

NOT WHOLLY CLEAN OR WHOLLY GREEN

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Mr. President, Ladies and Gentlemen:

The subject assigned to the committee to which I have the honor to belong is "Methods of Handling Citrus Groves." I am glad that the plural, *methods*, is used, for there are and must be various methods, depending on the different varieties of soil and climate. The methods applicable to hammock groves, for example, are very different from those adapted to pine land groves. My practical knowledge of citrus groves is confined to the pine land groves of Volusia County; but the culture adapted to these groves will apply, with slight modifications, to pine land groves everywhere.

That word "handling," from the verb *to handle*, means managing, and seems to limit the scope of our inquiry. It does not seem to embrace the location, planting and building of groves, but presupposes their actual existence. It reminds me of the celebrated receipt for cooking a hare, given in an old cook book. It begins, "First catch your hare." So we must first catch our grove before we can handle it.

I take it that this meeting is somewhat like what our church people call an "experience meeting." Our committee have not been able to meet and agree upon a comprehensive report, so I shall make an individual report, giv-

ing my own methods and the results of my experience.

Most of our Volusia County groves are situated on rolling, or high pine land, though there are some rich hammock groves, especially on the margins of our beautiful lakes. My own grove overlooks one of these lakes—pretty Lake Helen. The land is of an excellent quality, the soil, to a depth of several inches, being of a dark gray color, showing that it contains a good percentage of humus. Here I located twenty-six years ago, and here by personal experience, I learned what little I know about handling citrus groves.

As to the actual working of my grove, I suppose my method is about the same as that of most growers. I practice not wholly "clean culture," nor wholly "green culture," but what may be called green-clean culture; clean during the dry spring months, and green during the rainy season. I plow my grove once, and once only, preferably in the fall, about the first of October; but sometimes I postpone it till January—the time of the first fertilizing. I prefer October for the reason that the vegetation, whatever it may be, is then mature, and if turned under will rot in the ground during the winter and be in a condition to assist the trees in making their spring growth. If left on the ground, much

of it will be dried up, blown away or otherwise wasted. The plow, in any case, should be run as shallow as possible. Many growers fertilize before plowing; but I prefer to fertilize *after* plowing; spreading the fertilizer on the furrows, and working it in with an acme or a cutaway harrow. The plow buries the fertilizer too deep. For all the other workings, unless the ground is too grassy, I use the cutaway harrow. If I want to subdue the grass or weeds, I use the Planet Junior cultivator. During a dry season the grove should be lightly worked about every ten days, so as to close the pores, so to speak, and conserve the moisture. This is what is called "dry farming." It draws the moisture up from the deep subsoil by capillary action, so as to bring it within reach of the thirsty feeding roots. I am not anybody's agent, but I want to tell you about a new cutaway that I bought a few weeks ago. It is called the "double action cutaway," and consists of four gangs of notched discs instead of two. The forward gangs are set so as to throw the earth outward, as in the old style. The rear gangs are set so as to throw the earth in the opposite direction, and the discs track between the forward discs, thus breaking up every inch of ground. The gangs are easily controlled by means of levers, and there is a hinged pole, so that there is no weight on the necks of the horses, and the machine runs perfectly level. You may get any size, from twelve discs up. Mine is a 16-disc harrow—four gangs of four discs each—with a

cut of 4 1-2 feet, which is about the right size for any ordinary 2-horse team. It is just the thing for grove work, and when it becomes better known will doubtless supplant all other harrows for such use.

I generally hoe the trees twice a year; in the spring, about March, and in the fall, at the time of last working. Hoeing, as often done, is of but little use; the hoer scrapes the ground under the trees and draws the weeds and grass, mixed with surface soil, out so as to form a circular ridge, leaving the ground as hard and smooth as a barn floor. The earth should be loosened up by a chopping motion of the hoe, so as to let in the rain and the air. The trash should be left to rot under the tree.

It is now generally agreed that the ground should be shaded during the hot summer months, either by its natural covering of grass or by some "cover crop." It is a maxim that "Nature abhors a vacuum." It may also be said that Nature abhors the bare ground. A Florida poetess has said that God sends His angels to sow flower seeds in all bare and unsightly places..

"For where no corn may flourish,
Always His angels nourish
The flower beds of God."

These angels come "on the wings of the wind," and some of them, I suspect, take the form of birds.

If there is a heavy growth of grass, it may be mowed and cured for hay; the fallen leaves, short grass and stubble will be as much as can well be

turned under. Whenever during the summer the grass seems to be encroaching on the trees, I have a man go around the trees with a scythe. In such cases mowing is better than hoeing.

