VEGETABLE PRODUCTION IN FLORIDA

C. K. McQuarrie, Gainesville, Fla.

Florida, in the mind of the prospective settler from more northern climes, will always be associated with citrus fruits and winter vegetables. Investigation will show him, however, that it takes several years to establish a citrus grove, and that the cost is higher than the average settler can afford. Therefore, he naturally turns to vegetable growing as the most attractive business. On investigation, he finds that the dollar invested in seeds, fertilizer, and labor, comes back quicker from vegetables than from any other agricultural work in which he may engage. Florida can justly be called the "winter vegetable garden" of the more northern states, or in fact of the entire North American continent.

A writer in a popular magazine lately made the assertion that three-fourths of the wonder stories of the acquisition of wealth in Florida turn on winter vegetables. Some of these stories, no doubt, are true, and have been picked out with great care by the parties that are especially interested in booming prices of lands, or in drawing attention to certain sections of the State. Some cases of large yields from vegetables and large incomes from a small area are to be met with, but what about the other side of it? What about the suppressed details of the constant grind and the constant fight of the man that knows very little about his business

and has to fight the adverse seasons and other adverse conditions that he has to contend with, and who, in the long run, has to face the despair that comes from constant failures?

We know, from close observation and a good many years of practical experience, that vegetable growing in Florida is, to a very large extent, a type of gambling of the most intense kind. However, there is this to be said in connection with vegetable-growing in the state; that an analysis of the business, as a whole, gives favorable results.

The biennial report of the Commissioner of Agriculture for the years 1913 and 1914, shows that the value of the vegetable crops for the State of Florida was \$13,185,904, as compared with \$11,408,223 for the citrus crop, while the total value of the field crops of the state was almost \$19,000,000. An analysis of this report is interesting. It shows that the earning value of the land in vegetables was, for those two years, \$141.15 for every acre, whereas, for the ordinary field crops the average earning value per acre was \$17.45. In following this analysis a little farther, we find from this report that the increase in acreage in vegetables for 1913 and 1914 was 30%, whereas the increase in value was 60%. This shows conclusively that the vegetable growers are beginning to get better posted

on the best methods of producing vegetables, as well as to market them to better advantage.

There are certain qualifications necessary for a successful vegetable grower. Quite a number of newcomers into the state have an idea that it is an easy matter to take up a piece of land and begin vegetable growing, for the reason, as already stated, that the dollar comes back quicker from vegetables than from any other crop. They overlook the fact that whatever line of business a man enters, there is a certain educational period through which he must pass before he can become an expert. This holds true of vegetable production, just as much as it holds true of ship-building, steel-making, or any of the other industries in which any man may engage.

There are certain mistakes that the Florida vegetable growers have been making in the past, and which they are still making. When the time comes that they can eliminate these mistakes the industry will assume much larger and more important proportions than it does at the present.

I would like to enumerate a few of these mistakes that have been made in the past, with a few suggestions as to the best methods of combating them.

#### TOO SMALL HOLDINGS

One of these is having too small holdings in the vegetable farm, thus preventing the use of crop rotation. We know, from practical experience along all lines of agricultural produc-

tion, that diversification and rotation of crops is one of the essential points that all producers must bear in mind. The same kind of crops grown in succession on the same piece of land for a number of years will tend to limit the ability of that soil to produce large crops, for the reason that soil diseases will creep in, both of bacterial and fungus origin. We know, for instance, that if you grow cabbage on the same piece of land for two or three seasons in succession the soil will become "cabbage sick." But if we had rotated cabbage with some other crops that are immune to the diseases that infect cabbage, we would have been able to maintain the fertility of soil, and also to maintain its sanitary condition. It is just as necessary that crops should grow on soil under the best sanitary conditions, as it is for human beings or animals to live under sanitary conditions. The continual cropping of a piece of soil to a single crop will of course tend to prevent the soil from getting toned up to produce crops in the largest possible quantity.

#### DIVERSIFICATION

It is not within the scope of this article to go into details as to how this condition could be maintained, except as far as we should study how to grow, where practicable, the crops that we know, in general agricultural practice, are scavenger crops. For instance, if a spring or winter crop of cabbage has been grown on the land, as soon as the cabbage crop is harvested, the land

should be seeded to sorghum or corn or some of those staple crops that will be a complete contrast to the previous crop, both in their rooting system and in their methods of getting soil fertility. Then, for the winter cover crop, we should continue that same idea by growing what we know to be the most effective scavenger crop in the whole list of crops; that is, winter oats. The ordinary truck grower will ridicule this idea of growing what he calls a cheap crop on his expensive land. This may be reasonable to a certain extent, but would it not be better to do that than to have his soil contaminated with the soil diseases that belong to his particular truck crops to such an extent that in a year or two the land would have to be thrown out of use, because it could not be used for the crops that would pay best? It would be true economy on the part of the vegetable growers to practice this diversification of crops to the highest degree possible.

#### CROP ROTATION

Crop rotation in vegetable growing should include a complete change of the type of crop. For instance, we know certain crops to be deep rooters. Such crops should be followed by crops that are subject to certain diseases, such as wilt in cucumbers, drop in lettuce, etc. Scientific investigation has given us the information that certain crops are immune to the diseases that other crops have, so we should never follow up with a crop of the same type or family. The main

idea in crop rotation should be to maintain the soil fertility and soil sanitation, and to increase the crop production.

Now let me suggest one or two rotations that from observation have been found efficient in maintaining and building up soil fertility. We know, for instance, that cabbage is a gross feeder and that it wants plenty of moisture. To maintain the moisture supply there should be a large amount of humus in the soil. The crop preceding cabbage should be a crop that will give this amount of humus to the soil, and also maintain its fertility. That crop should be a legume crop, such as velvet beans, soy beans, or a crop of beggarweed, which has been cut and allowed to dry before being plowed under. If there is a large amount of stable manure available, a good plan would be to apply this manure broadcast and grow a crop on it that would take away the rankness of this stable manure, before planting cabbage. Then, immediately after cabbage, let the land either produce a crop of hay, or a crop of velvet beans, or some crop that would protect the soil during the hot summer months, and at the same time maintain or improve its fertility. The velvet-bean crop should be used to a far greater extent by all growers than it is. In growing watermelons, for instance, velvet beans should be planted at the last working of the melon crop. When the melons are all marketed, those left on the field should be removed and either fed to livestock or buried. The land should be smoothed with either a harrow or a weeder, and allowed to grow

a crop of velvet beans during the summer time. This crop will protect the soil from the hot rays of the summer sun, and it will also equalize the moisture during the heavy summer showers, also putting the soil in a condition when the aftermath of the velvet bean crop is plowed under, to give us a spring crop of far larger dimensions than we would get in any other way. This method should be followed where cucumbers, lettuce, and all of the spring or summer crops are produced. Sweet potatoes are also a good soil scavenger, and should be used in a rotation of the earlier spring vegetables.

The Florida vegetable grower ridicules the idea of going in to produce these crops that yield such small returns compared with the vegetable crops that he depends upon. But, should he study the matter thoroughly, he would find that unless he preserves the sanitary soil condition necessary to the crops, and also preserves the soil fertility, his soil will be unable to produce as large crops as it should.

#### SPECIALIZATION

There is also a tendency on the part of the vegetable growers to confine themselves too much to one or two specialties. This, in itself, is not to be desired, not only from the producing standpoint but also from the general marketing standpoint. The idea among growers in sections where carload lots are the rule, is to grow just one or two crops, and ship in carload lots. This to a certain extent, is desirable, but prices

received generally are not as satisfactory as if they were mixed cars with well-selected materials. The mixed cars could be sent to the smaller markets, where the prices on the whole would be better than where the carload lots were sent to distributing points and reshipped, thus causing a day or two of lost time before the product gets on the consumer's table.

Some of our growers handle but one crop, and the result, in seventy-five per cent of the cases, is disaster. Take the history of agriculture the world over, and you will find wherever one section or one community gives itself entirely over to a specialty, every now and again it spells disaster for everyone concerned. This should be avoided as much as possible.

#### UNIFORMITY IN PRODUCTS

Another mistake that our growers make is a lack of uniformity in their products, the lack of proper standardizing, both in type and quality. Those that have the privilege of visiting the different packing houses and shipping platforms during the shipping season must be struck with the great difference in appearance and the differences in the quality of the materials shipped.

#### HONESTY IN PACKING AND GRADING

In going over the state of Florida during the shipping seasons of the different products, we are often struck with the difference that prevails at certain shipping points in the honesty in grading and packing. It is not within

the scope of this paper to point out any particular point in the state that is ahead of others, but if I wanted to buy, say strawberries, there are only one or two shipping points in the state that I would care to buy from. There is really only one point in the state where I know when I buy a basket of strawberries that every berry in that basket is as near like its fellow as it is possible to have it. This condition has been brought about by one buyer at that point who insists that one quality be maintained, and he pays a top-notch price and knows that he gets a top-notch article.

The Irish potato growers at Hastings furnish a good example along this line. When a barrel of Hastings potatoes is marked No. 1, you can depend upon it being that grade, and No. 2, the same way. The result is that the Hastings potato growers command the top-notch figure in every market in the country.

#### TAKING CARE OF CROP REMNANTS

Another mistake the vegetable growers make is in not taking due care of the unmarketable product or remnants of their crops. In going over the fields that have produced cucumbers, cantaloupes, watermelons, and such crops, after the shipping season is over, we generally find what looks like about fifty or sixty per cent of the crop left on the field to decay. In the decaying process certain bacterial and fungus diseases occur. When the decaying is completed, naturally the soil is infected with diseases belonging to

that crop. Some of those diseases have what we know as "resting spores," that will remain in that soil for quite a long period, particularly if the soil is not being plowed or cultivated and other crops grown thereon. This tends to contaminate future crops of the same type and will reduce the production at least fifty to sixty per cent. Contamination of clean soil is also likely to occur by carrying some of the soil on plows or cultivators, or even on one's shoes from the contaminated field. We should insist that all vegetable growers collect the unmarketable product and destroy it by burying it in deep holes or by feeding it to live stock. Generally speaking, however, very few of our vegetable growers have any live-stock to feed anything to. They believe in getting a large return for the crops produced and buying almost everything that is needed for home consumption. This is poor policy and shows lack of business methods.

#### METHODS OF HANDLING COMMERCIAL FERTILIZERS

Another mistake the vegetable growers make is in the way they handle their commercial fertilizers, in the methods of application, and the stage of the crop's growth at which commercial fertilizers are applied. This is an important matter and one that is often overlooked. A good many of our vegetable growers today are fertilizing their crops along the same lines that were followed twenty-five or thirty years ago. One of the most flagrant abuses, I should say, is the

practice of making two or three applications of fertilizer to the same crop. Anyone who has studied the results from the various methods of crop fertilization, will bear me out in saying that for all short season crops, such as cucumbers, beans, Irish potatoes, etc., fertilizer for the crop should be applied broadcast and mixed with the soil before the crop is planted. The reason for this is that certain chemical changes have to occur in the soil before the roots of the plants can use the plant food from this fertilizer to advantage.

Now, if, say one-third of the fertilizer is applied in the furrow or in the hill before planting the crop, and then at the second or third working of the crop another application of fertilizer is made, and then a still later application, one can readily see that the crop is not going to get the full advantage of the fertilizer, because sufficient time will not have elapsed to make it available before the crop is made. Over and above this, that method tends to disturb the root system of the growing crop and will interfere with the feeding ability of the roots, so that the crop does not get the most out of the fertilizer. The growers who are getting the best returns are those who apply the fertilizer broadcast and mix it well with the soil, and conduct the future cultivation of the crop as shallow as possible so as not to interfere with the work of the roots in the soil.

#### TOO MUCH AREA TO ONE CROP

Some growers, before planting time, want to put as large an acreage as they

possibly can into a crop that they think is going to give the best returns. Some of them do not consider the question of available help at harvest time. In many cases a loss occurs from lack of help to handle the crop and send it to market when ready. We can sympathize with the man who has the fertilizer, land, and everything else necessary, and trusts to luck when it comes to harvesting; but we find, in many cases, particularly in the bulky crops, that a loss occurs through the inability of the producer to get enough help when he needs it.

#### IS IRRIGATION NECESSARY?

Another mistake that a number of our vegetable growers make is that of depending too much upon irrigation. The man with a few acres of irrigated land considers himself well fortified against a good many things that may happen during the growth of his crop, let it be what it may. The main thing he depends upon is of course water. Now, while it is true that the most important factor in all crop production is soil moisture; at the same time the quality of the product from irrigated land is not as good as that from soils that have been properly prepared before the crop was planted. We have in Florida, enough rainfall to make a maximum crop of any of our products, providing we start in time to prepare the land and do it in the proper way. If we have large enough holdings, so that we can rotate crops and diversify them in such a way that we are all the time building up the soil, the matter

of irrigation could be dispensed with. In land that is broken deep, say 12 to 16 inches, with a good turning or disc plow, and subsoiled at the same time, and all the time carrying a crop of some kind on it, the aftermath of the crops and the decaying roots left plowed under, will put the soil in a condition that, no matter what crop is grown on it, there will always be a good supply of moisture. Owing to the soil capillarity introduced by deep plowing and cultivation, the moisture supply will be almost unlimited. Another important consideration is that on irrigated lands, the fertility which is carried to the lower soil strata by irrigation can never be recovered; whereas, by having the soil properly prepared by deep breaking, ninety per cent of the fertility carried by heavy rainfalls to these lower strata will be brought back to the roots of the growing crops by capillary action. We therefore think that the spending of \$200 to \$300 per acre for an irrigation plant for vegetable production is unnecessary. True, there are certain seasons when a little more water will do good; but, as I have already said, if the soil had been properly prepared the lack of moisture would not be felt so very much.

#### CO-OPERATION

Another weak point in our vegetable growing is a lack of co-operation among our vegetable producers. Many communities have one or two large producers who are able to select their market, and in a general way know just what to do. Where the small pro-

ducer comes into competition with the larger one, he generally finds himself left in the cold; but if there is a live co-operative organization in the community—and one should exist in every community—many of the small growers could arrange their shipments in such a way that they would be able to get the best results for their work.

#### DISTRIBUTION AND MARKETING

The matter of marketing, distribution of the material after it is produced, is the most important point of all. Into the discussion of this I am not prepared to enter, for the reason that I am not well enough posted along these lines. I should say, however, that as far as I can see, the tendency among the small growers is to go back to express shipments. Now that the express business is on a zone basis, the same as the parcel post, the smaller markets of the country are not discriminated against as they have been in the past. There have been some very extensive shippings by express made by some communities in the state last season with good results, to certain smaller markets in the northern states that had never been touched before. The express people do the distributing and collect the returns, and while it may cost more than carload shipments to the central points, at the same time it is more certain. The material gets to the consumer's table two or three days earlier than by the other method, and of course that means that it is in a better condition. This will help stimulate the particular market served.

The distribution is the weakest part of the entire work. It has been so in the past and is likely to continue so for some time to come.

Florida could produce vegetables enough to supply the whole continent at a profit to the producer and a benefit to the consumer. But under our

old methods of shipping to central points and then reshipping to the smaller markets, loss of time occurs that makes the material stale and unpalatable before they get on the consumer's table, except in certain cases. The amount sold under this method is also limited.

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## VEGETABLE GROWING IN FLORIDA

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R. A. Conkling, Fellsmere, Fla.

*Mr. President, Ladies and Gentlemen:*

At our last meeting held at Palatka, Professor Rolfs made the remark: "If you want to keep a good horticulturist away from the meeting, put him on the program." You see this could not apply to me, for I make no pretensions of being a *good* horticulturist, but I am very anxious to be in that class. So I come here to learn, and, if you want to keep me away you must pursue a different course.

My first visit to Florida was in the winter of 1888. In the spring of '89 I moved here from Texas, bringing my family and all I possessed in the way of wealth, which was only enough to pay for a small place, and a very small amount for improvements. I managed to get two acres of land into a partial state of cultivation by the following fall and winter. I had nothing left to live on should I fail to "pull off a crop," (a very unwise thing to do) as comparatively few who come here without money and without experience do make a good crop the first season, and at that

time it was more foolish than now, for there was no one able or willing to give intelligent advice to the beginner. At least there was not at the point where I decided to make my home, which was in Brevard County, on the banks of the beautiful Indian River, three miles south of the now beautiful and thriving town of Melbourne.

You are wondering what all this has to do with the subject under discussion, viz: Vegetables in Florida. Well, all I know about vegetables is from experience gathered on that little place, and when I tell you about that place you will agree with me—if I succeeded in living from the profits made from vegetables on a place such as it was in its original state—that vegetables in Florida are a success. It consisted mainly of a high ridge with stunted pines, scrubby saw palmettoes and a scanty growth of wire grass, sloping off to east and west to a swale of gall berry and myrtle, with hardpan in twelve inches of surface.

I was told soon after buying the

place that I could make neither grove nor garden, that it was absolutely worthless for either, and I was regarded as an object of pity, and no one expected me to make anything at all, much less a living.

I am perfectly sincere when I tell you that cow peas did not get six inches high, and that one-eighth of an acre of sweet potatoes without any fertilizer made only four bushels of indifferent potatoes. After a few years I made six hundred bushels of sweet potatoes per acre and grass and peas grew waist high. About this time I heard that Prof. Rolfs was an authority on vegetable growing, and I immediately procured his book. I do not remember when it was written. After reading it very carefully I loaned it and it was passed along. My recollection now is that he did not think such land as I owned could be successfully cropped with anything. But my faith was strong in Florida—I had to make good, as I had burned my bridges and had spent nearly all my money. I lived on that place for twenty-one years and grew almost every vegetable with success. I failed on asparagus, rhubarb and French artichokes. I grew twenty-two different vegetables successfully simultaneously. Up to this time I had not visited other parts of the State and had not investigated the East Coast to any extent. When I bought the place I believed that any place in Florida was a good place and did not know that other places were far better adapted to growing vegetables.

I am telling you this only to em-

phasize this point: *That given fertiliser and moisture, or drainage, as the case may need, there is no land in Florida (or but very little) cultivated with intelligence where vegetables may not be grown successfully.* But does it pay?

Yes; if I made it pay on such land as I have described, you can make it pay. I have never been a large grower, and I know there are those present who know much more about this subject than I am able to tell, those who have specialized and made a wonderful success. But my advice, especially to the beginner, is not to go too largely to one thing, as a failure often means disaster. Many farms have a variety of soils, and he who owns one is fortunate, as there is always something that will be at home on each grade.

For the last four years I have lived at Fellsmere, where there is a variety of soils—high grade flat woods, prairie and thousands of acres of rich muck. The main crop of the year is tomatoes, and, in spite of the unfavorable season there is a large acreage of very fine tomatoes. The farmers have made fine lettuce, celery, beans, egg plants, strawberries, and everything that the season would permit. The land has produced abundantly. Those who have planted strawberries, and there are many who have planted small patches, are so well pleased with the result that they intend to plant for the Northern market next fall. Our farmers are planning to follow the vegetable crops with forage. Sudan grass, cow peas, beggar weed, velvet beans, fetereta, Rhodes

grass, Sorghum, natal grass, rice and peas combined, field corn (of which the Mexican June has proven the best) have all been tried here and have proven a success.

In addition to planting the above as follow-up crops, many meadows and permanent pastures will be planted, and, as elsewhere in the State, the farmers of this locality are planning to make vegetable growing a success by raising the necessities which have been shipped to us in the past, without which vegetable growing as a business will be a more or less hazardous undertaking. While by combining with such

crops as can be raised during the summer it not only becomes very profitable, but, to me at least, most pleasurable.

The East Coast is being rapidly settled by an intelligent class of people, from East, West, North and South, who are making beautiful homes and are bringing new ideas and business methods with them, which is acting as a tonic on "us Crackers," and will result in great good. We welcome them and gladly co-operate with them in making vegetable growing a profitable occupation.

# Committee Report on Fertilizers

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## FERTILIZER AND THE CITRUS GROVE

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J. A. Stevens, DeLand, Fla.

*Mr. President, Ladies and Gentlemen:*

The word fertilizer usually brings to the average citrus grower's mind a vision of a two-hundred-pound bag of dry, powdery material, with the name of some fertilizer company and its brand printed on the bag, and a tag with inspection stamp affixed and a printed analysis guaranteeing the contents of the bag attached. Such guaranteed analysis will read something like this:

Ammonia, not less than -----4 per cent  
Available phosphoric acid, not less

than -----8 per cent  
Potash, not less than -----12 per cent

and following will be printed the names of the materials composing the fertilizer, from which these elements are derived.

To the average grower this is fertilizer, and when he has purchased his supply and applied it to his grove, the fertilizer question is settled—until time for the next application. If the trees make a good growth and mature a fine crop of fruit, he is pleased with the results of his fertilizer and buys more of the same brand next year. On the other hand, if the trees do not put on the growth he thinks they should, and if the matured crop is less

than he expects and especially if it does not sell to good advantage, the average grower seems prone to blame the fertilizer—thinks the fertilizer is not what it used to be, that the company must have lowered its standard, or has been careless in the mixing—and decides he will have to make a change in the kind of fertilizer he uses.

Not infrequently, when these conditions result, the grower wishes he had drawn samples of that fertilizer and had it analyzed.

As a matter of fact, if he had drawn samples and had the fertilizer analyzed, and had done the same with each lot of fertilizer previously purchased, he would probably find by a comparison of analyses of fertilizers of the same brand or guarantee that the fertilizer which he thought had failed to give satisfactory results was in reality the same in every way as he had used before; or, if there was any difference, it would be infinitesimal and easily accounted for by variations in the chemists' calculations.

If the two lots of fertilizer were really the same, why, then, the difference in results? Because fertilizer, in the sense in which it has just been referred to, is but

one of many factors which govern the growth and productivity of the citrus tree.

Most of these factors are not under our control, and consequently have never been given their just amount of importance in our discussions before the Horticultural Society. I will discuss these briefly in connection with my address this morning, so that my thoughts in connection with what I have to say may not be misunderstood.

The application of fertilizers, the aeration of the soil (cultivation), the humus content of the soil, diseases and insect pests, are factors which are all more or less under our control. The moisture of the soil is only imperfectly under control, the temperature is outside of our control, and the kind of soil and its chemical composition, as well as its physical make-up, is entirely outside of our control.

*Moisture* is probably the most important of the factors which enter into the making of a grove and the production of fruit. An excess of moisture is as injurious as not enough; yet we cannot stop the rains and only in a general way can we prevent rapid evaporation, and only in a few instances are we able to irrigate successfully. In order that our groves may utilize to best advantage the fertilizer which we apply there must be a sufficient amount of moisture in the soil to dissolve the plant food; also, to supply the tree with the necessary moisture for its make-up and to replace that lost from the tree through transpiration or evaporation. If a very hard rain, or a series of hard rains, should occur shortly after fertilizer has been applied, it is more than probable that

a large part of the ammonia in the fertilizer would be lost and with this element lacking, the grove would hardly produce the growth that should follow the application of fertilizer, if normal moisture conditions prevailed.

Thus we see that insufficient moisture, or an excess of moisture, may be largely responsible for disappointing results, following the use of fertilizer.

*Temperature* is also a very important factor in determining for or against the production of fruit. The citrus tree needs some variations of temperature with the different seasons. This is borne out by the fact that citrus fruits grown near the northern extremity of the citrus belt, where there are a greater number of cool nights in winter, have a more pronounced flavor than other fruits of the same varieties grown farther south and not having the same periods of low temperature. Abnormal temperature conditions, however, disturb the equilibrium of growth and fruit production. For instance, periods of unusually high temperature in winter tend to stimulate growth, and when followed by periods of low temperature, especially if frosts occur and cause either partial or total defoliation, succeeding growth develops leaves, rather than fruit. If, instead of good growing weather, low temperatures prevail and result in a late spring, and again if low summer and fall temperatures occur when warm growing weather would be normal, growth and production are again impaired; and yet the application of fertilizer is in no way responsible.

*Diseases and Insect Pests*, whether pres-

ent or absent from the grove, have a greater influence upon the production of fruit than is often realized. When moisture and temperature conditions are normal, the effects of diseases and insects present may not be very noticeable, unless existing to an abnormal extent; but when moisture or temperature conditions are adverse, the ravages of disease and insect pests, if present, sap the vigor of the trees to an alarming extent, and a very large part of the benefit from the application of fertilizer is lost through these drains upon the trees. This is especially true when a grove has just borne, or is carrying a heavy crop of fruit.

*The treatment of the soil* in which the trees are planted is an important factor in citrus fruit production. With so many different types of soil, however, the treatment required by one kind of soil may differ quite materially from the treatment best suited to some other type.

