

A Standard Method of Feeding Citrus Trees

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The subject of this paper, "A Standard Method of Feeding Citrus," would be important if a standard method could be set down. Unfortunately, in the light of our comparatively limited knowledge of citrus tree nutrition, we find wide discrepancies between fertilizer treatments, even in adjoining groves, each of which may appear healthy and fruitful. Soil types, varieties, rootstocks, water supply and drainage, cover crops—all contribute their influence, and make it virtually impossible to say "This is the correct method for fertilizing Florida citrus groves."

For purposes of discussion, however, we may consider a grove on the Norfolk series of soils, planted to standard varieties budded on rough lemon roots. This will perhaps include as large a percentage of the Florida citrus acreage as any one group.

Some ten years ago the writer advanced the following rule of thumb, using three applications annually of a 3-8-5 mixture, as follows: one pound per year of age of the tree, plus one pound per box capacity, per application. For instance, a ten year old grapefruit tree capable of bearing five boxes, would receive fifteen pounds per application. It held fairly well for round oranges and grapefruit

with an increase of about twenty-five per cent for tangerines.

In the light of present fertilizer trends this rule, to be of use, needs considerable revision; first, in the ratio as between nitrogen, phosphorus and potash. There appears to be a growing trend toward the use of more nitrogen, especially in inorganic forms. Phosphorus appears to be losing ground, with one man's guess as good as another's on potash. But, since this is a discussion of a standard method, let us attempt to strike a mean. Perhaps the best criterion is what ratio is in most general use. Apparently it is gravitating toward a 1-2-2, with the possibility of a 1-1-1 just around the corner. Consider this ratio with four per cent nitrogen, for a moment. Variations in phosphorus and potash do not affect the tree as quickly as nitrogen variations. This statement might be challenged, but it is a safe guess that the majority of citrus men decide on their nitrogen requirements first, then build their formulae around that requirement. So our rule works out about like this—.04 pound of nitrogen for each year of age, plus the same for each box capacity. In other words, we have raised the nitrogen "ante" a little better than twenty-five per cent, as the old mixture was stated as ammonia.

Of course, this does not mean that we must make three applications of 4-8-8; simply that the average fertilizer program for the year on our typical grove would come out approximately in that ratio. To illustrate—the spring application might be 5-8-5, the summer 3-8-8 and the fall 4-8-10. Except for a slight discrepancy in potash we should have finished our year with an average ratio of 1-2-2.

Now, lest there be some newcomer in our midst who might breathe a sigh of relief, thinking he had a definite rule by which to fertilize, consider some other "mights." It might rain—we have had a little over our way this spring. In that case our nitrogen, and some of our potash, leaches out. No one has said positively what happens to our phosphorus; we believe it stays there. Then, it might *not* rain during the spring months and we could have a carry-over of nitrogen, particularly on a non-irrigated grove, with attendant possibilities of splitting, coarsening, and so-called ammoniation. A heavy leguminous cover crop the previous season could necessitate a cut of fifty per cent or more in the summer nitrogen. Therefore, our rule should be used, not literally, but as a guide.

If our average grower, on our average grove, in an average year, will take his year's ratio of 12-24-24 (3 times the 4-8-8), and apply 5 of the 12 nitrogen units in early February, 3 in early May and 4 in early November, he will not be far from an average application.

As mentioned above, this paper is not an attempt to state the exact need of the

tree and its crop, but rather an attempt to strike an average in the commercial fertilizer practice in Florida at present. It may seem a little high in nitrogen for a bearing grove, to which the remarks particularly refer, but when judged either from the standpoint of apparent requirements of tree and crop, leaching considered, or as a mean between the grower who uses a 2-8-10 consistently and those who are using mainly nitrogen to produce their crops, it will be found low.

So much for the material. As to its application, hand broadcasting is still largely used. To be most effective it should be distributed in a uniform layer, beginning at the trunk and extending as far beyond the outer edge of the branches as the tree is high. If the trees are of such height that application of this rule would make the bands overlap, it should be spread in a uniform layer over the entire ground area. Practically, this is almost impossible to do by hand. A mechanical distributor of the whirling disc type, if pulled at good speed will very closely approach it, however, though the application of such mixtures as 8-16-16 or 10-20-20 present difficulties in metering the flow. It is to be hoped that a distributor of this type designed to overcome that difficulty will be available in the near future.

The objection advanced by some growers that it is not possible to change settings rapidly enough where the planting varies widely in size or age is not serious. Few, if any, citrus men can guess the relative root concentration of, say, a five and a ten year old tree when they adjoin

in the row closely enough to differentiate between either poundage or formula. Results from an average application over such a block, unless the trees are in considerable groups of widely variant ages or different varieties, will be as good as or better than an attempt to fit the individual needs of each tree. This writer uses a distributor, but is not an agent for any, nor financially interested in any.

