

soil is very easily studied, and I think growers should have a definite knowledge from what we have said, especially of the reaction of the soil. If we know the reaction in terms of pH we can give you rather definite advice.

A. W. Garnett, Hypoluxo: I would like to ask this: Mr. DeBusk and Mr. Nettles were in my grove, and helped superintend the erecting of the trees following the storm. We have since planted trees in lands adjoining, and found it has hardpan, of chocolate color or brown color, about three and one half or four feet, and the soil turns dark a foot below. I don't know what to do with the trees or how to fix the land so it will make citrus. It is adjoining a grove forty years old, that has yellow soil, gopher sand. This land was once subject to overflow, but since the Lake Worth drainage has lowered the water level six feet it is not subject to overflow, but there is a somewhat acid condition there yet. I would like to know if anyone can tell me whether I can grow trees on this land.

R. V. Allison: What is the type of material lying directly beneath the hardpan?

A. W. Garnett: It runs off in fine, white sand.

R. V. Allison: It seems as if it is a problem of water manipulation, and by deep knifing, you

could break up the hard pan. If you want to break it up, you can get free drainage by the use of special tools that will go down thirty inches under the glades, I believe.

A. W. Garnett: Thirty inches won't reach most of it.

R. V. Allison: What's the depth of the bottom?

A. W. Garnett: It would require four and one half feet to go all the way through; the water level is sometimes below, sometimes above.

R. V. Allison: With the establishment of drainage by other means, it is entirely possible, by keeping the water table down, and exposing its stratum to leeching you do away with a good bit of it.

A. W. Garnett: It has been suggested, and I have read you can treat such land with dynamite. Would a hole under each tree be sufficient?

R. V. Allison: I should think so.

L. B. Skinner: Use 20c dynamite and half a stick to the tree.

Mr. S. F. Poole: Mr. Skinner says use 20c dynamite.

Mr. L. B. Skinner: Twenty cent don't blow up like 50c. It just breaks the soil.

CITRUS GROVE PRACTICE ON THE HIGH PINE LANDS

By N. H. Vissering of Babson Park, Fla.

Mr. Chairman and fellow Members of the Horticultural Society: I deem it a great honor to be called to deliver a paper at this meeting. The subject assigned to me was Citrus Grove Practices on the High Pine Lands of Florida. In the following pages I have endeavored to outline the trend of grove practices on these lands. I have also taken the liberty of setting forth a few of my own theories and experiences.

Grove practices on the high pine lands are undergoing very radical changes. Progressive growers are continually searching for new ways by which they can cut their production costs and still raise larger crops of high quality fruit. Any-

one who keeps an accurate record of production costs will readily note that there are two major cost items: namely, fertilizer and labor. If any substantial savings are to be made in the cost of production these two accounts are the logical ones to examine first.

Let us consider first the fertilizer item. There is a growing tendency to use materials instead of mixed goods. Apparently satisfactory results have been received by cutting the amount of phosphoric acid used and applying this material once a year. Many growers are also applying all their potash in one or two applications, using either muriate or sulphate. I am not prepared to say,

however, that satisfactory results have been received by reducing the amounts of potash applied. There is also a tendency to turn from the use of the expensive organic sources of nitrogen to the cheaper chemicals. It has been quite conclusively proven that quality fruit can be grown with these cheaper fertilizers providing the grower uses intelligence in their application and the rest of his grove practice.

For the grower who intends to cut his costs by using chemical ammoniates, I have several recommendations to make. First and most important he should either supervise the fertilization of each tree personally or have this done by someone whose judgment can be relied upon. Most of these chemicals are very high in analysis and are not fool proof. There was very little temptation for a man to overfertilize a tree by the old method, because that meant real work but with these new high powered products mistakes are so easily made. My second recommendation is that the grower increase the number of applications of ammonia made during the year. This will prevent leaching, reduce the possibility of mistakes and provide a more uniform supply of plant food which is essential in the pursuit of quality. Third, he should insist upon even distribution; and fourth if the organic matter is left out of the fertilizer bag it should be applied through some other means. Cover crops are the cheapest source and too much can not be said of their importance. *Crotalaria spectabilis* appears to be the most desirable crop to use because it does not encourage pumpkin bugs; yields a large amount of organic matter, and is easily disposed of in the fall. On land that does not grow good cover crops it might be economy to haul in some cheap organic material. I have on my grove at present a large pile of muck which I have been composting with manure for some time preparatory to applying it to such land.

Many growers are also becoming aware of the important part played by a number of the so-called secondary elements in the diet of their trees. A deficiency of calcium is probably easier to notice in a grove than a shortage of any of these plant foods. Following Professor Lord's address at the annual meeting of this society in Sebring a number of growers, myself included,

experimented with Calcium Nitrate as a quickly available source of calcium. This material has proven very efficient in eliminating a type of Frenching, very common in the Ridge section.