If the trees are not too large, a so-called "cover crop" may be planted in the middles. For this purpose the legumes are recommended, as they are good nitrogen gatherers and add humus to the soil. But velvet beans in a grove are a nuisance. They are too rampant. You have to go through the grove every two or three days and pull the vines out of the trees. Three or four rows of cowpeas may be planted in each middle, but additional fertilizer should be applied to prevent the robbing of the trees. Desmodium beggarweed, is probably the best cover crop. The seed may be broadcasted the first year, after which it will proagate itself. If the soil is good, two crops may generally be grown. The first may be mowed before seeding time, for hay; the second may be left to go to seed and afterwards allowed to decay on the ground or be turned under.

In my own grove, there is but little room for a cover crop. My trees are twenty-five feet apart, are low headed and have a spread of some sixteen or eighteen feet; so there is barely room for a hay wagon to pass between the rows. The lower limbs are about eighteen to twenty-four inches above the ground. Limbs that droop so as to touch the ground are supported by props. I am a firm believer in low-headed trees; the ground under them

is always shady and free from grass, and about half the crop may be picked without the use of a ladder.

As to the treatment of diseased trees, spraying for insect pests and all that, there is another committee to which these are referred, and it becomes us to be modest in the presence of our learned Gainesville professors. I will say, however, that I have not found it necessary to do any spraying since the big freeze. That terrible insect pest, the whitefly, has not yet made its appearance, but it is coming. It has attacked our town at two vulnerable points; on the north, coming from DeLand by carriages and autos, and on the south and east, coming by rail from the East Coast. But "sufficient unto the day is the evil thereof," and I will not go to meet the enemy.

Before leaving the subject of grove working, I will say that some growers work their groves too much. They keep working and worrying their trees nearly all the time; keep them excited, so to speak, so that they are unable to eat their meals in peace and quietude. You see I am using figurative language. I can't help thinking of my trees as persons, and sometimes I amuse myself by drawing parallels between men and trees. They have life, as we have—plant life. How it originated and how it differs from animal life we do not know. If we are cut we bleed; so does the tree, but the blood is clear and we call it sap. We breathe, and so does the tree; but its lungs are on the outside, the leaves. And how about the senses? Do they

feel and see and hear and smell? A question more easily asked than answered. When I cut a flower and the blood or sap follows the knife, I sometimes wonder whether the plant feels the hurt. Now suppose I drop a potato on the earthen floor of a vault or cellar. It is dark, except that there is a small knot hole in one corner through which a ray of light enters. In a few days the tuber will put forth white silken sprouts which reach eagerly toward the speck of light. What draws them? Do they see? And again, suppose you bury some choice plant food in your grove. Examine it a week or two later and you will find that the rootlets or feeders of the trees, silently creeping, creeping through the dark and silent earth, have found it and are eagerly devouring it. What directed them to it? Did they smell it? I don't know. Do you? Does anybody? It curiously happened that after formulating these questions in my own mind, I saw an article in the April number of "Current Literature," under the title "The Eyes of a Plant," in which it is stated that a great German botanist named Haberlandt, of the University of Graz, has actually discovered that plants have eyes; that the epidermal cells contain lenses which give distinct and proper images, just as the eyes of insects do. The plants may not consciously see things, but the eyes are there all the same.

"There are more things in heaven and earth,
Horatio,
Than are dreamt of in your philosophy."

The most important thing in the handling of citrus groves, namely, fer-

tilizing, I have left for the last. The scientific aspects of the subject I shall not discuss, as there is a standing committee on fertilizers, of which the eminent scientist, Prof. Blair, is chairman. I have some views on the subject, based on my experience of twenty-six years, which I believe to be important. I have not been able to consult my colleagues on the committee, and don't know whether their views coincide with mine or not, so I give my method as a personal matter and accept the responsibility. Owing to the absence of another committee, our report was called for on Tuesday, out of the regular order. I was not able to be present at that time, and so informed our worthy president, but I am glad to know that one of my colleagues, Mr. Edwards, of Zellwood, was present, and presented an interesting report.