The foregoing was an attempt to summarize the subject as it was understood. Writer's personal conviction is that a 1-1-1 ratio is more logical, as well as cheaper, if inorganic mixtures are used in connection with irrigation and leguminous cover crops. In either case, part of the year's application should be made up of so-called low-grade materials carrying "impurities" such as compounds of manganese, boron, copper, zinc, arsenic,

etc. Organic materials of marine origin, for instance sea-fowl guanos, fish scrap and others may owe their undoubted value to such compounds rather than their organic nature per se. Supplying our heretofore "non-essential" elements in this way may be a "shotgun" treatment, but it is better than none unless we overdo some element such as boron. There is little danger of that in standard materials, or commercial mixtures.

One last word for any practise, standard or unorthodox. Be careful of the nitrogen in the summer application. If in doubt, cut it down. Some Chinaman will probably get the benefit of it anyway, but if he did not and the fruit did it might not show up so well on the grading belt, where many of our fertilizing sins find us out.

Member: What is your formula for spring application?

E. H. Hurlebaus: I have not quoted, nor have I tried to quote, any particular formulas, but rather to mention an average ratio, and convey the idea that the ingredients in that ratio can be varied spring, summer and fall, more or less at the discretion of the grove man, if he will wind up his year with a certain total supply of food, which is also an attempt to reach a consensus of the commercial practice in the state, rather than say "This is the optimum ratio." My understanding of the subject was that we were to try to arrive at present practices in fertilizing citrus on the average. My personal conviction is that for spring

application at least I would use 5-5-5 or 10-10-10.

Mr. Smith, Avon Park: Do you mean to say you fertilize from the base of the tree out to the extent of the lap of the tree?

E. H. Hurlebaus: Yes sir.

Mr. Smith, Avon Park: You don't mean fertilize three or four feet from the base?

E. H. Hurlebaus: No sir.

Mr. Smith: You believe in fertilizing from the base of the tree outward?

E. H. Hurlebaus: Absolutely.

Mr. Smith: That is a practice not followed in my community.

E. H. Hurlebaus: I realize that is more or less contrary to general prac-

tice, but if you dig around the base of citrus trees you will find a mass of roots there.

Mr. Waite: I would like to ask if fertilizer was put close to the base of the tree, if it doesn't produce a more or less root bound condition. I know you will find in digging around the tree that there is a mass of roots around the trunk, but in digging up trees fifteen years old and replanting I have found that the further out we had those feeder roots, the better the tree; and where I had in some places, trees on a ridge, and fertilized very close to the base, we had a more or less root bound tree.

E. H. Hurlebaus: We have not found that true in our studies. We find the nearer we can get an even layer from trunk to trunk, with trees ten years old or older, the application of that general rule, fertilizing from trunk to trunk, with a mechanical distributor seems to give us better utilization of the food.

Mr. Smith: Some of my neighbors are dynamiting their trees around the trunk. Is that advisable?

Mr. E. H. Hurlebaus: I can't answer that.

Mr. Dorn: I would like to know how he proposes to cut down the cost of fertilizer by changing to 1-1-1?

E. H. Hurlebaus: If you will remember I said if you apply chemical nitrogen you will find you are saving on the average three units of phosphoric acid and three units of potash. I believe phosphoric acid is 70 cents a unit right now, and approximately \$1.10 per unit for potash. In other words, you would save

\$3.30 and \$2.10, or \$5.40 at an expense of about \$2.00 added cost.

Mr. Dorn: How do you propose to effect a saving?

E. H. Hurlebaus: In that connection, the discussion on fertilizer rates has applied mainly to the extent of commercial fertilizer. The change to 1-1-1 is purely personal opinion.

Mr. Dorn: Do you think you could use 1-1-1 and still get commercial fruit?

E. H. Hurlebaus: I can show you where it has been done for five years.

Mr. Smith: Do you recommend the double strength fertilizer?

E. H. Hurlebaus: I think it is largely a matter of personal preference. Sometime during the year, the grower should use some of these so-called low grade materials. They contain manganese, for instance; it is a constituent of manure. If he will add sometime during the year those impurities, I see no objection. It means he can't fertilize consistently with those double analyses of fertilizer. That would be my only objection to them, as I said.

Member: Do you think that 1-1-1 ratio is practical three applications a year or spring and fall.

E. H. Hurlebaus: That comes back to the question again in the discussion of 1-2-2 ratio. You might apply the nitrogen in the spring, just so you wind up your year's business with the equivalent quantities of nitrogen, potash and phosphorus. We find under these conditions that our leaching is not a serious matter with phosphorus and potash, but it is with the nitrogen.