Next to the change in fertilizer practice probably the most radical change to be noted is in the practice of cultivation. Growers are abandoning the wasteful habit of frequent cultivation. They will probably only do enough in the future to prevent damage from fires and frost. The old theory of the advisability of a dust mulch seems to be exploded. Several winters ago I was making some tests on winter cover crops in my grove. This happened to be a very dry winter. Everyone in our section was hauling water to their groves to revive wilted trees. It was very interesting to note that I had fewer trees suffering from drought in the areas where I had a good winter cover crop growing than in the clean cultivated areas. I might also add that the quality of the fruit in the uncultivated areas was also infinitely better.

Hoeing is still general practice but it seems quite likely that this may be omitted in the future.

The aforementioned changes may be made by any grower, regardless of his acreage. Further reduction in grove expense must come from savings made possible by large scale production. Many men have known the facts which I am about to state but have refrained from discussing them publicly because of the possible effect they might have on real estate values. This season we have come face to face with the common problem of practically all American industries: over production and yet the present crop will soon be dwarfed by what we will produce in the very near future. According to the United States Department of Agriculture we will soon be confronted with the problem of marketing twenty-three million boxes of American grapefruit while the most we have ever profitably marketed has been nine million boxes. To meet this keen competition very radical changes will have to be made both in our production and marketing systems. The inevitable results will be the same in our citrus industry as it has been in other great industries—combination. The grower who lives in Florida can avail himself to a considerable degree of the benefits of large scale production by co-

operating with his neighbors in buying materials and joint ownership of equipment. However, I believe that the stage is set for the advent of a relatively new unit, the Citrus Corporation. Instead of groves in the future being owned by absentee owners and operated by caretakers I look for them to be owned and operated by large corporations, who will be in a position to avail themselves of all the benefits of large scale production.

I hope that these remarks will not class me as an alarmist. I have every reason to believe that the citrus industry of the Ridge section and the state as a whole will survive the competition but I also believe that the time has come when the individual grove owner will have to really run his business and take advantage of all possible savings if he wants to show a profit from his operations five years hence.

I also hope that I will not be taken too literally when I advocate reducing costs. I honestly believe that the observations I have made earlier in this paper can be followed to the benefit of the fruit as well as the pocketbook. I am not prepared, however, to go as far as some of our more radical cost cutters and say that we can do away with our spraying and pruning. I know that a certain amount of both is essential. The day may come when the bulk of Florida's crop will move forward in cans or as juice but until then I do not feel that the grower can afford to neglect the appearance of his fruit in his newly awakened interest in economy.

Mr. Vissering: Perhaps I ought to qualify a few of my remarks in regard to the chemical fertilizers. Please note that I stated if a man left organics out of his fertilizer, he should apply them by some other means. I think very few groves in Florida, especially in the high pine lands, have sufficient organic accumulation in them at present that they can abandon consideration of organics. A great deal has been said by various experts about the advisability of turning to the chemical mixtures. After talking to a number of growers who have attended these meetings, I am afraid there is a little misconcep-

tion among them. They are apt to take the speaker too literally and interpret the quality of fruit grown by strikingly inorganic diet, regardless of what source of inorganic is used. The gentlemen who received these good results understood their application. They knew the difference between one chemical fertilizer and another, and when one should be used, and how much. I realize many of our growers have this information at their finger tips, but it seems to me that a dose has been prescribed for them and yet the directions for taking were not quite clear.

If this adaptation is going to increase, as it seems certain it will, the quality of the fruit in the future will be even more important than in the past. Before growers dive into an inorganic source I think they should consider their own problem very carefully first—find out the nitrifying power of their soil, and how much humus it contains, and so on, and consider that before they sacrifice their quality.

Mr. Hammerstein, Hollywood: I would like to ask Mr. Vissering to go further into detail about hoeing.

Mr. Vissering: I might state that's rather a new idea to me personally. I have always practiced hoeing in my own groves. However, this season I neglected to hoe certain blocks in my grove accidentally, and I can't see but what they set as good a crop and that the quality of the crop left on the trees, if anything, was a little better fruit, and I know I saved five or six cents a tree on them, which at the present time is a considerable saving over a large acreage. I don't see, unless you want to sell the grove, why we can't abandon the practice.

Mr. Hammerstein: Would you suggest you continue this practice on that certain block of trees for the next year or so, as an expert?

Mr. Vissering: That suggestion was made by some men whom I think know their business fairly well. It seems like a lot of merit to it, especially on early varieties. As soon as you have pickers, they will do the work and not charge you anything. Perhaps on your late Valencias, if you are afraid of damage by frost, by having that stuff in there, you might go ahead removing it.