In whatever soil the trees are planted, it is essential that the soil be in condition for the proper development of the roots. It must be possible for the roots to absorb plant food when dissolved. For best results, the soil must neither be too wet nor allowed to become too dry. Underlying hardpan, if too near the surface, will no doubt sooner or later cause trouble unless steps are taken to remedy this condition. Imperfect drainage is also sometimes the cause of disappointments in crop production. In some soils acid conditions seem to accumulate until, unless corrected by applications of some form of lime, the roots are not able to take up the full quantity of plant food required, even though

the applications of fertilizer have been just as liberal as before, and shortened growth or crop production is the result.

*Upon the humus content of the soil* probably depends, more than upon any other one factor, what is considered the success or failure of the application of fertilizer.

Soils containing sufficient humus, if provided with proper drainage to prevent an over-abundance of moisture, are better adapted to hold the right amount of moisture and thus enable the fertilizer to become dissolved and available to the roots.

Soils insufficiently supplied with humus are most difficult to handle in the use of fertilizers, the hoped-for results very often failing to materialize, notwithstanding the fact that liberal applications of fertilizers which apparently have produced excellent results on other soils were used here also.

Where too much humus abounds, as in the case of some muck soils, for instance, we also find a difficult proposition. Groves planted on muck soils are usually supplied with little or no ammonia in the fertilizer applied, while high per cents of potash and phosphorus are given. Yet, it not infrequently happens that, while the trees make good growth and are well provided with large, dark-green leaves, the crop is not overly abundant, and the fruits most likely are large and coarse.

The proper amount of humus in the soil, let me repeat, makes for the best conditions, and when the other factors are favorable, the best growth and crop results are obtained.

The chemical analysis of our virgin soils shows that in nearly every instance our soils are well supplied with the minor elements required by the tree roots, but usually lacking in sufficient quantities of the major elements, ammonia, potash and phosphorus. Therefore, fertilizers are manufactured and sold to supply these deficiencies, in the proportions which analyses and experience have taught are most needed. After fertilizers have been applied, analyses of the soil show a much larger content of these major elements than before.

Experience has also taught, in a general way, that certain materials used in the manufacture of fertilizers, and from which the major elements of plant food are derived, are more suitable to the needs of citrus trees than certain other materials used in the manufacture of fertilizers for other kinds of crops. These different sources of plant food for the citrus tree, with their relative merits, have been discussed from time to time before the Horticultural Society and I will not take up time to enlarge upon them here further than to say that responsible fertilizer manufacturers know what sources are safe to apply to the citrus tree and which are considered injurious, or unwise to use. It would be very foolish on their part to put out fertilizers made from unsuitable materials. The financial success of the fertilizer manufacturer depends upon his supplying his customers with the kind of plant food suitable to their crops.

Unsuitable fertilizers would tend to cause disease, or if improperly balanced would most likely result in abnormal

growth development or the production of fruit of undesirable quality. Therefore, insufficient growth, or the scant productiveness of fruit, would seem to indicate that the fertilizer was what it was represented to be, rather than that it was a failure, and most likely one or more of the other determining factors mentioned should be charged with the responsibility of the failure.

No chain is stronger than its weakest link. Fertilizer is but one link in the chain of factors that govern satisfactory growth or crop production. That the use of fertilizer is both necessary and profitable is known beyond all question of doubt, but that fertilizer alone should be credited with the success of the grove, or charged entirely with its failure, is absurd.

It is not uncommon that fertilizers are used unwisely. They may be used in excess of the quantity really needed, or, on the other hand, an insufficient amount applied; or they may be applied at the wrong season of the year. It is needless to say that unsatisfactory results from such unwise use should not be chargeable to the fertilizer.

It has been my privilege to be more or less in touch with a number of citrus groves in Florida, situated in widely different sections and upon various types of soils, and to know something of the kinds of fertilizers used and to note the growth and crops of fruit produced in these groves. My observations have led me to the conclusion:

1st. That different kinds of soil will give varying results, even when identical fertilizers are applied.

2nd. That when the conditions of moisture, of temperature, of freedom from disease and insects, and especially when the soil is liberally supplied with humus and other factors mentioned are most favorable to the production of the crop, the kind of ammonia, the kind of potash, the kind of phosphoric acid, is of relatively less importance. In certain plot experiments in a bearing grove, where the soil is well supplied with humus, the different plots received their plant food from different fertilizer materials. Results in growth and crop production seemed equally as good in one plot as another, where the proportions of ammonia, potash and phosphoric acid were well balanced.

3rd. That when the conditions of

moisture, of temperature, of diseases and insects, as well as other soil conditions, are adverse, it becomes very important to apply fertilizers of any kind with the greatest caution.

4th. The grove with its trees in heavy foliage, having large, rich, dark green leaves, and the appearance of being exceedingly well fed, is less likely to be the best producer. My observations lead me to believe very strongly that the grove owner can put his grove in such good growth condition that the crop will be relatively small. We have similar illustrations from other lines: First, the fat cow is not the best milk producer; second, the fat horse does not win the race; third, the over-fed hen does not lay the greatest number of eggs.

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## FERTILIZERS

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L. R. Woods

There has never been in this country so widespread and so deep an interest in the subject of conservation of fertilizer as at the present time; and never before have so many men, trained for investigation, been engaged in studying the subject in all its manifold phases and varied relations.

Fertilizing is *not* a simple problem. Its solution depends upon much more than the liberal use of farm manure, commercial fertilizers or other materials. Intelligent and successful use of fertilizers in the growing of crops is based upon the knowledge of definite facts and of the re-

lations of these facts one with another. The beneficial action of fertilizers upon crops depends upon, and is limited by, many different conditions, each of which must be taken into careful consideration if the cost of crop production is to be satisfactorily regulated.

As commonly used, the term fertilizer includes compounds containing nitrogen, phosphorus and potash. This has arisen because these constituents are the ones that have been usually considered in the growing of crops. *Commercial* fertilizers are manufactured preparations, made by mixing plant food materials of different

kinds, and are usually sold under special brands. These are also known as artificial, prepared or manufactured fertilizers or manures. When they consist only of inorganic materials, they are usually termed *chemical fertilizers* or manures.

While commercial fertilizers contain numerous constituent elements, their chief value depends on the presence of only three forms of plant food, and these are compounds of *nitrogen*, *phosphorus* and *potassium*.

*Nitrogen* is generally conceded to be the agent most actively concerned in the vegetative functions of vigorous growth, especially of the stems and leaves; but if present in *excess* gives rise to a weak and sappy growth which in the nature of things is soft and vulnerable to attack by insects and disease. (Certain forms of nitrogenous fertilizers under certain conditions, are also connected intimately with what might be termed derangements of the digestive system of citrus trees.) The action of this element tends to prolong growth and to delay fruition and maturity, and generally to develop the vegetative functions at the expense of those concerned in fruit development or reproduction.

*Phosphoric acid* is intimately concerned in the most vital functions of cell life and reproduction. In the early life of the young plant it greatly stimulates root production. If present in excess it tends to force maturity and the reproductive functions of the tree or premature fruit bearing. It is supposed to be concerned also in the proper balancing of the flavor of the fruit.

*Potash* is in some way connected with the elaboration of starch, sugar and cellulose, to the efficient production of which by the plant cells its presence is vital. Yet according to recent experimental results on cane sugar, it does not seem possible by this means to increase the percentage of sugar in the cane juice. It is also probably responsible for the production of certain organic acids concerned in the flavor of fruits and vegetables. It tends to stiffen the straw of grains, and to harden the vegetative part generally of other plants and trees; produces better carrying qualities in marketable products, and it increases the ability of the plant or tree to resist disease. It possesses a regulatory action on the blooming and fruit-setting of fruit trees, and influences the color of blossoms. Like nitrogen, it tends to prolong growth and delay maturity.

*Commercial fertilizers*, in the commonly accepted sense of the term, are essentially a product of our modern agricultural system. He who refuses to avail himself of the power thus placed in his hands, intelligently utilizing the same to restore, maintain, or increase the productive power of the soil; and thereby raise larger, better and more profitable crops, is equally standing in his own light with the man who refuses to profit by the work of the plant-breeding specialist, or the ingenious development of modern agricultural machinery. In this connection, it may be interesting as well as surprising to you to learn that Florida alone, in the year 1914, consumed 240,812 tons of fertilizers and fertilizer materials, valued approximately at six and a quarter million dollars, and

the growers paid into the State during this same period an inspection tax, in the form of stamps, to the amount of \$80,-203.00.

In accordance with the demands of modern agriculture, fertilizers—other than the home supplies of farm manure, crop residues and legume cultivation—are manufactured from nitrate soda, sulphate ammonia, cyanamid (atmospheric nitrogen), dried blood, blood and bone, tankage, dried meat, goat manure, wool waste, hair, leather, bird guano, ground fish, acidulated fish, linseed meal, cotton seed meal, raw bone meal, steamed bone flour, hoof meal, castor pomace, bone black, ground tobacco stems, acid phosphate, sulphate potash—known as high-grade sulphate and double manure salts—nitrate potash, muriate potash, sylvinit and kainit. These, and other materials, whose names are almost legion, form the raw materials flowing in a never-ending stream to the modern fertilizer factory, emerging finally in the many brands of scientifically compounded "fertilizers" prepared for use on every kind of crop known to modern agriculture, and suited to the needs of every class of soil.

In normal times the one source of *potash* that stands out above all others is the inexhaustible deposits of potash salts in North Germany, which practically completely dominates the world's supply of that element. Unfortunately, the present situation in Europe has, temporarily at least, and possibly for some time to come, cut off that supply, and we are face to face with a problem in fertilizing that

may become in the not distant future very difficult to solve. *Previous* to the discovery and mining of the German deposits, potash was derived almost entirely from wood ashes, with small amounts produced by the Scotch "Kelp" industry. These sources are still open to a limited extent, although quite insufficient to meet the demands of our modern agriculture. During the past few years strenuous efforts have been made in this country to locate sources of potash similar to the Strassfurt beds and otherwise, and development has been begun on lake deposits in Southern California, and of the "Kelp" off the coast of the same State, the promoters of which claim them to be sufficient to supply a considerable amount of the material. However, with the probable end of the present deadlock in the near future, and the immense deposits of the Strassfurt mines again a producing factor, it does not seem likely that capital will be keen on rushing in to fill a gap from sources of doubtful practicability financially, and run the risk of being unable to meet foreign competition at the close of the war. Such being the case, it is up to the grower to make the best use of the potash supplies already locked up in the soil. As long as the supply of his local fertilizer manufacturer holds out, he is probably in no serious need, but it is now even more essential than ever to maintain the ammonia and phosphoric acid in the soil, thereby aiding nature in her efforts to make available for plant use the otherwise unavailable stores of potash, and those who are fortunate enough to be able to secure hardwood ashes and tobacco

stems will do well to make the best use of them.

Such questions as how much fertilizer to use, when to use it, and how to use it, are best answered by field tests conducted on the home grove and farm, although results and advice concerning similar work carried out at the Experimental Stations and elsewhere are always useful, and are cheerfully given to the grower for the asking. However, the final answer to many questions must be determined by the grower on his own ground. Nor is it necessarily a difficult matter in most cases to obtain really practical results. Haphazard trials frequently reveal new facts, but are seldom of value to the man who makes them, because he fails to reason and therefore to recognize their significance. The true scientist experiments with a definite object in view, and deductions are made from the results recorded, with the object of proving or disproving certain facts or theories.

In seeking to increase the productivity of the soil there are two stages to be considered: First, the correcting of some chemical or physical condition; second, the maintenance of normal conditions after they have once been established. Needless to say that both are to be aimed at.

In conducting field tests or experiments two systems are mainly used:

First. A certain yield per acre is assumed, and sufficient fertilizer added to produce this, having of course due regard for the other factors limiting fertility.

Second. An arbitrary formula is chosen as a starting point, and plats laid out with different amounts, omitting or doubling each element in turn.

By such means, if careful records are kept, and no disturbing factor enters to upset the results, it is possible to form a fairly accurate idea of what a particular soil requires. In interpreting such results there are frequently other factors to be considered besides the mere application of a certain amount of fertilizer of a certain formula. Among such are the *materials* used and the methods of their application, method of cultivation, mulching, etc., as well as the question of the most profitable amount to apply. The neglect of due consideration of these points may mean the difference between success and failure to obtain the object in view. Above all it should be remembered that it is only under the best system of tillage, whereby the humus content of the soil is sustained, moisture duly regulated to the requirements of the crop, and the general maintenance of a soil environment favorable to vigorous root action, that *any* system of fertilizing will give profitable results.

## INSTRUCTIONS FOR BEGINNERS

Mrs. N. M. G. Prange, Tampa, Fla.

*Mr. President, Ladies and Gentlemen:*

To those of us who have been in Florida half a lifetime, there is nothing strange in the great interest shown by people in other sections as to her resources or in the rapidly increasing influx to her borders, for we know of the many advantages awaiting right development.

There are many new faces here today, and copy of our proceedings will go to many others who are also on the threshold of their new homes; so in token of our wish to extend a helping hand, I shall in great measure address these new associates.

Our land is sold at moderate prices. Good schools, good roads, good transportation facilities, local and long distance telephone as well as telegraph service, rural mail and express delivery, ice plants, meat market, and other "home comforts" are general except in some of the newest settlements.

The clearing of land is made easy by the use of dynamite and up-to-date machinery.

Much of the land needs drainage, for the water table should be at least two and a half or three feet below the surface. Usually a few ditches leading to a nearby creek will take away the surplus water, but where extensive drainage systems are needed these in many instances have been established before the sale of the land.

Irrigation is often necessary to obtain maximum results, but seldom to produce a fair crop. Whenever it is desired plenty of water is found right on the place—no expensive storage basins or miles of costly conduits.

#### FLORIDA SOILS

Our soil, except in limited areas, is easily and therefore cheaply tilled—we do not have the sticky sodden masses common in many agricultural sections.

Because of this open texture of the soil, plant roots are unhampered in their development and soil activities are more rapid and constant. This insures quicker growth.

All soil activities waste lime by forming soluble lime compounds which are carried off in the drainage waters. The never ceasing changes, the abundant rains, and the open soil of Florida have combined to make most of our land very lacking in basic matter. The state, however, has bountiful resources of practically pure carbonate of lime which can be supplied at nominal cost. The most natural and economical form is ground limestone which should be bought in bulk, car lots, minimum fifteen tons. Two or three tons per acre should be applied broadcast after plowing, and harrowed in.

Florida soil is also generally lacking in humus matter, though we have marked exceptions to this in the many

acres of muck lands. Humus is necessary to fertility, so the grower should give careful attention to this phase of soil management. The rapid growth of vegetation makes his task simple if gone about in the right way, but he must not follow the northern practice of turning under green vegetation.

#### PREPARING NEW LAND

In preparing new land, it is better to grow one crop at least of velvet beans or cowpeas before setting trees. Besides giving the land increased tilth and adding to the humus, it takes up certain compounds, common in our virgin soil, which are deleterious to the citrus family. The vines can be mowed, or they can be chopped with a disc harrow set to run shallow, and when dry either plowed or disced in. Whatever use is made of the land, each year should provide some crop—legume or grass, according to conditions—to be returned to the soil.

The foregoing is quite readily accepted by newcomers though many do not fully appreciate the value of drainage and lime, but the need of fertilizer is almost invariably regarded as an imposition.

The fact that a living can be eked out of richer soils has caused people in those sections to overlook the far greater gains possible through intelligent fertilization. However, this is gradually being recognized, and often the retired business man who comes to us for pleasure and profit as represented by a citrus grove, and who honestly believes "folks

don't have to fertilize back home" would find that farm life in his state is very different today from what it was when he was a boy.

However, there are few states in the Union that use so much fertilizer, use it so wisely, or make so much net profit per acre of cultivated land as we do here in Florida.

#### CAN HARDLY APPROXIMATE OUR CLIMATE

Only with glass, steam heat, and other expensive arrangements can the Northern grower even approximate our wonderful climate which gives to us twelve months of production instead of six months to produce and six to consume; but by attention to lime and humus content and with just a few dollars wisely invested in fertilizer we can duplicate the growing properties of his soil, however rich it may be.

We do not feel aggrieved at the Creator because He did not add a bountiful supply of plant food to the many other good things He gave us. Indeed, in many instances we find that commercial fertilizers grow far more desirable products than would come from naturally rich soil, for naturally grown fruit is inclined to be coarse and soft. Our produce has a fine, smooth texture most pleasing to the eye and carries well for hundred of miles.

We look upon fertilizer not as an expense but as an investment, the returns from proper fertilization being so definite as to preclude any other conclusion when viewed from a business standpoint.

However reluctant he may be to do so, the newcomer has to accept the fact that fertilizer must be used. He has had no experience in growing our crops,—likely he has never grown crops of any kind, and certainly is not skilled in the use of the different plant foods.

#### KNOWLEDGE AT COMMAND

With the right idea of knowing how to spend his money judiciously, he starts in to learn about fertilizer, but by far the greater number of these new settlers feel that they must commence at the very bottom and work out all of this information for themselves. They seem utterly to ignore the vast fund of practical knowledge that has been collected during the past forty years upon which they could draw and save many disappointments and financial losses.

Not that the mystery of plant life has been solved, or that any branch of crop production has been reduced to a cold science. We are still striving for betterment, but we have established a broad, solid foundation upon which to build,—something safe and sure so far as it goes, as is attested by our general prosperity.

Just as we have learned general methods of cultivation, so have we learned general methods of fertilization. Seasons vary—different degrees of heat or cold, and drouth or rainfall almost invariably bring the unexpected; therefore, it is the best average which is surest to give satisfactory results.

#### WHAT MOST "FILLER" REALLY IS

The newcomer will probably first notice the analysis of fertilizer and ask: "What's the rest of it, sand?" When he sees that including the moisture content the descriptive analysis accounts for less than thirty per cent. The idea of "filler" has a wonderful fascination for some people, but a little figuring on analyses will convince the most prejudiced that fertilizer materials contain a large per cent of matter more or less beneficial in soil building and crop production which is not recognized as of commercial value. It is these "carriers" that affect the practical value of different sources of plant food.

Potash is potash in whatever form, but we cannot use Muriate of Potash on our citrus trees because of its chlorine, and we get additional value from Low Grade Sulphate of Potash because of its magnesia content.

Phosphoric acid is ever the same, but it can be in such combinations as to be unavailable to the plant, or uncertainly available, or slowly but surely available, or in two different forms of immediate and absolute availability—one soluble in root excretions, and one soluble in the soil water.

"Ammonia" is our legal term for all forms of nitrogen. We not only have this plant food in three forms—nitrogen, ammonia, and nitrate—but we have a great variety of sources of both organic and inorganic origin, giving widely different effects on both plant and soil.

The novice learns that ammonia is

the growing power, phosphoric acid influences bloom and fruit development, and potash hardens the tissues; that nitrate of soda is quickly available, and sulphate of ammonia more slowly available, and probably has gathered a very exaggerated conception as to the value of "plenty of potash." With this he frequently feels prepared to make a formula for fertilizer that will meet his "special needs."

#### SPECIALIZATION THE SPIRIT OF THE AGE

It is a very popular saying that "a grower ought to know the needs of his crop better than anyone else." Perhaps he ought. In the good old days of our grandfather each home was expected to provide for the family's needs. The man was carpenter, blacksmith, etc., while the woman spun, wove, and knit. Gradually the economy, convenience, and effectiveness of people specializing in work became recognized.

Personally, I can't see why a grower ought to know how to construct a fertilizer formula any more than he ought to know how to make his harness or his plow. He knows the materials that go into the harness and the plow much more thoroughly than he knows fertilizer materials. In the one instance he can appreciate skilled workmanship, while in the other he can't, simply because he knows so little about fertilizer he doesn't realize what there is to know.

Now, understand I am not speaking of those of our growers who have studied the subject for years and really do know what their crops need. There

is nothing known about fertilizer or plant life but what any intelligent person can learn if he will give the matter sufficient time and attention, but buying land and setting some trees doesn't give this knowledge to anyone.

#### THE BEST KNOWLEDGE IS TO KNOW WHAT YOU DON'T KNOW

Most of us think it does, though, just as we reach this stage. I believe every one of the old growers present, some of whom have helped to create the best commercial formulas on the market today, will willingly own to having known (?) very much more about fertilizer the first two or three years of their grove experience than they ever have known since.

There comes to my mind a confession from one of the most prominent men in the state of having used a special mixture containing 16 per cent potash on one of his young groves. The trees were still behind later plantings though some five or six years had elapsed.

My worst "stunt" in manufacturing (?) fertilizer was an attempt to get ashes by mixing potash, superphosphate and lime. Needless to say, though the analysis figured right, the mixture wasn't ashes! But it came just as near to being ashes as the greater number of special mixtures come to being well balanced fertilizers from right sources and in right proportions to give maximum results for the money invested.

I repeat, this stage seems to be a natural period in our development and

it is with genuine fellow feeling that I strive to help people pass on and beyond it just as I was helped some years ago.

#### ESSENTIALS OF A GOOD FERTILIZER

What are the essentials of good fertilizer? First of all, the plant food must be derived from right sources; second, it must be well balanced as to percentage of ammonia, phosphoric acid and potash; third, the ammoniates must be proportioned to give steady growth with minimum waste; and fourth, these different ingredients must be put together right—some materials perhaps not allowed to come in contact with each other until mixed with certain other materials—and all ground to make a perfect combination, not a mere mixing. And with all, due care given to secure good physical condition—lumpy fertilizer does not spread well.

#### SOURCES

The citrus tree is very sensitive to the effects of different sources of plant food. The several materials carrying phosphoric acid are all congenial, the grower's one necessary precaution being as to availability; but the ammonia must in great measure be derived from chemicals, an excess of organic ammoniates tending to diseased trees and coarse, rough fruit; and the potash must be free from chlorine content.

#### ANALYSIS

Experience has taught us that the young tree uses plenty of ammonia to

good advantage and about an equal percentage of potash, but that excessive potash will so harden the tissue as to restrict proper development. A fertilizer carrying

5% Ammonia,

6% Available Phosphoric Acid, and

5% Potash

has been found especially desirable for a growing formula.

Older trees should continue to have a growing formula for spring application, but need less ammonia and more potash in summer and fall. Fruit cannot develop the fine, firm tissue so essential if it is to find an appreciative buyer in a far off market without this goodly potash content. A formula carrying

4% Ammonia,

6% Available Phosphoric Acid, and

13% Potash

is good for summer application to develop the fruit and bring out good growth of branch, this new wood being the foundation for next season's fruiting; and one carrying

3% Ammonia,

6% Available Phosphoric Acid, and

10% Potash

for fall, gives the trees materials from which to build up their general vitality after the heavy drain of the matured crop.

Without doubt these analyses show rather more potash than is actually needed to get right results, but they have been generally accepted by both growers and manufacturers.

### PROPORTIONING

One source each of phosphoric acid and potash is sufficient so far as economy is concerned, for phosphoric acid does not leach away to any extent, and neither does potash up to a certain soil content, after which one form of potash will leach about as readily as another, hence there is nothing to be gained in diversification. But when we consider that practically all available ammonia is subject to leaching, the proportioning of ammoniates in a growing formula to insure a steady supply of nitrate with a minimum loss is a question of vast importance and the key to the difference in field work of formulas of the same analysis and ingredients.

### JUDGMENT IN THE USE OF NITRATES

There should be enough nitrate to supply the needs of the plant until the sulphate of ammonia comes into availability, and enough sulphate of ammonia to last until the tankage or other organic matter has been reduced to nitrate form. The slower ammoniates do not become available all at once, so if the proportioning is right there is very little loss. If, however, there is too great a proportion of nitrates a large part is likely to leach away, leaving an insufficient supply for the later growth, for, remember, we have only a definite amount of ammonia in the formula as indicated by the analysis. On the other hand, if we have too little nitrate there is a stunting period at first and a period later, perhaps of waste or perhaps of over growth. The

same unbalanced condition occurs by the use of too small or too great proportion of the slower ammoniates. The point is to have food for the trees when they need it and just as little as possible in a form subject to waste.

### MIXING

The subject of mixing is altogether too broad to be covered at this time, and besides I would feel very diffident about attempting to handle it. I have studied fertilizer enough to appreciate the many problems that arise, but not enough to be competent to mix materials to get best results from the money expended.

### THE GROWER IS THEORETICAL

Did it ever occur to you how many factors there are in crop production, and how difficult it is for the grower to see to just what extent his results are governed by the fertilizer applied? Very often he forms conclusions based on his field work that are entirely at variance with the findings of carefully trained scientific men working under controlled conditions. Why? Because in the field, results may be controlled by factors unnoticed by him. There is much said about theory and practice in farming, but when dealing with basic principles, it is the grower and not the scientist who is theoretical.

It is not at all unusual to have such good condition of the soil and favorable climatic influences as to produce a fine crop with very poor fertilization; neither is it unusual especially where people have been experimenting with

all sorts of mixtures, to have such abnormal soil conditions as to cause a most abnormal fertilizer to give excellent results; and it is equally true that poor soil management and unfavorable climatic conditions can bar success despite the best of fertilizer.

While we freely recognize that our best commercial formulas came from grove experimentation, like all good things, they are the few from the many. By far the greater number of mixtures made to meet special conditions are unbalanced and wasteful, and the "special conditions" which materialize are nearly always different from those anticipated.

Very often a grower helps us by his experiments to the detriment of his own bank account when the work of years is averaged up; but such a grower is first of all a student of plant life and counts money well invested when by its expenditure additional information has been gained.

#### A HARMLESS AMUSEMENT

If the novice can afford both the time and the money to test out the many facts he can learn far more easily from books and from people and enjoys doing so, it is, of course, a harmless and interesting amusement; but he is generally looking for financial profit and he certainly will come far nearer finding it if he adheres to established formulas.

#### VALUE OF GOOD AVERAGE

This has been recognized by many, for a large number of the finest and

most profitable groves in the state have never had anything in the way of plant food but standard commercial formulas.

A good fertilizer is one that will produce good crops under varying conditions. We cannot foresee the weather, so the best average means the greatest general success.

A good system of fertilization is one that can be followed year after year, giving to the trees a constantly increasing bearing surface and heavy yields of fancy fruit.

I say good fertilization will do this, but with the understanding that other influences are reasonably favorable. As mentioned before, fertilizer, though a very important factor, can be outweighed by soil management and climatic conditions, to say nothing of insect and disease troubles.

#### SOIL ACIDITY

It is only in late years that we have given soil conditions any particular attention. Soil activities are very intricate and our time today is too limited even to touch upon them outside one phase of the action of fertilizer materials which predominates in the general interest at the present time; that is, tendency to soil acidity.

This tendency is greatly magnified. Sulphate of ammonia and sulphate of potash have the greatest acid tendency of all chemical sources of plant food, yet ten cents worth of lime, counting lime worth four dollars per ton laid down at your home station, will satisfy

all the acidity left by one per cent of plant food from either of these materials. Therefore, it is easy to see that there is no financial profit either in running the chances of loss by leaching or of paying for frequent applications of nitrate of soda to take the place of sulphate of ammonia or to substitute nitrate of potash for sulphate of potash.

One very mistaken conception as to acid tendency is the belief that acid-treated phosphates tend to acidity here in Florida. It is true they have this tendency in soils where there is a natural potash content, but here in Florida conditions are different. If we had this natural potash we could well afford the acidity, for, for every four cents worth of lime to correct it, we would receive one dollar and ten cents worth of potash, reckoning the potash at the prices ruling before the European war so increased its market value.

#### DON'T WORRY ABOUT "ACID"

All fertilizer materials tend to acidity or alkalinity according to whether the tree uses the base or the acid radicle. In the nitrates and phosphates the acid element is used thus the tendency is toward alkalinity; while in sulphate of ammonia and the different potashes the base is used, leaving the acid radicle to hunt other bases. Lime is the best of all bases for agricultural soil.

Acids are essential to plant life, both directly as food and indirectly in breaking down soil compounds, but they must be neutralized or the friendly soil organisms cannot multiply and prosper.

Use plenty of lime, choose the fertilizer materials giving best direct results and waste no time worrying about "acid" if you want to get the best results for the least money, for you can buy lime cheaper in car lots than in fertilizer.

We sometimes hear of young trees not doing well even though the land is well drained, cleared properly, and thoroughly limed. This more often than not is due to ill setting. The trees are set too low or the roots are not properly spread; again, severe scale infestation takes place. These things must be corrected before right results are obtained however much or however good fertilizer may be used.

#### ADVERSE FACTORS

In bearing groves, maximum crops cannot be expected if heavy rains occur frequently through the blooming period to wash the pollen from the blossoms, and fancy fruit will not be produced if the tree is affected with melanose or scab, or if there is heavy infestation of whitefly, scale, or rust mite. None of these troubles are in any way connected with fertilization.

As in every other business, there is no one decisive factor in citrus growing. "Eternal vigilance" is the price of success, but where intelligent effort is put forth the citrus tree responds most generously, and to anyone hesitating before the many problems confronting him we point out with pride our flourishing groves and happy, prosperous homes and say: "Come ye and do likewise."

## DISCUSSION

Mr. Warner: May I ask the question of Mrs. Prange in regard to the application of lime; when it should be put on.

Mrs. Prange: Put it on just as soon as you can, unless you have just put on an application of fertilizer.

Mr. Warner: I happened to apply lime just after a severe drought and it seemed to me it did harm for the time being. It was ground limestone. There seemed to be other instances along the same line. But there may have been other causes.

Mrs. Prange: I would say the harm must have come from some other cause. Another form of lime might have a tendency to burn, but ground limestone is harmless in application.

Mr. Soar: I would like to ask whether you believe acids will be formed in the soil by turning under green matter in the winter time.

Mrs. Prange: The colder the weather and the lighter the nature of the soil, the less harm there will be in turning under green vegetation, but although we can do that many times, just the same as we can eat very indigestible food many times and suffer no harm from it, it is likely to do a great deal of harm.

I have given the matter a good deal of attention, just as I have the action of superphosphate on the Florida soil, and I have taken up the matter with the Chief of the Bureau of Soils, who confirms my position. I believe that the

reason green vegetables is so likely to do harm in Florida (we know it is good in the North) is that we probably have a different soil flora here in Florida, the same as we have a different surface flora, and the different forms of bacteria and fungi undoubtedly break down these vegetable compounds in a different way. If you want to have me explain what this difference is, I will say right now, I don't know.

Mr. \_\_\_\_\_: I would like to ask the quantity of lime rock that should be applied on the basis of per acre or per tree.

Mrs. Prange: I should say two or three tons, as a general recommendation, per acre. I say per acre because you have to apply broadcast in order to get proper results. Lighter soils need rather less lime than heavier soils. It is not economy to buy lime except in car lots. When you consider the difference in the cost of lime in car lots f. o. b., and the price in sacks, it is more economical for you to use some four or five tons per acre in a small grove, than to get just exactly what you think you need. In our Florida practice of fertilization, you will lose very nearly 1,000 pounds of lime per acre from your grove each year.

Use lime as you would oil your machinery. You would not neglect putting oil on your machinery.

Mr. Hume: In this same connection, we have another paper from Mr. Wood, of Tampa. This paper is at the hotel and it will, of course, be printed.

# Human Resources in Horticulture

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L. H. Bailey, Ithaca, N. Y.

*Mr. President, Ladies and Gentlemen:*

It is a great responsibility that one feels in speaking to an audience on horticultural matters when one has little personal knowledge of the region; and particularly after an introduction which leads the audience to expect much. It is some support for a speaker, however, to have his program and his subject laid out for him, as I read in the papers that I am to speak on "The Twentieth Century Horticulturist." If I were to take this for my theme before this society, remembering the men and women who have made the progress in Florida horticulture, I should say, "Behold! here is the exhibit."

I prefer to speak on "The Human Resources in Horticulture," rather than on the products of horticulture as ordinarily understood. These human resources are much the same in all parts of the country, whereas the crop products may differ remarkably as between Florida and New York and the Great West. In approaching this subject, I am not thinking particularly of the training of children or of any preaching on character, although we all recognize the refining and restraining influence of fruits and flowers on the ideals of good living. I shall assume the character-building, the results of home training and of horticultural work, on which I build my theme.

While we all recognize the great influence of association with growing plants, it is not necessary for us to assume that horticulture is the only occupation that has important training value on the young. All occupations have their influence, particularly when the young are brought up in the atmosphere of the daily work. The natural products of the earth ought to have much influence in training character and in directing the mental processes. I like to think of an oak tree or of a citrus tree as a moral object, because it lives its own life properly and regularly and fulfills its destiny.

Now I am thinking of some of the larger human relations and also of some of the attitudes that our horticulturists should assume, to aid in the development of human affairs. The horticultural and agricultural occupations are organizing their affairs in a large way and in very close relation with many large public processes. These occupations are underlying, and they have not only business and commercial significance but important relations to social, educational, political and other public affairs.

## I THE ENLARGED VISION

My first suggestion is that the horticulture of Florida enlarges the national vision. Consider the continental extent of our country—the distance from east to

west and from north to south. Consider what a great breadth of interest is bequeathed to us, touching two great oceans, bringing us into contact with many peoples, giving us a large view of affairs. On the Atlantic seaboard, one is interested in the people and the affairs of Europe. On the Pacific coast, one has a feeling with China, Japan and the islands of the South Seas. Along the St. Lawrence, one recognizes the close touch with the Canadian people. In the southwest, one thinks of Mexico. And here in Florida, I feel the contact with Cuba and the riches of the West Indies. All these relations give us relations to world affairs in a large way and relieve us of national narrowness.

And now we can understand why the smaller peoples want possessions beyond the seas and why they ought to have them if they desire them. Even though these possessions may not be commercially important or even self-sustaining, they nevertheless allow the national life to expand to express itself. The peoples are enabled thereby to have contact with world problems. Holland has her islands in the East Indies and the West Indies; little Denmark has her possessions beyond the seas; Belgium has lands in the heart of Africa. The colonial possessions of little countries give an opportunity for overflow, the sense of proportion and also of conquest and dominion. You have heard it said that these possessions may not pay their cost and yet you know how tenaciously the people hold to them. They stimulate the imagination and enable the national genius to find expression. So long as these possessions or dependencies

can be secured justly and can be held righteously, they may be of great advantage to the peoples to whom they are attached.

In the great interior parts of the country, there is likely to be developed distinctively American points of view. Of late we have heard much of the "Iowa idea" in politics, of the political and social movements in Wisconsin, and we know about what attitude the interior States will take on certain national and international questions. This combination of interior country with seaboards provides a very productive experience for any people. It is a resource, also, for a people to have within its boundary a great variety and wealth of scenery. It has national value. I think the American point of view is influenced considerably by the scenery amidst which the people dwell. The vast mountain ranges, the great rivers, the plains stretching to the horizon, the wealth of forest, all contribute to form our national opinion. It is well for us as a people to have the Yellowstone, the Yosemite, the Grand Canyon, the great national forests and reservations. Such background reservations should be in many parts of the country so that all the people may have the sense of proprietorship. I am therefore interested in the nationalization of parts of the Appalachian regions, of the White Mountains, and the setting aside of bird refuges and other reservations. The national life is projected from mountain top to mountain top, from plain to plain, and from shore to shore.

It is also well for the people to have touch with great variety and extent of the

natural products of the earth. I think that to the horticultural products, rather than to other kinds of produce, we owe a peculiar kind of richness in our national experience. These products are of infinite variety and they are good to handle and to look upon. We may derive a distinct educational value from the kind and variety of the produce that we handle as a people. As an American, I am thankful that Florida has allowed us access to the tropics. This access broadens our experience, and it is more worth while to live in New York because Florida is a part of the Union. The tropical and sub-tropical productions that Florida has contributed to our experience is much in my mind at present, because I am engaged in the compilation of a thesaurus of cultivated plants and many species would not be included were it not for Florida.

If we can picture to ourselves the Union without Florida, we can readily understand how our experience and our national vision would have been restricted. Florida was not one of the thirteen original States. It has little history of the Revolutionary Period, as we ordinarily conceive of that history. If the land had not been purchased from Spain and this peninsula had been a foreign country, we can imagine the barriers that would have been put up between us and the tropics, and how much less close would have been our commercial and sentimental connection with them.

## II. THE STATE POLITY

The great horticultural questions are not personal and private problems alone. The State has its own entity and its own

life, made up of the combined interests of the inhabitants. It acts as a unit on the great questions that affect all the people. Individuals now begin to approach their personal problems with due regard to their effect on the public welfare; and the people are acting together on questions that need community action rather than that each person shall try to answer his own questions solely for himself. One of the marked characteristics of the time is the development of what we know as the social feeling.

No longer is it allowable for any person to harbor a disease or a pest about his premises, either in his cattle or in his crops, that may become a damage or a menace to his neighbors. There is public interest in any disease or difficulty that may be transferred in any way from one person or one property to another. So completely does society recognize this principle that many of the pests and diseases are specially controlled by law.

The quarantine for human diseases is of long standing and its justice is well recognized. We now require quarantine not only to guard the health of human beings but also to stay diseases of animals, the incursions and distribution of insects and fungous diseases and various pests, and to control the purity of streams and of bodies of water. We even begin to regulate advertising signs along the highways. In the peach-growing regions, it is now recognized as proper for the State to control the spread of peach yellows. Similar legislation is so well understood as to be practically beyond dispute.

We now have Federal crop-and-pest control. States also have laws for the

control of these difficulties and invasions. However perfectly we may develop our means of fighting insects and other pests on our own establishments, nevertheless we cannot control them in any large area until society in its corporate capacity comes to the rescue. In its political right, society must take the matter in hand and put together the machinery to safeguard the animals and the plants that we raise.

There are some persons who look to Federal control as the only means of handling such questions. Sometimes we regret that within the confines of any State there are such diverse conditions and we feel that the State boundaries should be the rivers or the mountain chains or other natural barriers. It would look well on the map no doubt, if one State were all prairie and another all mountains, and another all plains, but in practice it is well to have diverse conditions within one State, because it brings many problems together, and enables citizens to look at many sides of a question, increases the interest, and results in a welding process. I am glad that some rivers are within two States and others within one State, for we are thereby able to secure different kinds of control. This variety expresses itself not only in products but also in the character of the people. One of the finest results of American civilization is that all these various interests can be so readily combined and each community is able to act as a unit within the common interest.

There is great helpfulness in this common action to every one concerned. Sooner or later every section of the State will need the help of the other sections, for in time every one will undoubtedly be in-

vaded by some pest or overtaken by some special difficulty. Any section of a commonwealth should be ready to respond in the way of public action when any other section is in special trouble.

Much has been said about the necessity of maintaining the rights of the different States. One of the ways to secure this right is to be worthy of it—to take such action as will make it unnecessary for the Federal government to interfere or to intervene. This means that the State must meet its own problems so effectively that outside compulsory agencies will be reduced to the minimum. It also means that every State will co-operate actively with the Federal government for the purpose of controlling pests and difficulties that are likely to become a menace. By such a spirit of co-operation, we are able to maintain the separate experiences of the different States at the same time that we all join for the common good.

We are to look upon these forty-eight States as forty-eight experiment stations in legislative, economic, educational, social and legal problems. It would be a pity to have their experiments interfered with, even for the sake of uniformity. However, there are certain disadvantages that are common to all, and which must be met by united action. The question for any State to handle is this: Who is to handle this particular pest or disease? Shall it be ourselves or shall it be some one else?

We also owe a responsibility to other persons, to see that we do not distribute diseases and pests. Our responsibility to the market rests not alone in providing products that are true to name and are

full measure, but also to protect the buyer from injurious insects and serious plant and animal diseases; for many of the buyers of the products of one State are themselves growers of other products in other States.

Undoubtedly the best social results are to come not so much from organizing for the purpose of meeting general social problems and to undertake "reforms," as to attack and to solve the actual practical difficulties as they arise. Whenever any community or State works effectively for the purpose of eliminating a crop pest, it receives thereby good schooling and it is easier to organize for more abstract problems.

### III. COMMUNITY ACTION IN EDUCATION

The States have already come to act as units in respect to agricultural and horticultural education. There is no national scheme of education in the United States. We have left the educational developments to be worked out very largely by the different commonwealths. We have, to be sure, a Commissioner of Education, but this is not a centralized organization controlling the educational policies of the whole country. We really have forty-eight kinds of educational policy or educational administration. Amongst them all, we ought to work out the best results for all sorts and conditions of men. Possibly we could more quickly secure standardized results and more administrative "efficiency" if our educational policies were all administered from a common center; but we should lose in experience, in adaptation of means to ends,

and in allowing the people themselves to partake in their own way.

But at this moment, I am interested in the fact that the States have come to act as units in education by means of agriculture, each State making a somewhat different contribution and in its own way as its needs seem to require. They are maintaining this education in good part by State funds. This education is maintained for the purpose of developing the economic resources of the State and chiefly, as I think of it, to the end that they may develop a better people on the land. It is not enough to train for mere efficiency and skill in the different professions, trades and occupations, but we must use all these agencies as the means of better personal development.

Education by means of agriculture and horticulture does not replace or supplant other studies. It allows the persons engaged in these great occupations to have the privileges that naturally are theirs and the opportunity for their own best growth. Greek is not less important because we have more agriculture; it ought to be more important. History, the classics, mathematics and all the other conventional and traditional subjects are not less important but rather more important; as we can see that all the people are to be educated, so should there be more means of training and more avenues for usefulness. Education by means of agriculture has special importance because the agricultural pursuits are at the basis of our economic structure. We are giving these industrial pursuits their proper place when we allow the educational agencies growing out of them to secure their full devel-

opment, being on a parity with other subjects.

Florida has organized its educational efforts in these subjects, maintaining at public expense instruction and investigation. You have studied the situation broadly and have arrived at a state program. I congratulate you on the success that you are attaining. The maintenance of popular education by means of public funds has vast democratic results: All arts, occupations, professions and crafts are of value to the State and worthy of public encouragement. All people are really equal before the law and before society so far as they have ability. It is increasingly our responsibility to allow them freedom to partake politically and socially and to express themselves to their best. Thus shall we have no peasantry in the United States.

This effort of the States to educate the farmer by means of his own business and affairs gives him standing. It makes his occupation more worth the while. He is recognized. The better it is supported, other things being equal, the more far-reaching will be the political results.

Not only is it an obligation of the State to support educational institutions and to disseminate information, but also to discover the causes and the reasons why.

We must have knowledge before we can act wisely. Now, it is not necessary that all this knowledge should be immediately applicable. No one really knows what knowledge will be most useful in time to come; and a good body of knowledge must be secured before practical applications can be made here and there as necessities arise. All investigation ought

to look toward a solution, but this solution may not be immediate, and it may not all turn directly into so-called practical results. You could not have arrived so quickly at the cause of citrus canker if there had been no investigation along this and similar lines until the canker appeared. It would have taken years to have produced the specialists, to have developed the methods and arrived at an understanding of all the physiological questions involved.

We must have as a reserve not only the knowledge of facts but also a body of trained workers so that when the problems arise we shall be ready at once to attack them. These problems cannot be attacked by public speaking, by legislative enactment, or by any kind of popular propaganda. They can be attacked only by highly trained persons who have full knowledge of the subject in hand.

I do not state that all educational and investigational work shall be maintained by the State. There is need of the private endowment not only because there is work enough for all, but because we need the check of one type of organization on another. But the State on its own account cannot afford to lose primacy in these matters.

#### IV. THE QUESTION OF INDIVIDUALITY.

Thus far I have been speaking of the great importance of developing co-operative action, but I wish also to emphasize the other side of the question; and this is the importance of maintaining the individuality and the independence of the man on the land.

How to develop in the people an effective social feeling and at the same time to maintain the strength of personality and individuality, is the fundamental problem in civilization. It is necessary to the stability of any people that a large proportion of them own productive property from which they make a living and which renders them relatively independent of organization control, close group action and temporary enthusiasms. The man on the land stands on his own feet and not on any one's else feet. He is the ultimate individualist, because his situation represents a direct contact with the earth and because his business is his own.

Florida is strongly individualized in another way. Persons have come here to settle from many other states and countries, all with their own ideas formed in advance. These ideas of individualism and separateness very largely dominate your population. The same is true in southern California. In the end, this should give you a very high and effective kind of independent development, although it may hinder for a time. One of the disadvantages is expressed at the present time in your horticulture, if I see it aright. You have brought your ideas as to what kinds of plants ought to grow in Florida and you have tried to grow them with more or less unsatisfactory results. I am impressed with the fact that you have not yet arrived at your opportunities in Florida, horticulturally. I am not speaking of citrus fruits but am thinking of horticulture in the large sense, of the great variety of plants that will thrive well in this state when introduced and given the proper care. You have scarcely

more than begun to develop the possibilities of ornamental work with plants and have not yet reached the limits of food plants that may be well grown in the state. About two generations are required for persons to forget the old conditions and to adapt themselves completely to a new country and to make the most of its natural resources. In California and other semi-arid parts, it required a long time to give up, at least in part, the idea of smoothly shaven green lawns and to develop gardening on the basis of the old Spanish method, with the appropriation of the kind of landscape that is a part of the country itself.

One does not hear much now-a-days about the disastrous droughts of Nebraska and adjacent regions. My older auditors will know that the droughts of that region were supposed to be insurmountable and that eventually persons could not undertake farming there successfully. People were trying to adapt their eastern ideas to Nebraska conditions, and naturally they failed of the best results. Now that they have determined how best to adapt the crop scheme, tillage and the other operations to the natural conditions, they are making good progress.

So I think that you have not yet come in Florida to the point of developing your plant resources to their fullest possibilities. You are in an epoch of vast enterprises. Relatively small areas will be more worth while as time goes on. You will also come to a new realization of the satisfaction in personal work with plants. It is the kind of appreciation we have for a good building rather than for a city.

You have certain serious difficulties

with your crops. I know of no region in which there is not some damaging menace and the incursions of unusual pests. You are not single in this matter. All these difficulties become the means of developing strong men and women if the difficulties are conquered. You will conquer them or you will lie down. Just now you have the citrus canker. I have been much impressed with the way in which you have risen to the conflict and are determined to master the difficulty. Undoubtedly it will have much effect in stimulating the element of personal activity in your horticulture.

Farming has never been easy. While we expect that the physical labor will be relatively reduced, we hope that it will never be a life of ease in the general acceptance of that term. Its results must depend upon personal industry and application and not in any slighting or short-cut process. In this time, the farmer has at his command the tools of science, the weapons of public machinery whereby he is able to attack and to conquer his difficulties as they come; or if he cannot conquer them all, he at least has the courage to make the effort and the confidence that in the end he will succeed. We are relieving him of fatalism.

Every farm is an experiment station and the farmer is the director of it. If he is somewhat conservative, it must be remembered that he handles his own business, is responsible for it, and must take his own risks. Moreover, he naturally thinks in terms of experience and this experience is mostly on his own place. He hesitates to adopt practices which may be ever so good at a distance or under other

conditions. This is really the safety of the whole situation. Out of this situation we are to develop a very resourceful part of our people. As time goes on and as civilization becomes more and more complex, we shall be in greater need of the individual man standing in his own place and managing his enterprise, as a natural offset and check to the concentrated and impersonal movements.

Heretofore we have maintained a more or less destructive attitude toward the earth, denuded it of forests, mined it of phosphates, boxed the trees for turpentine, nearly annihilated the bison, robbed the soil of its fertility, polluted the streams. We now come to the epoch of the constructive process. We are not only to maintain the surface of the earth but to develop it to the end that we may regularly produce all the supplies that mankind is to need from the land. The needful supplies are increasing in quantity and variety. We can no longer be merely explorers or miners, searching for booty. This is really at the bottom of the new attitude toward farming and it is making the farmer a more responsible man.

The earth comes from the hand of the Creator and in a very real way the farmer is the keeper of it. He owes responsibility to the Creator and also to his fellows now and to come. He is therefore engaged in a quasi-public business. I should be sorry if it were necessary to regulate him by law as we try to regulate corporations, but I hope that his sense of responsibility will be quickened and that society will help him by removing all the handicaps that are not naturally a part of his business and will make it relatively

easy for him to till his lands and to market his produce. We speak much about the marginal man, the one who is on the edge and who does not know how to take hold or to make good; but the man of our first concern should be the bottom man, for he is the one that stands between society and the sustenance from the planet.

I like to think, therefore, of the farmer

as an independent person standing on his own land, and yet developing a strong idealism as a contributing part to society in general. He will not secure the best results unless he goes at his work reverently, realizing his place in the process, and exercising a religious expression toward all his work.

# Committee Reports on Ornamentals

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Mrs. Marian A. McAdow, Punta Gorda, Fla.

*Mr. President, Ladies and Gentlemen:*

Surely I may call you that after the gracious honor the Society last night conferred upon me by making me their second vice-president, and by the warm and generous response they and those outside the Society have made to my call for aid in developing the natural resources the Great Father has hidden in the soil of Old Florida, to stimulate and develop in us His own godliness in searching for his most precious gift.

When I was made chairman of the Committee on Ornamentals, I assumed my responsibility with great satisfaction, because I recognized therein my sovereign power in being privileged to crack the whip and make the rest of the committee do the fancy acts — so I did not prepare a paper for this meeting, and not being an extemporaneous speaker, I am not able to talk what I might be able to

write, but my heart is so full of exactly what our good Dean Bailey so grandly expressed to you in his address last night. I need only say, don't forget the message he brought you; try to incorporate some part of it into everything you do for Florida, from this day forth. It takes drops of water to make the ocean, and your small part and mine shall mean a greater and more wonderful world to leave behind us.

While I left the other members of my committee to prepare papers to read before you, I brought with me from my own garden, seeds of various plants and flowers which I shall be glad to give anyone who asks for them.

Thanking you, dear friends, for your attention, and the Society for the distinctive honor it conferred on a woman by giving her one, so nearly the greatest it has to convey, I leave you.

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## ORNAMENTALS FOR WINTER

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Edith Louise Hubbard

*Mr. President, Ladies and Gentlemen:*

It was because of my unquenchable enthusiasm, conspicuous ignorance, persistent questions, and finally my statement that in all the records of the Society there

was no article dealing explicitly with winter ornamentals, that I was told to write this paper, in order that I might learn. I have not become an authority on the subject yet; on the other hand, I have not lost

my ardor, so it is with a strong and virile belief that I wish to call your attention to what I consider the greatest privilege of Florida's lovers of flowers and foliage—the opportunity to give her message of beauty, health and joy to the thousands who visit her every year.

All these winter visitors come here from the cold and weary north to be cheered and gladdened. Some are mere pleasure seekers, but many are earnestly seeking health as well. That Floridians should ever deprive them of the State's greatest charms through carelessness or selfishness is a great shame. Yet how often people have said to me: "I went to Florida last winter, and I was so disappointed. They call it the land of flowers, yet I saw almost none, and nearly all the trees were as leafless as the ones I left behind me. Instead of flowers in the gardens, there were mostly shriveled leaves and mounds where tender plants were being protected. Really, I found it very depressing." They have my full sympathy, for I know how disappointed I always am when I come home and discover that the recently planted trees are deciduous and that an unsightly amount of effort is being devoted to making some sad, shivering plant of the tropics live through the winter, so that it can bloom in the summer when I am away.

Two very excellent traits in human nature cause the barren winter gardens. They are the love of old associations and the desire for discovery and adventure—only they are carried too far. All will acknowledge Florida's loveliness when her inhabitants learn to appreciate Florida for her best self and do

not try to make their homes duplicates of the ones they left at the North, nor poor imitations of the still distant tropics. Science is telling us more and more that plant life is sensitive to pain and discomfort very much as human beings are. Is it not, then, a cruel thing to take a helpless plant which can not run away, and put it in a soil and climate which it does not like, and try to make it do its little tricks of blooming and ripening fruit in spite of its homesick heart? How much better it would be to have happy healthy plants giving us their best the year around. These we could plant in such a way that passers-by may enjoy them. There should be unbroken spaces of lawn across which they can see to good advantage the well arranged borders or groups of trees and shrubs, placed so that the larger ones make a background for the smaller ones. Plants of contrasting types of foliage should be put together, for each will accentuate the other. Care also should be taken to keep inharmonious colors apart. The taller plants in the foreground should be of open growth or with tall trunks, so that they will give vistas of more distant plants, which is nature's way of framing her landscapes. Palms are excellent for this purpose. Vines or thick shrubs about the house can furnish the privacy and the air of mystery which makes a home of refinement seem desirable to the outsider. If, for summer, one must have plants which are not attractive in winter, they should be put in out-of-the-way places, where their bareness will not detract from the general aspect of living green; for if they are really gor-

geous summer bloomers, they will make themselves sufficiently conspicuous in their season. No one could hide a Royal Poinciana in full bloom.

In beautifying one's grounds, the great rule of decoration applies as truly as it does in placing the adornments on a building, or a piece of furniture. One must always decorate construction, and not construct decoration. Keeping this motto in mind one will be led to plant in such a way as to emphasize the realities and important features of one's place. The extent of the land can be indicated by hedges or banks of larger trees and shrubs; or, if it is a small yard, by a border of flower beds against the fence. The entrance should be emphasized by strong large trees or shrubs. A little gateway could have an arbor above it. A driveway may have an avenue of palms to show its importance. Turns in the driveway or path should be marked by some prominent trees or groups. The main entrance to the house should be made noticeable by some conspicuous arrangement of plants. Wherever dignity is desired, symmetrical effects are surest—like pairs of compact shrubs or avenues of trees of straight upward growth. Repetition always gives emphasis. For this reason the most impressive effects are gained by the use of many plants of one variety. However interesting to a botanist a place may be which has no two plants alike, it can not make as lasting an impression upon the eye of the average observer as one which has some special feature. For all these important positions, which are the frame

work about which other planting will grow, only vigorous hardy varieties should be chosen. Smaller plants or more distant backgrounds can be altered without leaving a distorted design.

Many of our most reliable plants are natives or so well known that they are not considered worth placing in prominent positions, yet to strangers they are quite as beautiful as many of the rare plants which we grow only with difficulty. It is not easy to find in all the world a more glorious tree than the magnolia *grandiflora*. Nor should we forget that our native pines make majestically picturesque specimens when given room to develop; or, if they have already reached maturity in crowded straightness, that their lofty trunks make splendid supports for the tallest climbing vines. Our beautiful cabbage palmettoes will grow in any soil and endure cold and even fire. The native cedar should not be overlooked, nor the gladsome wild plum, whose prodigality of bloom is as rapturous as a bird's song. Above all we must place the orange—commercialized it may be, yet still it has no rival as a winter-blooming tree. I have heard more praise given the sturdy Aggripina—that faithful little red rose which scarcely stopped blooming for the big freeze in 1895—than for any of the fashionable new varieties. Yet few people would take the trouble even to imagine what constant pleasure an ever-blooming hedge of these roses would give, nor how impressive it would be. Another rose which scarcely lets a day

pass without flowers, even in the worst cold, is the dainty "Daily Pink" or "Christmas Rose." The upright honeysuckle—*Lonicera fragrantissima*—is a modest shrub whose highly-scented flowers were not checked in the least by the big freeze. English violets also were faithful in that dark hour.

Unfortunately many people do not know which are hardy plants, nor which will bloom in winter. I have always found it very difficult to learn if any proposed addition to the garden has these important qualities. Usually there are ample descriptions of the growth and blossoms, but no mention of when they may be expected. In the hope that it may be a guide to someone who would need just such a thing, I have prepared a list of ornamentals suitable for winter effects. The trees, shrubs, and vines are each divided into four classes. First, those which are hardy, evergreen, and winter-blooming or bearing decorative fruit; second, those which are evergreen but not winter-blooming; third, those which are winter-blooming or of conspicuous foliage but tender, although not easily killed, recovering quickly if injured by frost; fourth, deciduous and hardy, but winter-blooming. This last class, so generally neglected, can be very useful where sunlight is needed during the winter, and shade in summer. There is also a list of hardy palms and cycads; another list of permanent bedding plants, perennials, bulbs, and scenic plants, many of which do well in partial shade; and a list of annuals, which, though more or less tender, will give a wealth of bloom during the aver-

age winter with a little care. The seeds should be planted in early October where they are to grow. Nasturtiums will bloom all winter with slight protection on frosty nights. The large apron I wore at the art students' league has helped more in saving nasturtiums than in painting masterpieces. October is also the time for sowing Italian rye grass on the lawn. Although not permanent nor sufficiently tough to withstand hard wear, it will make a brilliantly green lawn all winter if given water and a little fertilizer.

There is not space for me to give even short descriptions of the plants in these lists. Many are too well known to need explanation, and most of those less familiar can be found in articles appearing in previous records of the society. Of these I will mention particularly a paper by Mr. George A. Purdy in 1905; another by Mr. Schnabel in 1913 on vines; and four papers by Mr. Nehrling, the first in 1908 on bulbous and tuberous-rooted plants, one the following year on palms; another in 1910 on Chinese and Japanese evergreens, and the last in 1912 on bamboos.

Attractive homes should not be the exception, but the rule; for everyone in a community should take pride in the beauty of the place and feel it his privilege to do what he can to make it more lovely, even if that little is merely to let the roadside flowers bloom unmolested. A little child should be taught never to pick other people's flowers, and when he picks his own to gather them from the backside of the bushes, where they

will not be missed. Then he will not grow to be one of those people who, saying they love flowers, break a handful from the center of a fine cluster, and after sniffing the perfume, throw them away. I do not call that *love*; I call it license. Perhaps I have led you to suppose that I consider men the great offenders. Unfortunately it is usually members of the gentler sex who commit the worst atrocities. Is it not more often a woman who will stand talking to you while her restless fingers break and crush the leaves of your finest shrubs? And is it not also a woman who coquettishly nibbles a rose, or daintily pulls the petals one by one from an exquisite dahlia, while your heart quivers with the sacrilege of it? Most men feel clumsy and awkward before the delicacy of a flower, or their ever-present instinct of superior strength makes them gentle with so fragile and helpless a creation.

Let us learn truly to love and respect nature, and to share our happiness with others. We shall be amply rewarded, for our gardens will be more beautiful and our hearts richer. The spirit of the Giver of all good gifts will be ever in our work. God walked in the first garden—let us be sure He walks in ours.

## TREES—CLASS I

*Citrus aurantium*, Orange; *Quercus virens*, Live Oak; *Ilex Opaca*, Southern Holly; *I. cassine*, Dahoon; *I. vomitoria*; Cassena or Yaupon; *I. latifolia*, Japanese Holly; *Eriobotrya Japonica*, Loquat; *Cinnamomum Camphora*, Camphor; *C. Zey-*

*lanicum*, False Cinnamon; *C. Loureirii*; *C. pedunculatum*; *Arbutus Unedo*, European Strawberry Tree.

## TREES—CLASS II

*Magnolia grandiflora*; *M. glauca*, Sweet Bay; *Gordonia lasianthus*, Loblolly Bay; *Pinus palustris*, Yellow Pine; *Juniperus Barbadensis*, Native Cedar; *Podocarpus Japonica*; *P. Nageia*; *Thuya orientalis*, Arborvitae; *Cupressus Semperflorens*, Evergreen Cypress; *C. torulosa*; *C. Lusitanica*; *C. funebris*; *Ligustrum Japonicum*, Japanese Privet; *Quercus acuta*, *Q. cuspidata*; *Prunus Caroliniana*, Laurel Cherry; *Auracaria Bidwillii*; *A. Brasiliana*; *A. excelsa*; *Cunninghamia Sinensis*.

## TREES—CLASS III

*Grevillea robusta*, Australian Silk Oak; *Melaleuca leucadendron*, Cajeput Tree; *Bischofia Javanica*; *Eucalyptus robusta*, Broad-leaved Eucalyptus; *E. citriodora*, Lemon-scented Gum; *Cecropia palmata*.

## TREES—CLASS IV

*Magnolia yulam*; *M. stellata*; *M. Lennieri*; *M. Soulangeana*; *M. obovata*; *M. parviflora*; *M. Watsonii*, Chinese and Japanese Magnolias. *Prunus angustifolia*, Chickasaw plum; *P. umbellata*, Wild Plum; *Catalpa speciosa*, Catalpa; *Chionanthus virginica*, Fringe Tree.

## SHRUBS—CLASS I

*Camellia Japonica*; *C. reticulata*, *C. sasanqua*; *C. Thea*, Tea Shrub; *Lonicera fragrantissima*, Shrub Honeysuckle; *Citrus Japonica*, Kumquat; *Gardenia florida*, Cape Jasmine; *Osmanthus fragrans*, Sweet Olive; *O. Americanus*, Wild Olive;

*O. aquifolium*; *Michelia fuscata*, Banana Shrub; *Azalea Indica*, *Jasminum nudiflorum*; *J. humile*; *Photinia serrulata*; *Rhaphiolepsis Indica*; *R. ovata*; *Pittosporum Tobira*; *P. undulatum*; *P. eugenoides* "Taratā"; *P. phyllyraeoides*; *P. viridifolium*, Cape Pittosporum; *P. Revolutum*; *P. heterocyclo*, Myrtle-leaved P.; *Viburnum odoratissimum*; *V. Tinus* (Laurustinus); *Brunfelsia confertiflora*; *B. Lindeniana*; *Metrosideros lilacina*, Hort; *M. semperflorens*; *Callistemum rigidus*; *C. speciosus*; *C. lanceolatus*, Bottle-brush Shrubs; *Melaleuca hypericifolia*; *Nandina domestica*; *Phillyraea latifolia*; *Myrtus communis*, Old World Myrtle; *Elaeagnus macrophylla*; *E. pungens*; *E. Simonii*; *E. Friedericici*; *E. maculata*; *E. Simonii tricolor*; *E. aureo variegata*, Silver Shrubs; *Daphne odora* (*Indica*); *Daphnephllum macropodon*; *D. glaucescens*; *Sambucus Americana*, Elderberry; *Othera Japonica*.

## SHRUBS—CLASS II

*Pleroma macrantha*; *Nerium oleander* (many varieties); *Abelia grandiflora*; *A. rupestris*; *Ligustrum vulgare*, Privet; *L. Amurense*, Amoor River Privet; *Euonymus Japonicus*; *Ilex crenata*; *Thuya* "Rosedale Hybrid," Arborvitae; *Illicium Floridanum*; *I. religiosum*; *Psidium Cattleyanum*, Cattley Guava; *Acacia farnesiana*, Opopanax.

## SHRUBS—CLASS III

*Habrothamnus elegans*; *Aralia papyrifera*, Japanese Rice-paper Plant; *Rhodomyrtus tomentosus*, Little Mice; *Eranthemum pulchellum*; *Bauhinia alba*; *B. purpurea*; *Poinsettia pulcherima*; *Lantana camara*; *Mackaya bella*; *Myrtus Australis*

(*Eugenia Australis*); *Poinciana pulcherrima*, Bush Poinciana; *Datura Suaveolens*, Angel's Trumpets; *D. cornigera* (*Floripando*); *Cuphea micropetala*, Cigar Plant; *Eugenia uniflora* (*E. Michelii*), Surinam Cherry.

## SHRUBS—CLASS IV

*Weigelia rosea*

## VINES—CLASS I

*Gelsemium sempervirens*, Yellow Jessamine; *Lonicera sempervirens*, Woodbine; *L. Japonica*, Japanese Honeysuckle; *Smilax laurifolia*, Greenbriar; *Akebia quinata*, *Rosa laevigata*; *R. bracteata*; *Solanum jasminoides*, Pepper Vine; *S. Seaforthianum*; *S. Wendlandii*; *Bignonia crucigera* (*B. capreolata*), Cross Vine; *B. venusta*, Flame Vine; *Eleagnus reflexa*; *Trachelospermum jasminoides*, Rhyncospermum; *Lycium barbarum*; *Petraea volubilis*; *Quiscalus Indica*.

## VINES—CLASS II

*Hedra helix*, English Ivy; *Euonymous radicans*; *Ficus repens*, Climbing Rubber; *Bignonia Tweediana*; *B. speciosa* (*purpurea*).

## VINES—CLASS III

*Bougainvillea spectabilis* *Sanderiana*; *Allamanda Hendersonii*; *Spomea sidifolia*; *Tecoma capensis*; *Jasminum gracillimum*, Graceful Jasmine.

## HARDY PALMS

*Sabal Palmetto*; *S. Mexicana*; *S. Blackburniana*; *S. umbraculifera*; *Phoenix canariensis*; *P. sylvestris*; *P. dactylifera*; *P. reclinata*; *P. jarinifera*; *P. spinosa*; *P.*

*rupicola; P. Roebbelini; P. pumila; Cocos Australis; C. datil, C. eriospatha; C. Blumenavia; C. Yatai; C. bonnetti; Chamaerops humilis elegans; C. h. argentea; C. h. macrocarpa; C. h. aborescens; C. h. tomentosa; C. h. histrix; C. h. glauca; Raphidophyllum hystrix, Needle Palm; Washingtonia robusta; W. sonorae; W. filifera; Rapis flabelliformis; R. humilis; Acrocomia totai; Diplothemum campesiris; Livistonia Chinensis (Latania Bonica); L. Hoogendorpii; Trachiyarpus Fortunsi.*

#### SCENIC PLANTS, PERENNIALS AND BULBS

*Strelitzia reginae; S. Nicolai; Musa Zebrina; M. rosacea; Yuca Treculeana; Y. aloifolia, Spanish Bayonet; Y. filamentosa, Bear Grass; Y. gloriosa; Agave Americana; A. neglecta; Cycas revoluta; C. Siamensis; Zamia furfuracea; Z. pumila; Z. Floridana, Compte or Coontie;*

*Draceana indivisa; Moraea natalensis (irides), Natal Iris; Phorumim tenax, New Zealand Flax; Ph. tenax variegatum; Ph. tenax atropurpureum; Dasylirion acotrichum; D. glaucophyllum; D. quadrandulum; D. serratifolium; Aspidistra lirida; Ophiopagan Japuram; Alsophila Australis; Cibotium Schiedeii; Crenum giganteum; C. amobile; C. Asiaticum; Alocasia odora; Plumbago capensis; Bambusa argentea; B. disticha; B. Alphonse Karri, Hymenocallis caribaea, White Spider Lily, Roses, Violets.*

#### ANNUALS

Sweet alyssum, Petunia, Nasturtium, Ageratum, Stock, Candytuft, Cosmos, Mexican Marigold, Marigold, Mignonette, Salvia, Poppy, Pansy, Verbena, *Phlox Drummondii*, Sunflower, Eschscholtzia (California poppy), Cornflower (*Centaurea*).

## OUR ROSES

### Mrs. E. W. Berger

To anyone who has carefully observed conditions, it is very evident that the people of Florida have, up to this time, not fully availed themselves of the wonderful opportunities that this state offers for growing beautiful flowers and all sorts of ornamentals. Many native flowering plants and shrubs are of remarkable beauty and can be used effectively in the garden or for landscape purposes. Many cultivated annuals, perennials and shrubs, do so well in Florida that gardeners are beginning, more and

more, to realize the fine possibilities which these offer.

The lover of flowers here in Florida is, however, especially fortunate in being able to grow that "Queen of Flowers," the rose, in all its beauty and fragrance. For centuries the rose has been regarded as the peer of flowers and all will agree with Christina Rosetti when she sings:

"The lily has an air,  
And the snowdrop a grace,  
And the sweetpea a way,

And the heartsease a face—  
Yet there's nothing like a rose  
When she blows."

There is no part of the country where roses grow so magnificently as here in Florida. Nearly all the best ever-blooming varieties can be grown, and with care magnificent blooms can be had nearly every month in the year.

There is probably a variety of roses for every need: climbers for pillars, trellises, or porches; others like Louis Phillippe and Baby Rambler for borders, and still others for beds. Some recommend the rose as an individual plant, but with few exceptions we think it most satisfactory when we have all our roses in a garden by themselves.

We have had our successes and we have had our failures in growing roses, and this paper plans to tell of the methods we have followed and of a few conclusions we have reached.

#### LOCATION AND SOIL.

Our soil is high pine land with a coarse yellowish subsoil. The location is near a gentle slope so that the soil is well drained.

We have one row of about twenty-five bushes to the north of the house and about twenty feet from it, and another row of nine bushes along the south side and only about three feet from the house. We were advised, and ourselves believed, that the ones on the south side would not do so well, but they appear to be doing quite as well as the rest. It has been necessary, however, to water (and mulch) these roses very frequently as the ground on

the south side of the house becomes very dry. Recently we have started a rose garden with long rectangular beds that will accommodate two rows of plants, and we are planting at least four bushes of each variety.

#### PREPARATION OF THE SOIL AND PLANTING.

Our soil received no special preparation. A bed three or four feet wide was spaded over, and the roses planted about five feet apart in a row. Had we followed the best advice given us we should have incorporated an abundance of clay into the bed, and also have worked in an abundance of well rotted manure.

From the very beginning we watered the roses frequently, and when the roots were well established we began to apply some commercial fertilizer.

#### FERTILIZING.

We fertilize three or four times a year, giving each bush about one quart of a commercial rose fertilizer. We aim to fertilize soon after each period of bloom. During the blooming period some liquid fertilizer is also applied, and during winter the wood ashes are systematically scattered about the bushes. We do not work the fertilizer in but broadcast it as indicated for the ashes. If we practiced clean culture we should probably prefer to work the fertilizer into the soil with a hoe or rake, if for no other reason than to make it more quickly available to the plant. But since we practice the mulching system, the fertilizer disappears in the mulch and we trust to rain or water from the garden hose to wash it into the soil.

Small quantities of chicken manure are also applied at irregular intervals.

#### MULCHING.

It is here, we believe, that we have found a use for the superfluous paper that accumulates about a house. We spread the paper on the ground beneath the bushes, several layers thick when we have plenty, so that the entire length and breadth of the rose-bed is covered. What is the purpose of this new use for paper? Well, weeds and grass, including Bermuda grass, soon began to cause us trouble. It cost too much labor to always keep these hoed out, and it occurred to us that paper would prevent them from coming through, and paper probably would not hurt the roses either. We tried it and so far it has worked perfectly. The few sprigs of Bermuda grass that find their way through, probably between papers where they have not been allowed to lap sufficiently, are so few and far between that we actually feel sorry for them and let them grow. Neither have we discovered any injury to the bushes on account of the paper. Whether or not a mulch of paper could be used about other plants to keep down weeds and grass without injury to the plants we cannot state. To keep the paper in place we cover it with mulch, grass and weeds, or anything of the kind that we have or can readily obtain near at hand. If we desire a better finish we mulch with Spanish moss, or use moss on top of the other mulch. The layer of mulch on top of the paper may be just sufficient to hide the paper or it may be made thicker. A layer of mulch may be first placed on the

ground and then the paper with more mulch added. Leaves and other light material that could not be used on top of the paper may be used under it.

About once per year we replenish the papers and mulch where needed, or cover the whole with more paper and fresh mulch, at the same time widening the mulched area a little.

We decided to mulch for several other reasons. In the first place it is nature's way. In nature, falling leaves, dead branches and other vegetable debris accumulate on the ground and form a thin mulch. In the second place, we thought mulching would be easier than to keep the ground hoed clean. Then, again, mulch keeps the soil from drying out and furnishes a continuous supply of fresh soil by the rains, washing small decaying particles down into it, and by burrowing insects and worms. At all events, examination of soil that has been covered with mulch for some time shows it to be in an excellent condition of tilth—loose, moist and dark with humus. And, finally, do we not have those who strongly advocate and practice mulching in the grove, the orchard, and elsewhere? At all events, we concluded that we were on safe ground.

#### PRUNING.

All the dead, weak and overcrowded wood should be cut out of the rose bushes. After this thinning process has been completed, pruning proper must be done to get strong shoots. The advice generally given, "the stronger the growth the less the plant should be pruned, and the weaker the growth the harder it should be pruned," has been quite generally fol-

lowed, but we are coming to the conclusion that each individual variety needs to be studied by itself as far as pruning is concerned. In cutting roses we have generally cut the stems as long as possible; leaving a bud or two on the strong shoots for new growth; this has been in part our method of pruning. We have done our general pruning in September or October, and L. H. Bailey, in his "Garden Making" suggests that, in the South, roses pruned at this time will give a fine winter bloom.

#### PESTS AND REMEDIES.

Thrips, aphids, leaf-footed plant bug, pumpkin bugs, and leaf fungi have caused us the most trouble. The insects cause us little or no trouble in winter, but during warm weather it is difficult to get any perfect bloom on account of thrips. These minute brownish or yellowish streak-like insects, less than one-sixteenth inch long, infest the bud as soon as it begins to show color, and it develops only into an imperfect flower. Dozens and sometimes hundreds of thrips may be found between the petals of a single rose. In order to get relief from this pest it is necessary to cut off every rose and bud that shows color, together with about ten inches of stem and burn it or bury it; and then spray the bushes thoroughly with a mixture of soap and water made by dissolving a pound of soap in five to ten gallons of water. This treatment must be repeated each time the thrips get sufficiently abundant to injure the bloom. If tobacco extract is available, some of this may be mixed with the weaker solutions of soap and water. Tobacco extracts, of which

there are several on the market, are the standard remedy for thrips, but some soap should always be used with them to make the spray mixture spread better over and under the foliage. Soap has been mentioned first because it is always at hand and is a good insecticide. Another combination for spraying, recommended by the Florida Experiment Station, is as follows:

$2\frac{1}{2}$  quarts commercial lime sulphur.  
 $3\frac{1}{2}$  fluid ounces "Black Leaf 40."  
50 gallons of water.

Plant lice, aphids, cause us some injury, but the same kind of spraying as recommended for thrips also controls them. Aphids are small, plump, green, sucking insects, approximately one-eighth inch long and occur in colonies.

The two plant bugs named occasionally puncture the rose buds with their beaks, and hand-picking is the best way to keep down their numbers.

During the first two or three years we observed but little injury due to fungi, but this year and last year a number of our bushes are shedding large quantities of leaves infected with rose mildew and rose leaf spot. Last year we sprayed with bordeaux mixture with good results. This year we plan to spray with ammonia-copper-carbonate solution, as that does not discolor the plants. Bordeaux mixture is to be preferred, however, as it is more effective. Flowers of sulphur dusted into the leaves, pure, or mixed with two parts air-slaked lime, is most generally recommended for rose mildew. One part commercial lime sulphur to forty or fifty of water is also recommended.

Bordeaux mixture is easily made as follows:

A. Make one pound lump lime, or quick lime, into five gallons of thin whitewash.

B. Dissolve one pound blue-stone (copper sulphate) in five gallons of water by suspending same in a cloth sack in top of water.

C. Slowly pour A. and B. together, simultaneously into a larger vessel, stir, and spray onto the bushes. This strength of bordeaux is the same as that spoken of as 5-5-50. Bordeaux mixture should not be mixed or kept in metal vessels.

Ammonia-copper-carbonate solution is made by dissolving five ounces copper carbonate in three pints of ammonia, 26 degrees test, and diluting the same with water to make fifty gallons.

#### BOOKS ON ROSES.

1. *Roses, their History, Development, and Cultivation*, by Rev. Joseph H. Pemberton, President of the National Rose Society of England. 336 pages. Illustrated. Longmans, Green & Co. 1908. \$3.50.
2. *Roses and How to Grow Them*. By a group of experts. 189 pages. \$1.10.
3. *Book about Roses*. Dean Hole. 300 pages. 24th edition. \$1.50.
4. *The Rose*. H. B. Ellwanger. 310 pages. \$1.25.
5. *The Rose Book*. By H. H. Thomas, etc. Funk and Wagnalls Co., N. Y. \$2.
6. *Making a Rose Garden*. By Henry H. Saylor. McBride, Nast & Co., N. Y. 1912. 50 cents.
7. *How to Grow Roses*. The Conard & Jones Co., West Grove, Pa. 10 cents.

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## RARE AND BEAUTIFUL TREES FOR SOUTH FLORIDA

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### James L. Rodger

In these few brief remarks we shall practically say nothing on "palms." This is, perhaps, in a measure, disappointing and unfortunate, since the great majority of strangers who come to visit our state are especially on the lookout for palms, completely absorbed, and rightly so, when they see them, and therefore less disposed, unless they be particularly observant, and tree enthusiasts, to see the beauty of anything not a palm. Nevertheless we have successfully brought to our shores, trees of

great interest and beauty, which are not only valuable additions, but which in the experience of the writer, are very easily grown, the latter item being quite a consideration, since there are many genuinely enthusiastic lovers of trees, attested by the prices they pay for them, who, because of inexperience, or some other inexplicable reason do not always have the success they themselves desire, and which public-spirited citizens desire for them.

Apologizing for this lengthy explan-

atory prelude; we shall now proceed to mention a few of these easily grown trees.

The "*Spondia Dulcis*," popularly called "*Otaheite apple*" and "*golden apple*," by the Polynesians called *Hevi* (pronounced Hay-vee). Should any resident of South Florida possessing a large yard, desire a tree which, in addition to its other virtues, would give much shade, he could not choose any better than this one. It is a rapid grower, spreads out well, leaves grow very close together, rises high in the air, and invariably makes a most noble appearance. Once it makes a fair start, it can practically be forgotten, so far as any special attention is concerned. It will keep growing right on. Unfortunately its foliage is very dark, and casually looked at, is more suggestive of the somber foliage of austere and more unkind climates. Then again, in places where tourists are expected in winter, and where residents generally wish all their tree and plant family to be at their best in winter, it is somewhat exasperating to have this tree three-fourths, if not entirely defoliated. On the other hand, when once it gets to bearing, it is during a large part of the early winter season, or early tourist season, as we say in Florida, that it is loaded with bushels of fine edible fruit. About twice as large as a normal hen egg, with meat solid, like an apple, with somewhat of an apple flavor, besides something all its own, the whole covered with a thin rind, a beautiful golden yellow when ripe, the fruit hanging in great bunches on the tree, makes it one of those most noted, by strangers, and very much

visited when the nature of the fruit is discovered by them.

Nevertheless we stick to our first viewpoint—that of ornamental and comfort-bringing. During the long summer months of our Southland a well grown *Hevi*, creating the shade it does, will surely win the loyal love of those who have enjoyed the blissful cool of its environs, and seen from a little distance, be it twenty feet, or a block away, it surely enhances the beauty of the piece of land it grows on. Further, we have always maintained that poetic fancy, as much as the actual, material, visible, beauty of form of a tree (any tree) should enter in to add its delicious tang to the pleasure of the owner of it. Without indulging in this fancy at this time and taking up precious minutes needed for other thoughts, might we not suggest how the owner of a lovely yard, who is taken here and there by the associations of his trees, might set finally in the shade of his *Hevi*, and dream of yon perfume-laden isle in far mid-Pacific, immense watery wastes, and indulge his fancy as to possible and probable scenes under the shade of this tree's sisters, as well as follow up the history of the one he or she possesses from its original home to its new one in our beloved Florida, which it honors.

But we are digressing too much from the subject of our paper. So we return to business. Another tree which should be very much better known in South Florida, and seen much more in public parks and private yards is the *Ylang-Ylang*. Like the *Hevi*, it will, after being planted a few months, stand much

neglect. It grows rapidly, if not quite as rapidly as the first tree spoken of. It grows to most magnificent proportions. In our experience with a number of them, we have discovered that those planted close in on the south side of a building will grow twice as large, much more elegant in form, and with a more beautiful tint of green to their leaves, than those that were given a northern, open, and more exposed location. It may merely be a coincidence or be a proof, that they are sensitive, to even such slight climatic changes as we have in South Florida, and should therefore be on the south side of, and reasonably close to, a building.

Ladies will not have to be reminded that it is from the beautiful white bloom of this tree that a very rich and delicious perfume is made. In our experience we regret to say that while we have had all desired results in the growing of the trees, they have not begun to bloom anywhere nearly as much as botanists and travelers inform us they do in their native habitat.

Another tree which bears a great number of attractive bell-shaped white flowers, is, we know, an Oroxylum, and believe it to be the *Oroxylum Flavam*. To those who live in rocky portions of Florida it may be of interest to know that the specimens we have were planted out in a piece of ground, where the rock had never been removed, where the soil was all rock, where a hole large enough to hold the roots of the young tree had literally to be chipped out with a pick. The writer particularly remembers, for the day was hot and the "pick-

ing" was long, and he did the pick work. Planted, given some water every day for three weeks, watered three times a week for a couple of months, and then left.

NOTES FROM THE HOTEL ROYAL PALM  
GARDENS, MIAMI, FLORIDA.

For years we have had a "*Bombax Ceiba*" (silk cotton tree) planted on the edge of a walk on one of our lawns in a location where it is largely protected from winds, and the benefit of all sun and air. Its light colored, almost whitish body, has grown into a somewhat twisted, gnarled form, and, while of recent years the tree has grown an enlarged body, it has the deficiency of being somewhat too dwarfish. Like most all of its kind it has the misfortune to be almost entirely without leaves during the winter, a misfortune in a tree located in the grounds of a winter resort where people "foregather" from everywhere and where a large percentage of the strangers are as anxious to see all trees at their best, as we are anxious to have all our trees appear at their best. This silk cotton tree of which I speak, has this year commenced to bloom, the few 6 or 8 red blooms, stuck close to the main body or limbs, devoid of leaves, creating much interest. And here is the great expectation we have, that, like its great tall, naked neighbor in an adjoining property, it may in the future bloom so prolifically, and so long during the season, to make it as marked, as popular, as much discussed curiosity as its large neighbor. A hurricane a few years ago blew down

a large and stately specimen of the *Bombax Ceiba*, which occupied a striking location on our south lawn, but with all its rapidity of growth and elegance of form, it was a failure so far as blooming was concerned, and with all our experimenting we never made a success of it along those lines.

Some little children closely allied to us by ties of family connection, or friendship, are proudly wearing pretty, if simple, necklaces, made of strings of the perforated red beans about as large as a good sized pea, which are grown on a slender growing, attractive, dark leaved plant — *Adananthera* — which, planted in a spot well enriched with compost, well watered for some months thereafter, has done well, after having been for a couple of years, little attended to excepting that is common with other plants and bushes near by, it has in the spring been heavily "mulched" for a distance of 18 inches around its base, with well-packed "casuarina" pine straw.

A tree which we have, and which grows well, that is always interesting to us, and which arouses the interest and curiosity of strangers, is the "*Hura Crepitans*," or sand box tree. Our specimens grow a symmetrical trunk or body, and at about 7 to 8 feet from the ground, limb out somewhat in a manner suggestive of an umbrella, and are producers of a really acceptable shade. From a little distance the body and limbs of the *Hura Crepitans* have somewhat the same whitish creamy colors of the *Bombax Ceiba*, with this difference, very great differences, and this

makes the sand box tree a great oddity, that its body and limbs are thickly covered with dark colored, strong, sharp-pointed spears, an inch or more in length in many cases.

On account of its reputed valuable wood, as well as other unique qualities, we have heroically endeavored to bring the *Dalbergia* to the front, but *Dalbergia* and *Sterculias*, up to time of writing, seem to have decided that it is preferable to perish than to exhibit their charms on our grounds.

The large body, spreading limbs and pretty shade of green of the leaves, and the rattling of the very long seed pods (when dry) with every little wisp of wind, makes the *Abbizzia Lebbek* a tree of great interest to a lover of strange trees, and not unworthy of notice from the casual, and not over enthusiastic, observer. On our grounds it has been given perhaps more attention than it would in some other spots, because of the "common" or "popular" name, viz: "*Woman's Tongue*" painted beneath the *Albizzia Lebbek* on its label.

One of our force is experimenting on his own private place, a mile out of town, with a number of *Spanish Love trees*—*Clericidia*—but has not as yet had them long enough in his possession to enable him to truthfully tell anything about them. We know of one citizen in Miami, who has a superb specimen, but as it was brought to him from Cuba by an enthusiastic, tree-loving sea captain, at that time commanding a steamer plying between Miami and Cuban ports, and as said sea captain went to the extra trouble of bringing over in his

vessel a liberal load of earth from near the spot, if not the actual spot, where it stood in Cuba, in which to plant it, on its arrival here, it would not be fair—not be an honest example to cite as successfully raised in our local soil, as some of the rest of us are now endeavoring to do.

We feel that we can with confidence assert that if other tree lovers and tree growers succeed as well as we have in raising fine specimens of the *Ficus Pandurata* and the *Ficus Altissima*, they will not only themselves have the pleasure which comes from success, but will have the added pleasure of hearing the expressions of enthusiastic admiration from so many of the strangers who see them.

True, ours (especially the Pandurat-  
as) have been helped along, but in a simple way. For the purpose of having a rich circular or round bed in which to plant flowers for the season, in mid-September or early October, a liberal supply of compost has been dug in around them. The small treatments of commercial fertilizers, and the regular and systematic watering of the flower plants, from the planting in November till the close of the season in April, have all beyond a doubt, in ten-fold manner, added to the beauty and stateliness of the tree, to the shade of the green of its larger leaves, and has made of it one of the most talked about trees on our ground. Nevertheless, other Pandurat-  
as not so much being specially favored, are in like manner showing up in a manner indicative of their apt fitness to play a part in the beautifying of a park or garden, in this part of Florida

at any rate. The fact that the *Ficus elastica* is so commonly found with us should not cause a fear on the part of the tree lovers that the presence of the already mentioned two other members of the Ficus family will cause too much of a sameness, for to our minds, the *Ficus Pandurata* and *Ficus Altissima* will show such distinct and strong personalities of their own, such forms of beauty, differing from other Ficus, that there need be no fear of possessing specimens too nearly akin. Nevertheless, we concede the point, indeed would very much emphasize it, that if a yard is limited as all the average private yards are, there is such a wonderful array of wonderful plants and trees that can successfully be grown in South Florida, that it would not, in our humble judgment, be the highest wisdom, the best judgment, to place on the same limited area, two species of the same family, even though their beauty be great, and their differences in appearance sufficiently marked.

We could proceed and speak of other trees, but we feel we have imposed sufficiently on your patience. We do not, however, apologize for the tree friends we have made the subject of this talk. We are very sure that if you will become acquainted with them, if you are not already, that you, like us, will learn to love them and will take much pleasure in having them near you, and will never cease marveling at this beloved Florida of ours, which takes the strange and beautiful in plant life from all the four quarters of the globe, and makes them her own.

Floriat Florida!

## VALUE OF NATIVE ORNAMENTAL PLANTS

A. W. Allen, Sebring, Fla.

*Mr. President, Ladies and Gentlemen:*

The subject that the Chairman of the Committee on Ornamentals has asked me to speak on is one which I would have hesitated to accept, knowing as I do that in its entirety it comprises the beginning and end of horticulture. From the time that Adam and Eve first ate of the forbidden fruit and thereafter took into cultivation the native plants and raised them with the sweat of their brows, till the time that the human race, hardly existing on a parched and dying earth, ransacks the corners thereof for something green, all mankind has gone and will continue to go to the native vegetation for his food, clothing and shelter—and also for the satisfaction of his inborn sense of the beautiful.

This subject is so immense that it would be impossible for any man to cover it in a lifetime, but when the aforesaid Chairman tacked on to her request the words, "I believe this would be of great use to many pioneers who have not the means of purchasing nursery stock," I saw the point and at the risk of incurring the deep displeasure of my good friends, the nurserymen, I will try to tell of some of the commoner native plants that are available for garden purposes.

In the first place I want to impress on the new settlers, and on some of the old ones, too, that the best way to get a lovely garden or yard or waterfront is to leave the choicest of the native plants where

they are growing. To often a gang is put into a lot or home site with a contract to clear and plow the land. The consequence is that all the magnificent pines are felled, the oaks cut and the palmettoes grubbed. The roots are left in the ground and in a year or two yield a fine crop of oak runners, gopher apples, bamboo briars and other deep-rooted plants and the owner spends the balance of his gardening life blessing the man who did the work.

Rather let the owner or some competent overseer go over the ground and mark every tree and native plant that looks good to him, and have the rest of the ground deeply grubbed and every root taken out. He must remember that many an insignificant looking shrub will make a handsome bush under garden conditions. The scrubby bunch of palmetto will make a clump of palms that cannot be bought in any nursery and can never be replanted. Do not let the common idea that nothing will grow near a pine tree, trouble you—you may not want pine trees in an orange grove, but you will notice that lots of other trees and shrubs grow near pine trees where they have protection from fire.

Having left all the desirable wild plants in place let us see what we have available for our shade trees and street planting. First as a shade tree comes the *Quercus nigra* or water oak. This is found in almost any district in the state

and is easily transplanted. Remember that it requires plenty of room and, when fully grown, wants the earth and the fullness thereof, so put it where you do not expect to plant any crop in the future.

Next in order I would place *Prunus Caroliniana*, or mock orange. This lovely evergreen tree is found in hammocks and well repays the trouble of transplanting. It is beautiful in all stages, from a small shrub, which makes a fine hedge, to a tall, shapely, pyramidal tree.

Then come the bay trees, which are not used nearly as much as they should be, many people being under the impression that as they grow in wet places they will not thrive on the highlands. This is a great mistake as is easily seen when we remember that many of our garden flowers such as canna, are originally swamp plants. Many trees that confine their habitat to low places would extend their range to the higher land were it not for forest fires.

The long leaf pine can stand fire, hence it is found all over the sand hills, but you will notice that the short leaf pine and most of the hard wooded trees are confined to scrubs, hammocks and swamp lands and other areas where fire is infrequent. Do not be afraid therefore, to try any swamp plant you fancy in your sandy garden—as a rule they will take all the compost you can give them, but if you go into the scrub and try the plants there you must be careful and not kill them by kindness.

Of the red or sweet bays we have at least three varieties with us, *Persea Borbonia*, *Persea Pubescens* and *Persea Humilis*. Every housekeeper should have a

sweet bay in her yard for the sake of the spicy leaves which add so much to the flavor of soups and stews. This is the leaf used by the Creole cooks of Louisiana in the preparation of their famous dishes and is called by them, Gumbo Filet.

The *Gordonia Lasianthus*, called black bay, bull bay and loblolly bay, makes a splendid avenue tree and with its masses of pure white bloom in spring, and its bright colored leaves in autumn, is well worth a place in any park.

The white bay or *Magnolia Glauca* is easily handled and its creamy white fragrant blossoms borne throughout the summer make it very pleasing, though it cannot compare with its big brother the *Magnolia Grandiflora* with its immense, highly perfumed flowers and its rich dark green leaves. This noble evergreen flourishes best in Calcareous hammocks and rich soil and a judicious supply of lime ought to be provided for it.

Another fine evergreen is *Osmanthus Americana*, or wild olive, also found in hammocks, to which place we must go for our holly trees of which I will only mention three, i. e., *Ilex Cassine*, commonly called Cassina or Dahoon Holly. *Ilex Vomitoria*, or Youpon, and *Ilex Opaca* or American Holly. All these can be readily transplanted but care must be taken to defoliate them, as indeed must all wild plants with very few exceptions.

Of deciduous trees worthy a place in the garden we can easily locate and transplant *Acer Rubrum* or red maple, and *Liquidambar Styraciflua* or sweet gum—both of which are gorgeous, both in their spring and fall costumes. *Cercis Canadensis* or redbud, and *Cornus Florida* or

dogwood, may both be found in hammocks and are very beautiful with their early blooms.

Two of the native conifers bear transplanting well and succeed in almost any soil; these are the *Juniperus Virginiana* or red cedar and the cypress, of which Dr. Harper mentions two kinds, the swamp cypress and the pond cypress. In cultivation these trees make splendid specimens.

The cabbage palm is one of our finest subjects for street or garden planting and for the benefit of our new chums I would like to mention that the summer is the best time to move them and that the larger they are the greater the chances for success. Be sure and cut off all the roots close to the trunk and cut off all the fans leaving only the central unopened leaves. Do not try to peel off the old leaf stocks, nature will do that when the trunk is ready to go naked.

Many of our finest vines are native here and may be found in almost all parts of Florida. Perhaps the finest of these is the *Gelsemium sempervirens* or yellow jessamine which is evergreen and fills the air in January with its fragrance. It is easily transplanted and takes kindly, if rather slowly, to any situation. The *Tecomma radicans* with its euphonious local name of "cow itch," is a grand creeper with bright red tubular flowers and its cousin, the *Bignonia crucigera* or cross vine, with deeper red tubes, will climb to the top of the highest pine.

The Virginia creeper, *Parthenocissus quinquefolia* is also found in hammocks but in handling this or any other of the native vines it is well to carefully avoid

the *Rhus toxicodendron* or poison ivy. This plant may be easily distinguished from the former by its foliage being placed in groups of three, while the true Virginia Creeper is distinctly five leaved.

A very graceful spring flowering shrub is the *Chionanthus Virginiana* or "gray-beard," which is usually found in hammocks, though recently I was rather astonished to find it growing profusely in the poorest scrub. If you are near a scrub you will find plenty of plants to fill up a large garden, though you may have some difficulty in getting some of them to grow in garden conditions. One in particular is well worth transplanting and that is the *Ceratiola ericoides*, sometimes called "rosemary." "Bear grass" is another plant that can be used from the woods and is very interesting with its tall spike of creamy blossoms. Under the name of *Yucca Filamentosa* it will be found in many catalogues, but the natives know it best by its strong-fibred leaves which they use instead of string to hang their bacon in the smokehouse.

There are many ferns here which will thrive in a shady border even if taken from the water. The cinnamon fern and the *woodwardias* and *Blechnums* will soon adapt themselves to drier conditions. The tree-loving ferns such as the *Polypodium incanum* or resurrection fern and the *Polypodium aureum* or golden fern, will soon make themselves at home on the oaks and palms that you are supposed to leave on your garden site. The lovely little orchid, *Epidendron Tampense* will also repay you for a little trouble in wiring it on an oak tree. Every time you go on a picnic to a nice thick wood bring

back one of those air pines that grow so queerly on the forest trees and you will be astonished to find how many different kinds there are.

If you live near the sea you will have no difficulty in finding the beach convolvulus, *Ipomoea pes-capri*, and this plant will thrive and make a fine fence cover even in the interior sand hills. On the coast, also, you will find the sea-grape, *Coccoloba uvifera* which will grow inland and make a grand specimen on a lawn, besides bearing fruit that makes the best kind of jelly.

I must not forget the "Coontie" or Indian starch palm which grows in large quantities in some of the pine woods and also on some of the islands, so if you cannot afford to buy a sago palm you can at least have a lowly cousin of it—and you will find its downy brown seed cones very odd and attractive. Another odd plant which is common in Florida is the *Callicarpa Americana* or French Mulberry with its cluster of persistent purple carpels.

The time allotted to me will not allow of more than a mention of the hundreds of lesser vines, wild flowers, aquatics and grasses that grow freely with us and can be taken into the garden either by roots or seeds, but I venture to say that if any one goes into the deep places of the woods and takes up and plants one half of the plants I have mentioned he will find that he has only entered on the edge of a field that life is all too short to harvest.

There is an especial charm and a peculiar pride of personal ownership in the possession of a tree taken up from the wilds and brought to your door yard and the memories of the trip in search of it

will furnish material for many happy reminiscences of your pioneer days.

Very, very strenuously do I urge on the newcomer that he think long and carefully before he destroys a fine native tree and equally so do I urge that if the tree or shrub must go, you take it out completely, for many of them will not take meekly your efforts at destruction and will recall their existence to you by sending up root sprouts all over your lawn and flower beds.

Quite recently I have observed not only palmettoes, but grasses and legumes coming through three inches of asphalt road, and if a wild plant is beautiful in its proper place it can be as unsightly in the wrong place as anything I know of. Do not think in terms of orange trees and dollars all the time but take your families for a picnic to the hammocks and the scrubs and the bayheads occasionally, and instead of gathering armfuls of ferns and flowers which will not survive the homeward journey, take up carefully and pack in moss one or two large roots of a fern or a nice young holly tree and you will have always with you the memento of a happy day.

Too many of you suffer from preconceived and erroneous ideas that the woods and swamps are full of snakes and dangerous insects, but if you will only use your eyes and ears in looking at and listening to the things that really are there, instead of straining them for things that are not there, you will open to yourselves a new and wonderful world that will be to you a never failing refuge from the cares and worries of a strenuous and nerve racking life.

## HOW A FLORIDA TOWN IS WORKING FOR A CITY BEAUTIFUL

Mrs. Henry Wight, Sanford, Fla.

A good many years ago, when I was a very little girl, with a very big imagination, I used to entertain my younger brothers and sisters with marvelous stories of things I was just on the eve of doing. The tales would get bigger and more wondrous, as my small auditors became more and more impressed, and I would plume myself for still further flights, when all at once my practical minded mother would bring me to earth with a bang by saying, "It is better to speak of a very small thing actually accomplished than to be forever expatiating on things you are going to do, that may never come to pass."

I find myself reminded of this, as I undertake to tell the State Horticultural Society how one Florida town has set about getting more improvements in the way of ornamental planting in its gardens. Our plan is as yet but little more than a plan. It remains to be seen just what its results will be, but it is in the hope that it may present some suggestive thought to other communities that I have consented to set it forth for your consideration.

To begin with, we are working directly through a City Beautiful Committee, which of course is a part of our Woman's Club. We thus have the hearty support of one hundred and fifty women. This means a great deal in the way of publicity where publicity is most desired, and it means also that no sectarian interest will

hinder, no spirit of contention nor rivalry scatter our fire. Before we made any plans at all, we read up everything we could find on the City Beautiful. The campaigns successfully carried out in Birmingham, Alabama, and in Toledo, Ohio, presented many available ideas, and from the latter place we obtained some most inspirational literature. The work there was instituted and carried out under the auspices of the Toledo Museum of Art, in connection with the People's Saving Association, and it was more comprehensive in its scope than any other campaign of which we found data. The Curator of the Museum seems most happy to pass on any information he has, and has shown a real interest in our small venture. After reading all we could find, we first made a survey of our town—its assets and its possibilities. We have not the natural beauties of some Florida cities—no surrounding woodland of tropical beauty, no picturesque effects of little silver lake, or gentle slope of hills. We have the most wonderful possibilities in our lake front, but they are only possibilities as yet, for the fine bulkhead which is in process of construction will enzone a shore line which has been denuded of nearly all its palms, and now presents an unsightly string of rather discreditable wooden buildings. We have no large estates in our vicinity, so we have not their stimulating effect of beautiful parks and

landscape gardening, and our chief disadvantage lies in the smallness of our city lots, with their houses pushed as close to the street as can be. These are our troubles, but as the old lady said when everything else was gone, we have something to be thankful for. This old lady was asked what her particular blessing was, and she replied that she was so glad that since she had only two teeth left, those two *hit!* We are in some better plight, for we have splendidly paved streets, most excellent sidewalks with broad parkways, and in addition we have five beautifully located squares set aside for public parks. With all of this substantial foundation, we feel sure that the esthetic side will manifest itself eventually, and it is in just this faith that we have begun our work. Our first effort was to get the grounds about our really handsome building at the depot, put in some sort of shape, and to have an avenue of palms set along the street leading back from the railroad to the center of town. We formed a very clear idea of what we wanted and asked for it. Our ideas were accepted pleasantly, but the railroad authorities and the city council told us times were too hard last fall for them to take action at once. All of us had become inured to this sad story from our own men-folks—hard times, and harder coming—but still we lived and had things pretty comfortable about us, so we are keeping hopeful, and not too insistent, for it is our policy not to be fussy nor officious. A few days ago two members of our city council assured us that we should have our avenue this fall, and the depot improvements will surely follow

that. If we couldn't get our big ambition, however, we knew there were always smaller things to accomplish, so instead of nagging at those in authority, we turned our attention to the individual work which must always underlie any civic effort. The ball was set to rolling by the bright youngsters of the Junior Civic League. When it came time to plant nasturtiums and sweet peas, we bought seeds in quantity, weighed them up into ten-cent packages, and sent the children out peddling. A plant prize was given those who made sales to the *most houses*. We worded it this way, as our object was to get as many gardens planted as we could. It was not a nuisance to people to have the children come to them—many wanted the seed anyway, and others were glad to know just when it was time to plant. In addition to the seed, some of the girls took with them marked catalogues from one of our Florida florists, and received orders for roses and shrubbery.

As a result of this plan, our town is now fairly ablaze with nasturtiums and there is a stronger if invisible effect in that we have planted the garden spirit in the thought of our little girls who are proud to feel they had a part in the work. Along in the winter, after a great deal of thought and discussion on the part of the committee we worked out more definite plans suited to our own especial needs. Briefly, these include semi-annual garden and lawn contests and flower shows with good prizes. We first set about getting our cash for prizes. Never insistent, the committee presented their ambition for the town's great attractiveness to men of known public spirit. The

idea appealed at once and in only one instance were they met by anything else than cordial support. Within a week sufficient money was subscribed to finance the undertaking, besides the gardening implements offered as prizes by merchants, and plants promised by various florists. This done, we districted the town, asked a few other interested women to help us, and equipped with the marked catalogues again, we made a thorough house to house canvass, taking orders for ornamentals, which we promised to deliver free of express. : This idea originated from Mrs. McAdow's plea in the Florida Grower for a palm and a poinsettia in every Florida garden, but we had so far to go in our work, that we enlarged the request to include hibiscus, and vines of Bougainvillea and Pyrostegia Venusta. In Daytona the Bougainvillea is surpassingly lovely, and no one who has ever seen the Pyrostegia wreathing the trees in Winter Park and Maitland with its flaming blossoms, needed any urging. We were quite successful sending several different orders to a northern florist as well as to our Florida friends, and when one considers the fact that no single order exceeded six dollars, while there were many of ten, twenty-five and fifty cents, it is plain enough that the planting was done in very, very many gardens. We had lots of fun taking the orders, we became much better acquainted with our own town, and townswomen, and as they gave us their little orders, we made them feel that they were actually a part of our City Beautiful plan. I think, if we were to stop work right now, and never do another thing, we still for years to come would

be visibly reminded that we had *tried*, for our plants were nearly every one of permanent value that will grow handsomer from year to year. Within a few weeks, probably about the tenth of May, we will hold our first public event. This we have planned directly in connection with the Civic Committee of the Woman's Club, and it will include three days of strong civic appeal. The first of these will be a general clean-up day, in which we will have the active co-operation of the City Sanitary Department. It is our idea to see for one time, our town in its Sunday clothes, gardens and parks in apple-pie order, alleys above reproach, and private grounds all swept and garnished. The second will be the day of inspection, by a committee of gentlemen from out of town, a thorough survey being made of the six districts into which we have divided the city. In each district a prize will be awarded for the most attractive garden, with especial reference to the spring blossoming plants it shows, and another will be given for the finest display of veranda plants, this to include boxes as well as potted specimens. The third day, we will have our first semi-annual exhibition of potted plants and cut flowers, in some prominent place down town, and on this occasion the prize lists for the previous day will be made public. As our one idea just now is to stimulate the garden spirit, all our prizes in the spring show will be of plant specimens and summer bulbs, and we expect to have our lovely premiums in a show window on our principal street for several days before the event. This by way of advertising and attracting exhibits, in addition

to the slide we will run in the moving picture show, and the constant previous reference in the columns of our local paper. We will not trust to these agencies alone for publicity, however, but about ten days beforehand we will make another personal canvass in the interest of our Civic Three Days. Next November we will have worked out another plan for awarding the cash we have for prizes, and this will probably be a good deal more ambitious, as we want to offer prizes for beautifying church and school grounds, and the parkways about stores and other public buildings. We wish also to work out some scheme to encourage the householders in blocks to co-operative planting—no fences, and a certain uniformity of effect that will mitigate in some measure the smallness of space between houses and streets.

One rather important requisite of a campaign of this kind is to have some one who has time and ability to answer a thousand questions about planting. Seeding time here is all topsy turvy to so many of the people who have come from the North, and while we can have all the flowers any heart could desire, there are some that it is useless for us to try to grow, and it is always discouraging to one who endeavours to have some New England favorite in her garden, see it pine and dwindle in Florida soil.

Our little plan is now before you, just as it has evolved itself from time to time to fit our own particular circumstances. It has proceeded from a sincere desire to help in making Florida as beautiful as any state in the Union, and there is no reason why this should not come to pass. We have the soil, and the climate, and certainly as up-and-doing a people as any one could desire.

Sometimes, when we look at our handsome depot building surrounded by unkept squares, at our parks still far from developed, and the school grounds bare and scrubby, we are tempted to sigh that it is a long, long way to Tipperary. When we remember however, that more than half the joy of life lies in planning, and in working up to certain great objective points, we count ourselves happy in being thus *in* at the start. Those people who plant gardens, and who help others to plant them, are the ones to become permanent citizens in a town, and who develop civic loyalty—a great asset in these days of shifting populations, so here's to a Florida made up of those who have learned for themselves the little rhyme:

“The heart of a rose for sweetness,  
The song of a bird for mirth,  
I am nearer God’s heart in my garden,  
Than anywhere else on earth.”

# Peaches and Deciduous Fruits

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Ira E. Soar, Chairman of Committee  
L. La Trobe-Bateman, Member.

*Mr President, Ladies and Gentlemen:*

As your Committee of last year covered quite fully many important points leading to the culture of peaches, pears and plums, we deem it unnecessary to go over this same ground at length. We will, however, discuss briefly those problems which are of the most vital economic importance to the grower, and more fully some other phases of the subject which were not presented last year or not fully developed. Your Committee in this report prefers to pass over the topics or discussions on pecans and persimmons, as our President has so ably covered these subjects in his writings, and we have no further or fresh data to present thereon.

## PEACHES

We will take the subject of peaches under first consideration, and in this connection the nature of soils most adaptable for their successful propagation. Peaches thrive in almost any soil that is well drained, and has the essential elements of fertility present in reasonable quantities, but the first essential is good drainage. A soil ranging from a clay to a sandy loam will usually give the best results. In some

places experience seems to indicate that stiff clay or moist land is preferable. This, however, is due to the fact that the trees are on peach stock and that nematodes (to which we refer later) do not thrive in such quality of soil. It is a known fact and familiar to many that a peach tree located in the back yard and which receives dish water or soap suds almost daily will thrive far better than one situated at a distance from the home, and only gets water every once in a while, possibly not at all except what nature may supply.

Proper location to insure early fruit is of great importance. The crest of a hill or proximity to water seems to tend to keep off frost. If this precaution is not taken, the fruit is liable to injury from late frosts every few years, and this danger increases the further south you go in Florida. A sudden freeze, not altogether an unusual occurrence, is liable to nip the bloom or the swollen buds at the most critical moment, and the early blooming varieties are naturally more susceptible. As the further south along the peninsula the bloom is earlier, hence the greater hazard, and consequently the greater necessity for greater precaution. Later varieties may be planted further from water pro-

tection or on lower ground, as the risk from damage from frost is not so great. There is a very common error in planting peach trees, in not taking the earliness or otherwise of the variety into consideration when the location for each is being selected.

This brings us to the consideration of the importance of varieties selected to suit the location in which they are to be grown. This point has been covered at various times in many series of articles or bulletins, so we will do no more than allude to it in as brief a manner as possible. There are five general groups or types into which the varieties of peach trees are divided, namely, the Peen-to, the South China Type, the Spanish or Indian Type, the North China Type, and the Persian Type. For northwestern Florida the North China type, such as the Elberta, seems the most adaptable; for east Florida in the north section the Spanish type for late fruit and the Peen-to and South China types are the most acceptable without going into specifying each variety, such as the Waldo, etc. For South Florida, the Jewel of the Peen-to type is the favorite and best from a commercial standpoint, and for this district there are many other varieties, but almost exclusively of the Peen-to type, such as Waldo, Hall's Yellow, Angel, Millen's Favorite, a new variety originating from Dade City, and the Rival. An important feature in this selection of varieties, however, is the fact that all with the exception of the Jewel will come into competition in the market with peaches from other

sections, but the Jewel is invariably two weeks ahead of all others, hence its importance from a commercial standpoint.

Relative to planting, the soil should be well prepared for the trees by early breaking and thorough harrowing, and trees are best planted in December or January, although under favorable conditions they may be planted much later. Trees should be set from 15 to 20 feet apart each way, the closer distance perhaps being the better. In many instances peach trees are planted in citrus groves alternating with each tree, so if the grove is planted 30 feet from tree to tree, the peaches intervene at 15 feet. While we do not advocate this as good practice, preferring to set peaches as peaches and citrus as citrus, keeping each separate, it is quite admissible where the necessities or requirements of the grower call for such an arrangement, such as gaining time for returns to help his grove expense or in utilizing to the utmost a small area. Before planting all tops should be cut back closely, the roots freshly pruned upon putting the tree into the ground, and where it is on plum-stock set with the union 4 to 5 inches below the surface. Trees on plum-stock may be planted on either old or new land with every success, and in the event of any dying they may be replaced and the orchard maintained indefinitely. Trees on peach-stock should be set only on new land and even then only where the soil conditions are clay or moist.

Cultivation of a peach orchard should not be haphazard, but carefully carried out. Give clean cultivation the first

year with cow peas, beggarweed or other similar crops except the Florida velvet bean, sown along the rows. The Florida velvet bean is too liable to smother the trees but the Yokohama would not. However, cow peas or any crop subject to root-knot should not be planted where peach-stock is used. A space several feet wide around the trees should be left bare and cultivated frequently. After the first year shallow and frequent cultivation should be practised until May or June and then the land left to beggarweed or cow-peas.

The first year the trees should receive a fair application of fertilizer containing about  $2\frac{1}{2}$  to 3 per cent of ammonia, 6 per cent phosphoric acid, and 8 per cent potash. As the trees come into bearing the phosphoric acid may be increased to 10 per cent and the potash to 12 per cent. Much of the ammonia may be derived from the leguminous crops in the rows and if such are used the proportion of ammonia in the commercial fertilizer should be reduced. Peaches do not require any large amount of ammonia, but still they like more than pears or plums. Trees on peach roots, however, should have more than those on plum-stock, as ammonia helps the trees to withstand to a very great extent attacks by nematodes. Large quantities of ammonia push too rapidly wood growth on plum-root stock. The plum is naturally a gross feeder and were the plum-stock fed too highly on ammonia too rank a wood growth would result, which is not desirable, as wood must be sacrificed for fruit, the main object for which the

trees are grown. Best results in fertilizing are obtained by making several applications, the first in January or February, the second in May or June, the times for these depending upon the earliness or otherwise of the variety treated. When the trees reach bearing age a fall application of mineral element is beneficial.

Pruning is the real science of peach culture. Pruning at the right time and in the right way is one of the most important points to consider in caring for the trees. When set, as already stated, they should be cut back closely, and they may be trained to a compact head by pinching out the growing tips from time to time during the summer. The first winter after setting, the trees should be pruned so that only three or four limbs branch from the main trunk. These should slope outward and upward making a vase-shaped top with open center, and each branch should be headed back to about half of its length. Always prune so as to remove "blind wood" as much as possible in those varieties where this formation is prevalent, this has special reference to the Jewel. The cut should be smooth and slightly sloping and close to a bud with the uppermost bud on the outside of the limb. After the second year most of the pruning should be done in the summer immediately after the crop is removed. This is contrary to the general practice of pruning when the trees are dormant, that is during the winter season, but the climatic conditions of Florida call for a variation in this practice and hence the advocating

of summer pruning. With all early maturing fruit the pruning can be done by July 15th. There is no use doing much summer pruning after August 1st, as it is then too late for the formation of a fruiting top of desirable size for the next year's crop, and also after that time much of the growth is "blind."

Close winter pruning induces a heavy growth of new wood with the consequence that the fruit is shaded by heavy foliage and is later and not so highly colored. Our season is very long for a tree to maintain a continuous unchecked period of growth, and summer pruning gives a brief respite followed by rapid growth which will form a new top for next year's crop, and the increased leaf area builds up food for a future crop, storing it in the limbs of the tree. Where pruning has not been done for some time the leaves maturing late in the summer are attacked by fungi and hence fall at the time they are most needed, and even if sprayed the old leaves would not be such efficient starch producers as the new growth. Again, where the leaves have shed during the late summer, there will be another attempt on the part of the tree to leaf-out again in the fall. This will occur when maturity should be setting in for the winter, thus exhausting some of the starch already stored in the limbs for future use. Correct pruning should put the trees in such shape that no fruit-ladder would be needed. Short limbs reduce the strain on the tree and much larger and finer fruit can be grown near the main trunk than on long limbs. If any mem-

ber of our Society who plays golf wishes to put the matter to a test let him try the difference in carrying a basket of peaches in his hand or at the end of a 10- or 15-foot pole, and he will obtain an accurate idea of the tree's position, and realize why it strikes for a shorter crop just as he would strike for a shorter pole. Correct pruning results in these three prime essentials: (1) Lower cost in picking and tree ladders not required. (2) Better fruit; the peaches will average from 50 to 100 per cent larger, of much finer appearance and superior quality. (3) The average life of the tree is almost quadrupled.

Thus much for the tree, now for the fruit. No work on a peach orchard pays better than thinning and it seems strange how very generally it is neglected. Thinning also prolongs the life of the tree, and also improves equally with proper pruning the quality and the size of the fruit, which means higher prices and better returns. Moreover peach trees which are regularly pruned and thinned should bear every year and not alternate years, as so often is the case. There is one golden rule, and one only, for successful thinning. This is "no two peaches should stand closer on the same branch than five inches." Thinning should be done when the fruit is about the size of the thumb nail, but precaution should be taken not to do this until after all danger from frost is over, as it is possible that some of the fruit might be injured by cold, whereas others would escape and the grower can judge accordingly the extent of his thinning. Many au-

thorities maintain that it takes ten times as much nourishment from the tree to form seed as it does to form pulp, hence the wisdom of reducing by thinning the proportion of seed to pulp.

Regarding the question of diseases, we consider this matter was so fully discussed in the paper on this same subject at the last meeting of the Society we will not weary our readers with a repetition as, so far as we are able to ascertain, there have been no new developments either in new diseases or in new methods for controlling those that are already known.

#### PEARS

Too many of our fruit growers do not regard pears as worthy of their consideration, low prices, blight and thrips being responsible for this view. The last few years, however, the prices have been much better, and especially so on early fruit shipped to northern markets. The later fruit usually sells quite readily in local markets at remunerative prices.

The first consideration in controlling blight is the selection of a suitable location for the orchard. Hammock, wet or insufficiently drained land, and clay basins should never be selected for pears. It seems sandy land without clay for a considerable depth is best, but clay lying nearer the surface is not so objectionable if the land is well drained and does not occur in the form of a basin. The object of this is to select a soil which will always have ample drainage and promote a slow, well matured growth of wood. It may even be

stated that soil which is ordinarily too poor for the production of field crops is well adapted to pears. The bacteria which causes blight enters in two ways, either through the tips of rapidly growing wood or through the bloom. By checking a too succulent growth of wood this avenue of entry is blocked. However, the bacteria may still enter through the bloom, but by removing all fruit spurs from the larger limbs, these can be protected, and where it enters the smaller limbs these may be removed in pruning without a very serious loss of top. All pruning tools should be dipped in carbolineum or Bordeaux to prevent infection.

It is best to prune in summer, as the trees will not then make such a rapid growth which would induce new infection. The only essential pruning for pear trees is to give proper shape, remove fruit spurs from the large limbs, and cut out dead or diseased wood.

Thrips attack pear-bloom, causing it to fall, and giving the leaves a shaggy diminutive appearance as if they had been exposed to fire.

Tobacco decoctions or other sprays will hold the insects in check and insure a good crop of fruit. Rains or cool weather at the blooming period will have the same effect.

San Jose scale attacks the Garber and Smith pear, but it is easily controlled by spraying.

In fertilizing very little ammonia is needed, but plenty of lime, phosphoric acid and potash should be applied. Thinning of fruit should be practised as in peach culture, and for the same rea-

sons. Two or at most three pears to each hand of bloom is enough for the tree to bear if quality of fruit is desired.

Of the older varieties Kieffer, Le Comte and Smith are the best; of the newer, Garber, Cincinnis, Magnolia and Suwannee are to be preferred.

#### PLUMS

To the man who is looking for large returns from a small outlay of money, plums offer a splendid opportunity. They thrive practically on all soils, require but little care, and have but few insect enemies or diseases. The trees and fruit are seldom if ever injured by cold.

The trees do well on thin sandy soil, especially the Kelsey, which will not stand much ammonia. On soils rich in ammonia Kelsey fruit will be off in color and often decay before maturity. With a sparsity of ammonia the fruit is of splendid color and superior flavor.

The trees should be planted from 15 to 20 feet apart each way and be well cut back, like peaches, at the setting. A larger growth can be secured by heading back about half of each year's growth for the first two years. The limbs should also be opened up to a certain extent, and there should not be more than three or four branching off from the main trunk. After the second year little pruning is necessary.

Thrips, Curculio and San Jose are the most serious pests for South Florida, but these can be combatted and controlled in the same manner as for peaches. The idea that wild plums must be

planted in proximity to cultivated varieties in order to insure a good setting of fruit does not seem to be correct. The cultivated varieties bloom several weeks after the wild ones, and when thrips are checked by spraying or rains, they set a good crop regardless of whether there are wild trees around or not. It is purely a matter of thrips, not of pollination.

The Kelsey is unquestionably the most popular market variety, as the fruit is large, handsome in appearance and of excellent quality. The Excelsior is usually considered a better bearer, and has the advantage of blooming earlier when there is less thrip. Terrell, McRae and other varieties do well.

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We feel our time is limited, and certainly space. The list of deciduous fruit trees grown in and adaptable to Florida is a long one, and we have only here touched upon the three principal ones, or rather those which are the most taken up and cultivated. There should still be much to be said on the fig, the mulberry, dwarf pear trees and the quince, upon the English or rather the Persian walnut, and the list might even include the blackberry and the dewberry. In our opinion these should be made subjects for separate papers at our next meeting when more statistics and reliable information can be gotten together than what we are in possession of at this time. Of these we think the culture of the fig is the most important, and there are many who are now trying this out, but as yet it is too early to obtain very conclusive data.

In conclusion we think a few general pointers on fruit might be of service to many of our members and to those who will subsequently read this paper in the published Proceedings of the Society.

The main business of a fruit tree is to produce fruit and not wood, and it is up to the grower to see that the fruit is marketable and salable as well as eatable.

The most important point from a market standpoint is high color. Color is influenced to great measure by fertilizer. Phosphoric acid perfects the for-

mation of seeds, and hastens the maturity of the fruit. Potash gives richness of color and helps to build up the fruit. But phosphoric acid and potash work hand in hand, the former perfecting the seed, the latter the fruit or pulp. Nitrogen, when used in excess, causes too great a growth of leaf and wood at the expense of both fruit and color. If farm-yard or stable manure is applied alone to the soil, the fruit will be lacking in color.

It pays to grow the best in the best possible way.

## PEACHES

### Aaron A. Lewis, Kathleen, Fla.

*Mr President, Ladies and Gentlemen:*

A few years ago there was quite an interest taken in peach-growing in Florida for commercial purposes, especially in my home county (Polk), to which my paper will be confined.

The industry has not been very successful, in fact, has been very disappointing and in most cases a total failure. Quite a few are planted yet, each season, but not sufficient to create commercial interest, only for home and local markets.

Eternal vigilance is the watchword for this consumption, as from one to two and sometimes three crops of fruit may be realized from one planting before the tree is dead.

To keep the home supplied with peaches a few should be set each year.

I have seen vigorous and beautiful trees laden with fruit on one side of the yard or garden, and dead and dying on the other. This can be seen in my garden now. The planting of a few trees each season is the practice of many of our peach growers in order to evade, for a short time only, the ravages of the dreaded root-knot.

The question of varieties is about as knotty a one as the grower runs into; however, like other fruits, the local needs and conditions should be tried out and plant the variety which best suits the locality. The Peen-to, Jewel, Waldo, Bidwells Early, and Bidwells Late, all have been tried and given fairly good results.

The location and preparation of land is so well known I need not say very

much; however, will suggest a well drained, fertile, deeply prepared and thoroughly cultivated soil, with a clay sub-soil.

January or February is the best time for planting, shallow and fast cultivation, especially in dry weather to conserve the moisture. In setting young

trees, cut the roots well back, the top should also be cut to a uniform height, two or three feet as to age.

I wish to emphasize one fact, in order to keep a supply of this luscious fruit each season, to set enough young trees to meet the demand, keep them coming in all the time to off-set the going out.

# Tropical Fruits

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## NOTES ON MARKETING AND CULINARY RECIPES

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Mrs. P. H. Rolfs

*Mr President, Ladies and Gentlemen:*

During the development of the tropical fruit industry in Florida, there has come to the writer many amusing and valuable experiences. It is amusing to look over past records and find a check retained as a valuable souvenir amounting to five cents, received in return for two crates (14 dozen fruits) of No. 11 seedling mangoes. This was received in 1906, and it is most gratifying to be able to state that during the past season some of our new fiberless mangoes sold as high as 50 cents each. Much of the skill and labor required to place better fruits on the market can be credited to the efforts of the members of this Society, who are interested in the tropical fruit industry.

The mango season of 1914, extending from April, when the first seedlings were marketed, to October, when the last of the Totofari were taken from the trees, gave some interesting notes. The fruiting of the new Indian varieties is being watched with intense interest. The grower who succeeds first in bringing these to ripening is quite noted locally. It was the first year that a sufficient quantity of the finer fruits were

grown to allow them to be well distributed on the markets. It was also the first year to allow a fair trial of the parcel post shipments.

### SHIPPING BY PARCEL POST

This method requires much time for wrapping and packing, but it is interesting and satisfactory, in that it brings the grower and consumer more in touch with each other. The grower learns what the consumer wants and the consumer learns what the grower has to offer.

I would urge a more general use of the corrugated paper parcel post carton in mailing fruits. These are quite inexpensive. If they are not handled by your local dealer your postmaster will gladly furnish you with address of manufacturer, from whom you can order direct. We may not yet have an ideal container for each kind of fruit, but I am sure if we call for such the manufacturer will produce it for us. I was assured by one manufacturer that if my needs were not met, as to size, etc., that if I would give requisite measurements and order a sufficient number some weeks before needed, that same

would be put on the market. These cartons should be more generally on sale by local dealers in fruit sections. I used them in shipping both avocados and mangoes as far as Seattle, Washington. The fruit was received by the consumer in satisfactory condition.

I found that one of the best ways to advertise the new mangoes was to put a complimentary specimen in the shipment of other varieties. The testing of one specimen of Mulgoba was almost invariably followed by an order. One of my correspondents who considered the common mangoes not fit to eat was so infatuated with the Mulgoba that he insisted after the crop was gone that I should examine the trees again and see if I had not overlooked a specimen or two. It is not likely that one would have been overlooked when they were selling for 25 cents each.

#### NEW USE FOR MANGOES

In a twenty-page article prepared on Tropical Fruit Recipes and published in Report of Florida State Horticultural Society for 1911 I gave several methods of using the common mango. (Copies of this report can still be obtained from the Secretary for one dollar each.) With the advent of our fiberless sorts more can be given and I ask space to add a few of the most popular that were tested in my own home.

No fruit can surpass a well ripened mulgoba mango, either halved and served in skin or sliced as a peach and eaten with cream and sugar. The Ami-ni and Nucha are close seconds, while some connoisseurs prefer the Cambodi-

ana and Cecil. The Soondersha with its piquant spiciness suits other palates and is acknowledged by all to be the best for cooking purposes.

America is awaking to the fact that she has been importing many products which should be produced at home. Why import relishes when our own mangoes are so readily made into chutneys and pickles? In the Soondersha mango we have, I believe, our best basis for chutney, although good chutney can be made from the common seedlings. The following rule will prove a safe guide to follow. One must keep in mind variations in sizes of mangoes, onions, pepers, etc. It is also necessary to keep in mind whether hot or mild, sweet or sour chutney is desired and vary the formula accordingly.

#### MANGO CHUTNEY

One quart mangoes, green preferred; 1 onion; 6 sweet peppers; 6 hot pepers; 1 tablespoonful salt;  $\frac{1}{2}$  pint grapefruit or lime juice;  $\frac{1}{2}$  pint vinegar;  $\frac{1}{2}$  pint brown sugar;  $\frac{1}{2}$  lb. raisins; 1 tablespoonful white mustard seed.

Peel mangoes and cut from seed. Sections should be in about one-half-inch cubes. Chop onions and peppers fine; add salt, let stand one hour and drain, discarding liquid. Heat to boiling fruit juice, vinegar, sugar, add raisins, mustard seed and prepared mangoes, pepers, etc. Boil about thirty minutes. Put in jars and seal at once. All chutneys are better after standing for several weeks.

**MANGO PRESERVES**

The mulgoba mango has proven by test to be one of the best of our tropical fruits for the making of preserves and sweet pickles, surpassing even the peach, and it is quite possible that others of the fiberless group may prove equally good.

Peel mangoes and cut in neat sections. Place in boiling syrup made with one cup granulated sugar to each quart of sliced fruit with water to form syrup. Cook carefully until well sterilized. Place in jars and seal at once.

**MANGO SWEET PICKLE**

Select small ripe mangoes. Peel and place in stone jar, cover with syrup made by boiling equal parts sugar and vinegar with sufficient whole cloves, all-spice and cinnamon to produce desired flavor. When cold drain and reheat liquid and again pour over fruit. Repeat several times. The last time place fruit in boiling syrup and when well heated put in wide mouth jars. Seal at once. The continued draining off of

the liquid and reheating cooks fruit without breaking it.

**FRIED MANGOES**

Peel mangoes and cut in neat sections. Fry in butter or drippings and sprinkle with salt and sugar. Serve hot.

**MANGO ICE CREAM**

Make your plain ice cream as basis. To each quart add one pint ripe mango pulp and freeze.

**MANGO SUNDEA**

For this most delicious of all deserts have mangoes cut in half either length or cross-wise, and well iced. When ready to serve fill cavity made by removing seed with plain vanilla ice cream. The Mulgoba, Amini, Totofari, Nucka, Cambodian and Cecil are all adapted to this method of serving and one has the real sensation of eating the dish as well as the contents. It has proven quite popular at cafe and lunch counters as well as at the home table.

**THE DASHEEN AND ITS CULTURE****Wm. H. F. Gomme, Lake County**

*Mr President, Ladies and Gentlemen:*

Having been requested by the chairman on Sub-Tropical Fruits to prepare a paper on same, I take pleasure in addressing you on the new commodity, namely, the Dasheen or Colocasia esculentum. This plant, though apparently

new to most of you, is of ancient origin, having been evidently cultivated in China, hence the name "De la Chine," which being translated from the French means "from China"; this derivation is uncertain, but it is thought by Meffes Barrett Young to be fairly authentic.

For the last few years I have been growing this useful plant at Brooksville, Florida, in the United States Department of Agriculture's Foreign Plant and Seed Introduction Field Station, and had ample opportunity for studying its value. The Dasheen contains a higher per cent of protein than Irish or sweet potatoes, and can in this Southern climate be grown easier, yield more, and is a better keeper than either of the commodities just mentioned. It can be cooked and used the same way as the Irish potato, i. e., baking, boiling and for stuffing, and in addition, almost the whole of the plant can be used for culinary purposes, the leaves for spinach and the bleached shoots for asparagus.

Where an acre or more is planted, it is found advantageous to plant in check three by four, or three and a half by three. This method does away with a considerable portion of hoeing, which is an expensive item. The hammocks are best adapted to this plant, and seed tubers weighing from one and a half to two ounces, are planted practically one inch below the level, a three inch bull tongue run down the rows twice, makes a sufficient depression for planting, tubers can be dropped in the row at a distance of three or three and a half feet, and covered by running the bull tongue along one side, or the hind teeth of a Planet Junior five tooth run along each side at one operation. The seed tubers should not be cut, but planted whole, corms or large tubers, weighing from one to five pounds, can be cut in half transversely, but as these corms can be

used for other purposes, the cutting of same is not advised unless short of seed.

When plants are a few inches high, it is advisable to cultivate with five tooth cultivator or bull tongue, so eradicating obnoxious weeds, which later appear unsightly and in the way when harvesting. Cultivation should be kept up to conserve moisture, at intervals, and the last three cultivations a six-inch plow should be used, throwing the soil gradually to the plant. Care must be exercised at this operation in not cutting the rootlets, which in dry season feed close to the surface. Cutting off roots in cultivation will retard the yield and growth, and the lower leaves will turn yellow. Planting should take place about March 1st, the plant will mature about the end of October, though young tubers can be harvested in July and August.

Cultivation should cease at the end of August or the beginning of September, when the leaves of the plant supply sufficient cover to keep down weeds and keep in moisture. Maturing of the plants can be noticed by the yellowing and the dying back of the base leaves, and the plant itself will have a yellowish hue with yellow spots on the leaves. It is not advisable to plant Dasheen on muck or high pine soil. The muck soils produce excellent leaf growth, but the quality and keeping propensities of the tubers are poor. On high pine land the soil is usually too dry and lacking in humus.

Harvesting takes place about November, either before or after frost, a light frost will kill the foliage to the

ground, though not injuring the tubers, but it is advisable to harvest as soon after a frost as practicable; the crop can be dug by hand or plowed out. On small areas the former method is recommended as less tubers are damaged. On large areas, free from stumps, the ten-inch plow is practicable; this can be run under the clumps, turning them over completely. Harvesting by hand can be operated by three men, one with a spade, loosening the clumps, the other pulling them over to one side, exposing the roots and shaking off superfluous soil. The diggers should be followed up by another man who breaks the clump, pulls off the leaves and exposes the corms and tubers to the air and sun to dry. The corms and tubers should remain in the field a few days until thoroughly dry, when they can be picked up and stored. At first, the crop should be stored in a covered place with plenty of air, being sheltered from rain and spread out not deeper than six inches, later they can be pulled into heaps if not required for immediate use, but they must be examined from time to time to prevent decay.

An acre of Dasheens has yielded over three hundred bushels, and it takes approximately one bushel to seed an acre. As yet, no market has recognized this useful commodity to a great extent, and

it is hoped that the public taste will be further educated to it eventually. The Dasheen should never be eaten raw on account of its slight acidity, the three Trinidad varieties on which the Department of Agriculture are now working, contain apparently less acridity than any of the Colocasias. Dasheens, when cooked in any way, entirely lose this acridity and are extremely palatable, having the flavor of a good Irish potato, blended with chestnut.

Excellent flour can be made from the Dasheen by a process of slicing, baking and pulverizing, and when used with ten per cent other flour, excellent breakfast cakes can be made. A quantity of Dasheens were sent to Dr. D. H. Kellogg, of Battle Creek, Michigan, who used them in his Sanitarium, so in the future we might perhaps look for "Puffed Dasheens." An excellent substitute for asparagus can be made from this plant by pulling the soil to the young shoots as they grow, so bleaching them, and when about eight inches long, they can be cut and cooked with cream gravy. Another cutting can be made from the same tubers in about three weeks to a month consecutively. Personally I should like to see a small patch of Dasheens on the farms in Florida, as children readily take to them.

## THE LICHEE

Dr. Wm. F. Richardson, Tampa, Fla.

I regret that we have not the time to hear Mr. Taylor's paper and discuss this very interesting subject more fully than we now seem to have the time to do. There are a good many things we have gone over somewhat hurriedly at this morning session, particularly to one thing that I think we should discuss more, and that was the report of the Committee on Ornamentals. I think that was one of the most valuable reports we have ever had, and I am sure we all enjoyed it.

Speaking of ornamentals, the report of the Committee on Ornamentals was not the only ornamental thing we have had during this session. The canker situation has been ornamental and instructive. We have had many ornaments, and if you want to see something that is useful as well as ornamental, you have only to look at Mr. Hamner.

Mr. Taylor, who prepared this paper on the Lichee, is what might be called an enthusiast. It takes enthusiasm to move the world. Enthusiasas have always been the great factor in great movements that have been of utility to the world. Moses was an enthusiast; Paul was an enthusiast. Coming down to our own time, Burbank and other men like him, are enthusiasts.

I have no ambition to read papers, and I was very much disinclined to

comply with Mr. Taylor's request, but when you come to the Lichee, you touch a tender spot in my make-up, and I will read a paper or make a talk for Mr. Taylor or anyone else on this subject.

You may know about the Lichee. You may not know how to spell the word—I do not. Mr. Taylor spells it one way, the Bureau of Plant Industry at Washington spells it another, and the various people living in the countries where the Lichee is raised, spell it another.

We think the orange is the queen of fruits. It is not. The queen of fruits is the Lichte.

It has been the impression that the Lichee is a tropical fruit, but it is raised in latitudes parallel to ours, and I am confident it can be raised in Florida, as it is raised on the eastern half of the globe where it is really further north than Florida. Mr. Taylor's paper shows from reports that it grows as far north as latitude 30, and that it stands a temperature of about 20 degrees in India.

It is to the Chinaman what the peach is to us—and it is a peach, too, if you will pardon that expression. It is eaten out of the hand as it comes from the tree, and that is the best way to get it when it is fresh; and then it is dried, as our peaches are dried, and then it

is eaten by any Chinaman who can get it. You can get it here dried, but that does not give you any idea of what the fruit really is.

It is in size like a very large strawberry and on the outside is not unlike a strawberry—of the strawberry color. That is peeled off and you get a mass of pulp enclosing a small seed, and that pulp is indescribable in its delicious flavor.

It is eaten by more people than any other on the face of the earth. The four hundred million people of China eat it, the teeming millions of India eat it, the people of the Malay Archipelago eat it, and I have no doubt, from the experiments that are being conducted, that we will eat it, eventually.

The government undertook some years ago, to introduce the Lichee. Mr. Taylor does not believe me when I tell him Mr. Fairchild of the Plant Industry Bureau was the first enthusiast to introduce it. They brought a good many plants and endeavored to develop them in California and Florida. I believe in California they are nearly all dead. There are only seventeen out of about one hundred plants, now living. Of these Lichee plants, Tampa is the proud possessor of nearly half of them. Mr. Taylor has three on his place on Nebraska avenue. I have one much larger than his, but it has not bloomed yet. Mr. Reasoner has five, and five and four are nine, of the seventeen living in America, growing right here in Tampa.

The great difficulty seems to have been in the propagation of the plant. It cannot be grown from the seed. The

government experiments seem to indicate that they cannot bring the fresh fruit as far as the station at Washington and plant it and make it germinate. All kinds of efforts have been made to secure its growth by budding it upon other stocks. It seems to grow by budding upon a longan. The first tree in Florida was introduced by Mr. Reasoner and was budded on the longan. Mr. Taylor at his place here has planted a number of longans and hopes to succeed in budding.

During my visit to China some years ago, I had a special commission from Mr. Fairchild to investigate the propagation of the Lichee. He wanted to send me over there for no other purpose but to find some means by which he might succeed in propagating it. I had letters to all the experiment stations where it is grown, but they told me over there we would have to get it by the means of the system they use in China. They simply wrap a ball of clay around a limb and allow the limb to send out rootlets in the ball of clay and then cut it off.

Whatever the Chinamen can do, I am confident we can do. You go up from Hong Kong and other Chinese cities, and so far as you can see on each side of the river are groves of Lichee. Now, if the Chinamen can raise Lichee by the hundreds of thousands, we can raise them.

As to its adaptation to our climate and soil. My Lichee is surrounded by mangoes and avocados and other tender fruit. In November, there was cold enough to knock the leaves off most of

my mangoes and killed some of the younger ones and killed some of the avocados, but the Lichee was not hurt at all; the leaves were not even colored. My conclusion was that the Lichee can stand more cold than the mango or avocado or guava, and it is worth more than all three combined.

As I said before, Mr. Taylor is very much of an enthusiast and because of his success in getting his trees to a state of blooming and setting fruit, there can be no question about the other steps necessary to its successful introduction. He has on the way a consignment of fruit and seeds from Honolulu and hopes to succeed in budding on the longan stock.

He is very much in earnest in this matter, and has taken it up with the Department at Washington, and he

thinks they are not giving the assistance they should. I am inclined to think that his enthusiasm for the Lichee is so great that his judgment is a little bit warped in his belief that they are not inclined to help him.

He came to my house—it was the first time I had ever seen him or known of him—and looked at my Lichee and talked it over with me. I wanted to know something of him, and I asked him what business he was in. He said, "I am looking after my trees." I said, "how many trees have you?" He said, "Three." Those were his Lichee trees.

He is devoting his life to the Lichee, and I think we ought to help him, though I am not as enthusiastic as he is, and do not propose to give up all my time.

## EXTRACTS FROM LICHEE LITERATURE

W. S. Taylor, Tampa, Fla.

*Mr President, Ladies and Gentlemen:*

### THE LI CHEE

"A tree that they have introduced from China into Bengal. They have a kind of Plummets that they do call Lechi's."—Mendogas History of China, 1588.

"The Licheas is as big as a small pear, a somewhat long shape, of a reddish color."—Dampier Voiages.

"Delicious fruits, such as Rambostan, Lotchees and Durcans."—New Account East Indias, 1727.

"Among the plants are Litcheas, a very fine fruit of China of several sorts."—Annual Register, 1775.

"Of the fruits which this season offers, the finest are Leechees and Man-goes."—Journal, Upper India Provinces, 1844.

"He tried also to naturalize in Worcestershire, the delicious Leechees."—Macaulay, 1841.

"The fruit of a plant, native to China. It resembles a long strawberry in color and form. The dried fruit is exported."—Webster's Dictionary, 1875.

"One of the most delicious fruits of China, and the Malayan Archipelago. It is extensively cultivated in the provinces of China, Cochin-China, but is said to be impatient of a climate much more hot or much more cold."—Peoples Cyclopedias of Universal Knowledge.

"Holding under a shell of ruddy brown, its translucent and delicious flesh."—In My Garden.

"The delicious Litchi Nuts."—Hartley's Magazine, 1876.

"Here are a hundred and sixty Lichee fruits for you."—Steck's Indian Fairy Tales, 1879.

"The Lichee is the finest of Chinese fruits, having a white flesh with the taste of the best of grapes."—Popular Science Monthly, XXVIII.

"Tree of moderate size, with brown bark, large leaves and a fruit produced in bunches which are pendant from the extremities of the twigs. The fresh fruit is pleasantly sweet and reported to be one of the most delicious known. It is sold in America and Europe in a dried state, and though the pulp is much diminished in size, it retains a considerable portion of its flavor."—Encyclopedia Americana.

"It has a somewhat agreeably flavored pulp, containing a single seed and inclosed in a rough papery shell. It is eaten, both fresh and dried and often made into preserves. It is cultivated in China, the Philippines, India and elsewhere for its fruit."—Webster's Unabridged Dictionary, 1911.

"The most common variety is nearly round, about an inch and a half in diam-

eter, with a thin and brittle red shell which is covered with wart-like protuberances. The pulp, when fresh, is white and nearly transparent, sweet and jelly-like and contains a single shining brown seed. The fruit is borne in clusters. It is dried for preservation, the pulp shrinking away from the shell, and in this state it sometimes finds its way to western ports."—Century Cyclopedia.

"The most celebrated fruit of China. The tree grows in southern China and the Philippine Islands. 'The Li Chee looks like a strawberry in size and shape, the tough rough red skin enclosing a sweet watery pulp of white color, surrounding a hard seed.' "—The "Middle Kingdom," S. Wells Williams.

"A large evergreen plant of China and the Malay Peninsula, and extensively grown in many tropical countries. It is highly prized for its fruit, which is said to be one of the most delicious known. The fruit is a nut of an inch or more in diameter, which consists of a thin, brittle shell within which is a sweet pulp, surrounding a round seed. The pulp separates readily from the seed and is eaten fresh or dried or as a preserve. In the dried state, the nut keeps a long time and it is mostly in this form that they are found in commerce."—New International Encyclopedia.

"A tree producing a fruit much esteemed in China."—New Websterian Dictionary.

"The fruit of the *Nephelium Li Chi*. A small tree, native of southern China and one of the most important indigen-

ous fruits. It is also cultivated in India. The tree bears large compound leaves with two or four pairs of leathery lanceolate pointed leaflets, about three inches long, and panicles of small flowers without petals. The fruits are commonly roundish, about an inch and a half in diameter with a thin brittle red shell which bears rough protuberances. In the fresh state they are filled with a sweet, white pulp, which envelopes a large brown seed, but in the dried condition, the pulp forms a blackish fleshy substance. The pulp is of a reolux of an aril, that is an additional seed coat.

Nephelium belongs to the natural order Sapindaceae and contains about 22 species.

Nephelium Longana is a native of southern China. It is cultivated in that country, in Malay Peninsula, India and Ceylon for its fruit, which is smaller than that of the Litchi, being from one half to an inch in diameter."—Encyclopedia.

"Litchi. A Chinese edible fruit, which is occasionally to be found in the fruit stores of our seaport cities. It is produced by a small tree belonging to the Spindacea, the family which includes the horsechestnut, soapberry, etc.

The leaves are pinnate, and the small apetalous flowers are in pannels at the ends of the branches. The fruit, which is borne in clusters, is globular, about an inch and a half in diameter, and when fresh is filled with a sweet, white, nearly transparent, jelly-like pulp, within which is a single seed.

The Chinese are exceedingly fond of this pulp and esteem the Litchi above all other nature fruits.

The fruit comes to us in the dried state only, but they are dried for house use as well as for exportation. As found in the stores, the very thin, handsomely marked shell, of a reddish brown color and partly empty from shrinking of the pulp in drying, and which tastes somewhat like prunes.

Other species of Nephelium furnish the Longan and Rambuton, fruits highly esteemed in China and neighboring countries, but the Litchi is the only one imported."—American Cyclopedias.

"One of the most delicious fruits of China, Cochin China and the Malay Archipelago. The Chinese preserve the fruit by drying and in the dried state it is imported."—Everybody's Cyclopedias.

# Strawberries

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R. T. Kelly, Plant City, Fla.

*Mr President, Ladies and Gentlemen:*

There are several reasons why strawberry growing has become an important industry. Of these I will mention a few. The strawberry crop comes in a season when it has practically no competitors. It meets a ready market at fair prices and is a money crop. The shipping season for strawberries is continuous from about the 1st of December to the 1st of April. Each section has its certain conditions which may be different from all other sections. Therefore we cannot lay down a set of rules for berry growers in all strawberry sections to follow; but careful selection of soil, plants, and co-operation in marketing applies to all berry sections. Most of the low lands of Florida will grow strawberries, but a dark, sandy loam is preferable, and they will do well on a gray sandy soil, if it is properly drained. Avoid low lands that will become water-logged, for this will give trouble.

In preparing the soil I would recommend deep plowing with implements that will not bring sub-soil to the surface. Use disk harrow for pulverizing where practicable. The land should be kept in first-class condition, so that when setting time comes the plants will have a good bed to start in.

## PLANTS

A number of berry growers order plants in the spring from which they grow plants for the berry crop. These ordered plants can be set from March until May and should be set in  $3\frac{1}{2}$  or 4 foot rows, about 18 inches in the row. Land that is a little high and sloping is preferable for a plant bed on account of drainage. Blooms should be picked off and the plants trained along the rows to allow working. The Missionary variety seems to have the lead, as it comes in early and bears about as long as the market is good.

In our part of the State September and October is the usual time of setting for the berry crop, and there are two methods of setting, the single and the double row methods. Single rows should be 3 feet apart, slightly ridged, and plants ten inches apart in the row.

Double rows should be four or five feet apart, slightly ridged, and plants 10 or 12 inches each way. Berries require a great deal of moisture and frequent and shallow cultivation is necessary to conserve the moisture that is in the soil.

## FERTILIZING

From six to eight hundred pounds of a 4-6-10 fertilizer per acre should be drilled about 15 or 20 days before set-

ting the plants. About time bloom appears add 800 or 1200 pounds per acre more, an extra amount of 100 or 150 pounds of sulphate of potash added to this application will balance up the softening of berries later on caused by an application of nitrate of soda at time berries begin to run down in size.

Great care should be exercised in

picking and packing strawberries. Use all precautions against bruising and berries should be graded, as small berries packed in the cup with the large berries will control the prices.

The question of marketing is a very large one and no doubt will have to be worked out according to circumstances in the different localities.

# Creating a Cash Home Market for Unshipable Fruits

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C. E. Street, Avon Park, Fla.

*Mr President, Ladies and Gentlemen:*

While this organization is not primarily interested in the problem of marketing Florida fruits, nevertheless it is probably safe to say that the bulk of its membership is vastly interested in this question.

The Florida Growers' and Shippers' League is so closely associated with this organization that it is holding its annual meeting in conjunction with this Society. The writer also notices that some of the active members of these two organizations are important factors in The Florida Citrus Exchange; hence he will take the liberty to say that a cash home market for unshipable fruits undoubtedly interests all three corporations.

In advancing his theory of how to create a cash home market the writer will endeavor to point out why these organizations should seriously consider this problem and how they can solve it.

Lest some of the things the writer intends saying be misconstrued, he desires to say in advance that he thoroughly believes in the efficiency of co-operation; that he is an admirer of and a believer in the good work already accomplished by each of these organizations in the past. Supported by many

of the best growers in the State, and directed by as fine brain and unsullied integrity as can be found in this or any other State, these three organizations are destined to grow in usefulness to both the grower and consumer.

Why these organizations should consider the cash home market problem is easily answered, for the reason that the largest part of their membership have much of their worldly possessions tied up in groves of one kind or another. Also it is a fact that the cash home market is the most desirable market for the producer of any commodity.

How best to solve this question will always be open to more or less debate, owing, largely, to the diversity of viewpoints from which it is approached. That the solution here offered is both practical and reasonable cannot be successfully contradicted is the belief of the writer. Hence the reason for asking your consideration of this matter.

The writer will mention grapefruit more particularly, but as all other unshipable fruits can be handled in a somewhat similar manner, he means to say that practically everything said of the grapefruit will apply to the other fruits—yes, and to vegetables too. Many members have asked themselves

these questions this year: "What does it profit me to save my grapefruit tree from the citrus canker and then see the fruit it produces rot on the ground?" "What doth it avail me to pick and neatly pack my fruit and then have to pay the freight bill?" The answer is: Make and bottle pure unfermented grapefruit juice, and out of the residuum make desirable by-products, such as grapefruit marmalade, candied grapefruit peel, citric acid and possibly some essential oils.

The first man to establish a grape juice bottling works found the vineyards of New York in a dilapidated condition and rapidly degenerating. The vine-grower was either a bankrupt or believed he soon would be. This first grape juice bottler is now rated as a millionaire. The vine-grower is, on the whole, prosperous, and the acreage of vineyards has largely increased since those dark days.

One is almost justified in saying that the canner made the pineapple grower of Hawaii; certainly he made him over into a very much better looking and more prosperous individual.

It is sad to think what would become of many of the California fruit growers were the immense canning and preserving establishments of the Pacific coast to permanently close their doors.

Thousands of tons of fruit and vegetables annually rot in Florida groves and fields, while other thousands of tons are imported, at enormous expense, to sustain life in the same people who stand helplessly by and watch the prod-

uct of their own hands wither and decay.

Perhaps some are saying, at this very minute, "Why worry? All these things will adjust themselves in the course of time." To be sure they will. Christmas is coming, and time will, some day, be no more; but neither fact is a valid reason for sitting still, idly awaiting their approach.

Perhaps some few are saying, "Who ever heard of grapefruit juice?" To those the writer will say that grapefruit juice can be cheaply bottled, so that it will retain its natural flavor and appearance and may be kept indefinitely as long as the bottle remains sealed, and twenty-four to forty-eight hours after opening. The writer believes—and not without reasonable grounds—that grapefruit juice can be made one of the most popular temperance drinks in the United States, rivaling, if not surpassing, grape juice. Its health-giving properties and pleasing taste cannot be excelled by that of any drink that goes down the gullet of man.

Again, perhaps the critics are saying: "Manufacturing is not the grower's business, neither is it the purpose for which the Society, the League or the Exchange were founded." The reply is that the Exchange is in the manufacturing business—and the other two organizations are giving it at least moral support. A packing house is a factory, though all factories are not packing houses.

The cane-grower finds it necessary to become a manufacturer. The fruit-grower of Utah, almost universally, and

in many localities of California, as well as other places, finds it profitable to become a manufacturer. The sugar-beet raiser of Colorado has regretted many, many times that he ever allowed "The Trust" to become his manufacturer. The vine-raiser of New York realizes now that he would be in a safer position had he first occupied the manufacturing field, and put up his own grape juice, instead of allowing outsiders to pre-empt it.

That the Exchange does not occupy the sphere of influence its ambitions seek is known to all who are acquainted with the raising of Florida fruits. Could it fill the field it is trying to cultivate, in a more profitable manner, every grower would be more prosperous and the consumer would be better served.

What, then, is the thing to do? Let the Exchange more securely harness manufacturing up with growing and selling. The producer will then soon find the permanent "hard road" to a lasting prosperity. Co-operative selling of the products of the field and grove will never be the success it should be

till the co-operative manufacturing side is developed to its logical conclusion. How long would the Armour or Cudahy millions last if their packing houses threw away the hide, hair and tallow?

If the Exchange demonstrated its ability to profitably handle all the fruit of its members—say, in some one locality first—every grower would soon be clamoring for admission. It would then fulfill its destiny.

Yes, this is a dream, now; but brains, mixed with energy, judgment and perseverance—all of which are contained within the membership of either of these organizations—can soon make it a living reality.

The factory that will turn the unshipable fruits into merchantable products will create a cash home market—the most desirable market on earth. The writer believes that the Exchange is the agency that can, if it will, accomplish this result. If it rises to the occasion, so much the better for the Exchange. At any rate, for the sake of the grower's own best interest, let it be done cooperatively.

# Necrology

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## E. S. Hubbard and Edgar A. Wright

### CHARLES R. HILL

Charles R. Hill was born at Albion, N. Y., Feb. 4, 1857. For several years prior to 1889 he was employed as a clerk in the audit office of L. S. & M. S. Ry. Co.

In 1889 he resigned this position and went to Palatka, Fla., where he was employed by the J. T. & K. W. Ry. Co. on passenger accounts and as traveling auditor. In 1891 he was at St. Augustine, Fla., employed in the United States engineers' department under Capt. Black and engaged in the examination of rivers and harbors on the west coast preparing statistics relating to the same.

For about six years (1893-9) he was traveling auditor on the Santa Fe system under W. W. Pope, local auditor.

In 1899 he resigned this position and accepted a position with the R. S. & M. S. Ry. Co. in the general office, taking full charge of station accounts and was also register of contracts. In 1903 he was employed by the so-called Chicago Short Line Ry.

In 1905 he was with the C. H. & D. Ry. Co., at Cincinnati, Ohio, in charge of station accounts. In 1906 he was in the office of the National Surety Company at New York, N. Y.

In 1907 or 1908 he retired from business and came to Orange County, Florida, for a long rest.

He then held a position for several years with the E. O. Painter Fertilizer Company, who greatly regret his loss.

### FRANK DURAND CURTIS

Frank Durand Curtis died Friday, Jan. 8th, at his home on Elm St., Harrington Park, of hemorrhage of the lungs resulting from blood pressure from which he had suffered for eight weeks. He was 54 years of age, having been born in Ravenna, Ohio. He had lived in Harrington Park for seven years.

For a number of years the deceased was a member of the firm of Adams, Curtis & Chambers, court stenographers of New York City, and at the time of his death was with the Great Northern Railroad in the New York office. Shortly before his death his wife had undergone an operation at the Nyack Hospital, and her husband's serious condition was withheld from her until the last. He is survived only by Mrs. Curtis.

The funeral services were held at his residence and were largely attended, about one hundred friends from in and

around New York coming to pay their last respects to one whom they had greatly admired. Rev. H. M. Cox officiated, and the remains were taken to Ravenna, Ohio, for interment, accompanied by Mrs. Curtis.

Mrs. Curtis wishes to thank her

friends and neighbors for their kindnesses during her bereavement.

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Miss Anna E. Steere, Cocoanut Grove, Fla., was also a member of this Society, but no particulars of her life have reached this committee.

# Annual Reports

## REPORT OF AUDITING COMMITTEE

*Mr President, Ladies and Gentlemen:*

The Auditing Committee appointed by your president to examine the accounts of the Secretary and Treasurer has done so and found them correct. The Committee wishes to congratulate

the Society on the excellent financial condition which is shown by the report of the Treasurer.

F. R. ROBINSON, Chairman,  
M. S. BURBANK,  
A. M. HENLEY.

## REPORT OF SECRETARY

*Mr President, Ladies and Gentlemen:*

You will recall at the meeting last year Mr. Hamner promised us if we would come to Tampa in 1915 we would have the biggest meeting we ever had and the largest enrollment of members in the history of the Society. For the past thirty days the Secretary has been so busy receiving dues and issuing membership certificates that I have not had time to prepare any flowery introductory remarks to my report. But there is an old saying that figures tell the story. This year I have the figures.

Mr. Hamner's prophecy has come true. We have 604 members this year at the opening of the meeting against 585 last year, and a registered attendance of 488. Last year we had 332 in attendance. 201 have been added since the meeting began, making a total to date of 807 and 111 life, or 918 in all.

Many thanks are due the Experimental Station, the nursery firms, the

fertilizer and crate material people for sending out notices of the meeting along with their correspondence. The Florida Grower has also rendered us valuable assistance all through the year as well as the newspapers over the State.

Mr. H. E. Cornell and Mr. N. B. Brokaw have both been especially active, each sending a long list of members. Especial thanks are due Mr. B. L. Hamner for the excellent railroad rate he secured for the members to attend this meeting. Also his untiring efforts to make everything run smoothly and to ensure everyone having a pleasant time.

And now for the figures:

|   |          |
|---|----------|
| Reports sold for years prior to<br>1914, 32 -----       | \$ 32.00 |
| Reports sold for 1914, since last<br>meeting, 360 ----- | 360.00   |
| Life members -----                                      | 50.00    |
| Pins sold, 3-----                                       | 3.00     |
| Postage credit -----                                    | 1.14     |

## FLORIDA STATE HORTICULTURAL SOCIETY

|                           |            |
|---------------------------|------------|
| Donations received -----  | 364.00     |
| Memberships for 1916----- | 3.00       |
| Memberships for 1915----- | 755.00     |
|                           | <hr/>      |
|                           | \$1,568.14 |

*Dr.*

|                        |          |
|------------------------|----------|
| Stationery -----       | \$ 41.65 |
| Circular Letters ----- | 23.00    |
| Postage -----          | 46.89    |

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|                          |            |
|--------------------------|------------|
| Miscellaneous -----      | 15.04      |
| Secretary's Salary ----- | 100.00     |
| To Treasurer Hart -----  | 1,341.56   |
|                          | <hr/>      |
|                          | \$1,568.14 |

Respectfully submitted,

OKLE C. PAINTER,

*Secretary.*

## REPORT OF TREASURER

| 1914   | <i>Cr.</i>      |
|--|-----------------|
| May 1—To Balance on hand---- \$392.62                |                 |
| May 1—To Mrs. Dr. Forster's fee 1.00                 |                 |
| May 8—To Buckeye Nurs. cont. 25.00                   |                 |
| May 14—To Miss Painter's check 400.00                |                 |
| June 4—To Miss Painter's check 175.00                |                 |
| Sept. 12—To E. O. Painter Estate 60.00               |                 |
| Dec. 30—To Miss Painter's check 150.00               |                 |
|  |                 |
| <hr/>  |                 |
| 1915   | <i>Cr.</i>      |
| Feb. 24—To Burton M. Varney's fee ----- 1.00         | \$ 909.83       |
| Mar. 13—To R. S. Baldwin's fee 1.00                  | <hr/> 5.28      |
| Apr. 10—To Mr. and Mrs. Mendell and Miss Gibson 3.00 | <hr/> \$ 915.11 |
| Apr. 13—To Mr. and Mrs. Elwangers' fees ----- 2.00   |                 |
| Apr. 15—To checks and cash from Miss Painter- 616.56 |                 |
|  |                 |
| <hr/>  |                 |
|  | \$1,827.18      |

| 1914                                  | <i>Cr.</i> |
|---------------------------------------|------------|
| May 1—By J. H. McFarland---- \$ 77.70 |            |
| June 20—By Miss Ford, stenog. 69.65   |            |
| July 30—E. O. Painter Ptg. Co. 124.62 |            |
| Aug. 10—E. O. Painter Ptg. Co. 645.38 |            |
|                                       |            |
| <hr/>                                 |            |
| Interest for the year-----            | \$ 917.35  |
|                                       |            |
| <hr/>                                 |            |
|                                       | \$ 909.83  |
| <hr/>                                 |            |
| Interest for the year-----            | 5.28       |
|                                       |            |
| <hr/>                                 |            |
|                                       | \$ 915.11  |

Respectfully submitted,

W. S. HART,

*Treasurer.*

## REPORT OF EXECUTIVE COMMITTEE

The Executive Committee of the Florida State Horticultural Society met in the office of the Secretary, February 5th, 1915, with the following present:

P. H. Rolfs, Chairman,  
H. Harold Hume,  
E. S. Hubbard,  
G. L. Taber,  
Okle C. Painter.

At the request of Chairman Rolfs, Mr. B. L. Hamner of Tampa met with us.

The Secretary was able to report all

bills paid to date and \$305.00 in the treasury.

Mr. Hume reported for the Legislative Committee that they had been at work on a crop test bill for sixty days and same was practically ready to be presented to the Legislature now.

The question of a date for holding the next meeting was taken up and thoroughly discussed. The date finally agreed upon was April 13th to 16th inclusive.

It was moved by Mr. Taber and seconded by Mr. Hubbard that Mr. Hume

and Prof. Rolfs be a committee to prepare the program for the coming meeting. In connection with the program President Hume and Prof. Rolfs were instructed to arrange for at least one or two special speakers for the meeting.

Mr. Hamner was appointed Chairman of the local committee with Mr. B. L. Jones and Mr. Collins Gillett acting on the same committee.

Mr. Hamner kindly offered to take up the question of railroad rates, believing he would be able to get for us a little better rate than we have previously

enjoyed, and the Executive Committee gave him authority to act for the Society in this position.

The Tampa Bay Hotel was made Society headquarters and the place of holding the meetings the Tampa Bay Casino.

The Secretary was instructed to have printed some slips to go out in the regular mail.

There being no further business the Committee adjourned.

OKLE C. PAINTER,  
*Secretary.*

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#### REPORT OF COMMITTEE ON LEGISLATION

Several matters of importance have been before our Committee for consideration. The Society has felt for a long time that the State should recognize the value of our organization to the extent of an annual appropriation, as is done in nearly every other State in the Union, as financial aid from this source would enable the Society to extend the scope of its activity very materially. We find, however, that while societies propose, conditions as they arise dispose. The great necessity for the passage of the Plant Act now pending in the Legislature, with its accompanying appropriation for enforcement, and the still greater necessity for State aid to keep up the fight on Citrus Canker, are, it seemed to us, of so much greater importance, and the need for speedy relief so much more pressing, we decided to postpone until a more convenient season any request for State aid for this

Society, and hope this will meet with your approval.

Taking up the history of former attempts on the part of this Society to secure the passage of a crop pest bill, we give you a short resume of what has been done. At the Orlando meeting three years ago, a crop pest bill was submitted to the Society by a committee appointed for that purpose at the preceding meeting. This bill met with considerable opposition, and as the Legislature was about to adjourn, it was realized that even if submitted its passage would have been very doubtful, owing to the flood of bills to be taken care of before adjournment. A committee was then appointed by the President to revise the bill. This committee consisted of Gillett, Chairman; Taber, Painter, Connor, Stewart and Felt. Another bill was drawn and presented at the last session of the Legislature and

a committee of this Society, headed by L. B. Skinner, went to Tallahassee to endeavor if possible to secure its passage. It was passed by the Senate, but lost out in the House.

This brings us up to November, 1914, when a joint meeting of the Legislative Committee of the State Horticultural Society, the Executive Committee of the Growers' and Shippers' League, and representatives from the Experiment Station, and the Citrus Exchange, was called by the President of the Horticultural Society to meet in Orlando Nov. 9, 1914. At this meeting Mr. Hume, Mr. Tenny, and Judge I. A. Stewart were appointed a committee to draft a crop pest bill to be submitted to a subsequent meeting.

Early in February, 1915, these representatives were again called together and the bill drafted by Messrs. Tenny and Hume (Judge Stewart on account of legal matters being unable to assist) was submitted and approved with slight changes. A committee consisting of Mr. Krome, Dr. Hiram Byrd and Mr. Kilburn from Dade County was also present.

Mr. Hume was instructed to lay this bill before Governor Trammell and secure his endorsement. In the meantime, however, another bill was received from Mr. C. L. Marlatt, Chairman of the Federal Quarantine Board, Washington, D. C., which so impressed itself upon our President that he modified it and placed the two bills before the Governor. Governor Trammell reported a few days later, favoring the modified Marlatt bill.

This bill was then substituted for the bill drafted by Messrs. Tenny and Hume. A campaign by correspondence was taken up by President Hume with the members of the State Legislature. Many of them were visited by Mr. Hume and others.

The extreme gravity of the canker situation in Dade County, as affecting the whole State, was ably presented to the February meeting in Orlando, by the South Dade County delegation, and it was decided to ask for a sufficient appropriation to take care of this menace, in addition to the appropriation carried in the plant act bill. Later, Dr. Hiram Byrd offered his services in behalf of this work and Messrs. Tenny and Hume decided that it would be best for him to undertake it under the auspices of the Florida Growers' and Shippers' League. Dr. Byrd visited a large number of the legislators and rendered service, the value of which cannot be estimated. By the time the Legislature convened, the members of both House and Senate had been very generally acquainted with the canker situation and the necessity for an adequate quarantine law.

Mr. Hume went to Tallahassee on April 5th for the opening of the Legislature, Dr. Byrd arrived on the 6th and Mr. Tenny on the 7th. The work of securing the necessary support was vigorously pushed. On the morning of April 7th, Senator F. M. Hudson of Miami, Fla., introduced two bills into the Senate, the Plant Act Bill No. 4, and the Citrus Canker Appropriation Bill No. 6. These were referred to the

Committee on Agriculture, consisting of Senator Drane, Chairman, and Senators Hudson, Cooper, Igou and Middleton, and to the Committee on Appropriations, consisting of Senator Wells, Chairman, and Senators Drane, Johnson, Roland and Green.

The full details covered by these two bills were laid before a joint meeting of these two committees on Friday, April 9th, by Messrs. Byrd, Tenny and Hume. The committees made a unani-

mously favorable report, combined the two bills into one, made certain amendments in accordance with the wishes of our committee, and reported the new bill back to the Senate as Hudson Senate Bill No. 4.

M. E. GILLETT,  
A. H. BROWN,  
G. L. TABER,  
I. A. STEWART,  
O. W. CONNER,  
LLOYD S. TENNY.

### SELECTION OF NEXT PLACE OF MEETING

Invitations for the next meeting were received from Orlando, Fort Myers, and Arcadia. On the second ballot by

a vote of 83 to 75 it was decided to hold the next meeting—1916—in Arcadia.

### ELECTION OF OFFICERS

On Thursday evening, April 15th, 1915, the following officers were elected for the year January 1st, 1916, to December 31st, 1917:

President—H. Harold Hume.  
Vice-Presidents—L. B. Skinner, Mrs. Marian A. McAdow, W. J. Krome.

Secretary—Okle C. Painter.  
Treasurer—W. S. Hart.  
Executive Committee—P. H. Rolfs, E. S. Hubbard, G. L. Taber.

## Resolutions

The following resolution was introduced by Mr. M. E. Gillett, Chairman of the Legislative Committee:

"Whereas, it has long been recognized by every member of this Society, that without proper legislation such as obtains in nearly every other State in the Union, protecting their agricultural and horticultural interests from the introduction of insects, pests and diseases from without, we are laying the foundation for future trouble and this is especially true of the State of Florida, semi-tropical as it is, where our industries are so varied and so subject to the inroads of insects, pests and diseases.

And Whereas, on two occasions crop pest bills endorsed by this Society have been submitted to the legislative bodies of our State and were turned down, resulting as we believe in the loss to the citrus industry of hundreds of thousands of dollars, by allowing citrus canker to gain a foothold, which could have been prevented if proper precautions had been adopted—the same is true of white fly, as well as the disease which is causing such havoc among our potato growers,

And Whereas, realizing the enormous losses which must inevitably ensue without immediate legislative relief is obtained, another bill is now pending at Tallahassee, which bill is in

charge of our worthy president, H. Harold Hume, who has given it almost his entire time for months;

Therefore, be it resolved, that this Society unanimously and unqualifiedly endorses said bill and urges its immediate passage to the end that this serious menace to the great citrus industry of the State be eradicated.

And be it further resolved, that the thanks of this Society as a body and of its members individually be tendered to our president, H. Harold Hume, and his able co-worker, Lloyd S. Tenny, for the great work they are doing for the whole State of Florida, in giving so unselfishly of their time and talents, to the end that our best interests may be subserved."

Mr. Chairman, I move the adoption of that resolution.

Resolution seconded and adopted.

Resolution or motion introduced by Mr. Lloyd S. Tenny following the presentation of the valuable paper by Mr. J. C. Chase, as follows:

Just here I would like to offer a motion. Mr. Chase has touched upon the efforts of the Growers' and Shippers' League to secure a reduction of freight rates on grapefruit. A good deal of the information Mr. Chase has given was given at the St. Augustine meeting, but in not so good or concise a manner as that in which he has given

it to us today. We have been following up the information given at St. Augustine with additional information from time to time and, representing the League, I would like to ask the permission of the Horticultural Society to use Mr. Chase's paper in the immediate future, to act as follow-up work. We would like to have it mimeographed and sent to every representative of the railroads who were present at the St. Augustine meeting. I would make this request and would like a motion passed here today; if it meets with your approval, we would like to make use of this paper.

Motion seconded and carried.

The following resolution was presented by Rev. J. G. Glass:

Mr. Glass: "Resolved, that the thanks of the Horticultural Society is hereby gratefully tendered to the Shippers' and Growers' League through its Secretary, Mr. Lloyd S. Tenny, for its active and efficient participation in the fight for the eradication of Citrus Canker."

"Resolved, That a similar vote of thanks be extended to the staff of the Experimental Stations in the State, and to other inspectors and experimental workers in this field."

Moved, seconded and carried, that this resolution be adopted.

The following resolution was presented by Mr. S. C. Warner.

Mr. Warner: "Resolved, That the Secretary of Agriculture at Washington be and is hereby requested by the Florida State Horticultural Society to fix a chemical standard of maturity which shall apply to interstate shipments of citrus fruit."

Mr. Skinner: I second the resolution.

Mr. Warner: Of course, this applies to all citrus fruits, that which is imported as well; fruit coming from Cuba, Porto Rico and elsewhere. I think it would be of great value to us.

Motion carried.

The following resolution was introduced by Dr. Wm. C. Richardson:

"Resolved, That this Association heartily commends the efforts and experiments now being conducted by Mr. W. S. Taylor to adapt the Li Chee fruit in the United States, and requests Senator Bryan and his associate congressmen of this State to continue their efforts to secure the desired co-operation from the Agricultural Department, Washington, toward bringing to an early issue the plans now under investigation."

Motion made, seconded and carried that the resolution be adopted.

# Report of Committee on Final Resolutions

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In closing the 28th annual meeting of the Florida State Horticultural Society, one of the most successful in its history, we, the members, hereby return our sincere thanks to all those who have helped in making the proceedings profitable and instructive, pleasant and entertaining; and particularly do we thank:

1. The people of the City of Tampa for the spirit of hospitality they have shown in our entertainment. We note progress of their beautiful and vigorous city in material ways with more than formal interest; and see in its certain future greater development than has yet marked its forward course.

2. We appreciate the courtesies of the management of the Tampa Bay Hotel in providing unsurpassed facilities for our meeting both in the regular order of proceedings and in amusement diversions.

3. We recognize in the effective work of Mr. D. C. Gillett, President, and Mr. B. L. Hamner, Secretary, of the Tampa Board of Trade, most effective service for the Horticultural and Agricultural welfare of the State.

4. We realize that in the Florida Growers' and Shippers' League, under the direction of Mr. L. B. Skinner, President, and Lloyd S. Tenney, Manager, a strong organization whose good record is but an indication of the possi-

bilities before it; and we appeal to every loyal Floridian to extend the largest possible financial assistance to this necessary means of protecting and promoting our interests and those of the State.

5. To our President, H. Harold Hume, and to those sustaining him in work before the legislature, we give our unqualified approval. We urge the members of that law-making body to extend to the horticultural and agricultural interests of the State the liberal support that the present crisis demands, a crisis due to pests and dangers which the producers unaided are unable to control, but without whose control the largest interest of Florida is imperiled.

6. In the war to the death of the citrus canker, we are under lasting obligations to the well directed efforts of Wm. J. Krome, to him as a volunteer and to his force of determined assistants, and all who have aided in the success so far attained.

7. In this attack on citrus canker, the study and laboratory work under the care of Prof. H. E. Stevens, of the Agricultural Experiment Station, have contributed much technical and essential information in tracing causes.

8. A unique and deserving feature of the Society's meeting has been the varied exhibit of implements and equipment originated by the Florida Grower,

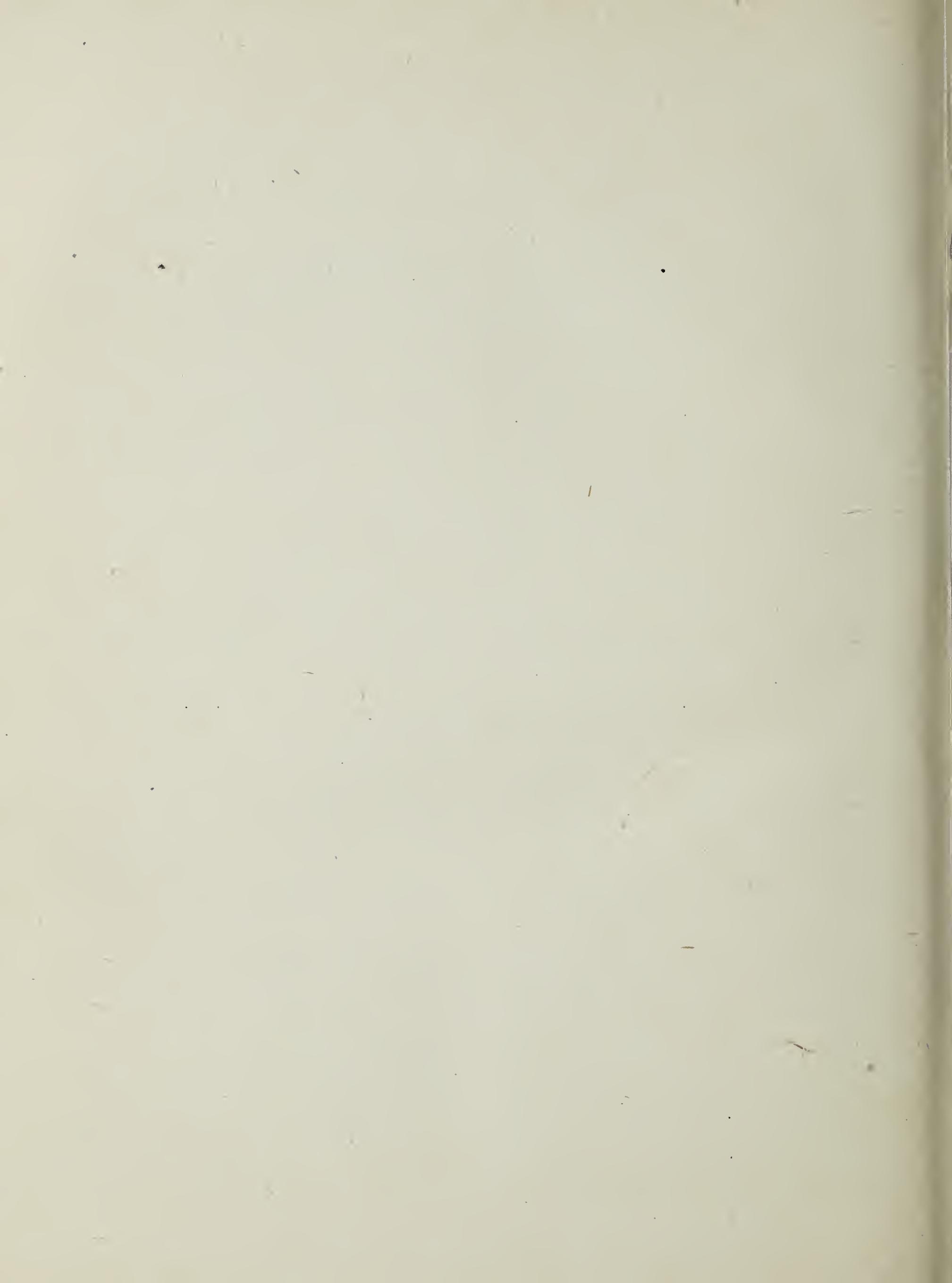
one which it is hoped may be repeated annually.

9. To the Press of Tampa and the State, for the unfailing support they have given, and to the railways of Florida for reduced rates, allowing a larger number to attend, we are grateful.

10. In the masterly address to which we have listened this evening

with so much pleasure we see a strong suggestion of the forceful means Dr. L. H. Bailey is using to make us all lovers of nature, to make the earth more bountiful, and more of a paradise in which to live.

(Signed) W. J. ELLSWORTH,  
B. F. TILLINGHAST,  
A. P. SPENCER.



# Topical Index

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