I call my method the *Common Sense Method*, because it is free from scientific technicalities, and deals only with such things as the unscientific grower may see and understand. There is no subject connected with orange culture that is so little understood as fertilizing. Many growers, even old growers, fertilize in a haphazard way, using the wrong fertilizer at the right time, the right fertilizer at the wrong time, or the wrong fertilizer all the time. In this way tens of thousands of dollars are wasted, or worse than wasted, every year. On the representation of interested parties, growers have been led to believe that the crop is in proportion to the amount of fertilizer applied; the more fertilizer, the more fruit; so they reason that if ten pounds per tree is

good, twenty pounds is better, and forty pounds best of all, and order accordingly. But here a fallacy comes in. No allowance has been made for waste. The appropriation and assimilation of plant food is a slow process, and no ordinary tree can take up more than about ten pounds at a meal; that is in the time that food is within reach. I suppose that owing to rains, winds, etc., very little of the fertilizer remains at the end of three months; so that if we apply eight hundred pounds to an acre in January, expecting that it will last until June, the trees will have three months of feasting and three months of famine; four hundred pounds having been taken up by the trees, and four hundred pounds having gone to regions unknown. The proper way would be to make two applications of four hundred pounds each. You thus double the value by saving the loss. At the meeting of this society in 1906, Prof. Blair, in an interesting paper on "The Loss of Plant Food in Sandy Soils" (Proceedings, page 74), stated that he was "strongly inclined to the belief that it would be economy to fertilize pineapples four to six instead of two to three times a year"; and he further gives it as his opinion "that 2000 pounds of fertilizer applied at intervals of two or three months would be as effective as 3500 pounds of the same material in two applications." This is confirmatory of my opinion that we should fertilize our trees four times a year instead of two. In the cases mentioned by Prof. Blair, large quantities of fertilizer were wasted; but in

some cases it is worse than wasted. There is such a thing as over-fertilization. Intensive cultivation may do in some cases, but if carried too far it leads to disaster. To give a tree 40 pounds of fertilizer for a six months' supply is like giving a man a week's food for one meal; he may gormandize, and it will give him indigestion; so the tree may gormandize or take up more than it can assimilate, with a similar result—plant indigestion, or mal-nutrition.

I will now, as briefly as possible, explain my own method, a method which if generally adopted would save tens of thousands of dollars in fertilizer bills, add hundreds of thousands of boxes to our orange crop, and greatly improve the quality of our fruit.

About the middle of January, or about two weeks before the blooming season, I apply 400 pounds per acre—a ton to five acres—of a fertilizer analyzing about 6-6-6 (the figures are here used to denote percentages, and in the usual order, ammonia, phosphoric acid, potash), the object being to give the trees a good send-off after their winter sleep, and to bring out the bloom; and it generally has the effect intended.

And right here many growers, even old growers, make a grievous mistake. They have read in all the fertilizer booklets, and have put it down as law and gospel, that fruit and vine analyzing about 2½-8-13 is the proper fertilizer for bearing trees, and they insist on using it all the time, even in the spring, when trees don't need much

potash, but do need ammonia, and a good deal of it.

On this subject I beg to quote from a letter written to me by a gentleman who has devoted almost a life time to the subject of fertilizing, and is himself a successful manufacturer of fertilizers. He says:

"There are still a great many growers in the state who insist on using the fruit and vine formulas the year round. They are simply potash crazy, and have the trees all tied up so that there is no sap flowing in them at all—small leaf growth, small oranges, and the trees just starving, as you say, for a little of the absolutely essential plant food in the shape of nitrogen."

Fruit and vine is good for bearing trees, but not as a steady diet, except, possibly, in some low hammock groves that are rich in humus and in natural sources of ammonia, and deficient in potash. It has been shown by analysis that in the production of a crop of oranges there are required for roots, wood, leaves and fruit, nearly equal quantities of ammonia and potash. (See Press Bulletin No. 138, Ag. Exper. Sta.) An approximate estimate is, for an acre of bearing grove, am. 120 pounds, potash 125 pounds. Now suppose we apply to this acre 1,600 pounds of fruit and vine fertilizer in a year. This will contain 40 pounds of ammonia (2 1-2 per cent), and 200 pounds of potash (12 1-2 per cent.)—five times as much potash as ammonia. How can we expect healthy groves under such conditions? A larger percentage of ammonia should be used,

especially in the spring, when trees are in a somewhat exhausted condition from the production of their crop, and a strong stimulus or tonic is required for the production of wood, leaves and blossoms.

About three months later, in March, I apply the same quantity of fertilizer analyzing about 5-7-8, but generally of a slightly different composition, the special object being to continue the spring growth and to enable the trees to hold their fruit. This will carry the trees on till June, when I apply a mixture analyzing about 4-8-10, the object being to continue the wood growth and begin the ripening process.

Three months later, about the middle of September, I apply the same quantity of a regular fruit and vine brand analyzing about 3-10-12, the object being to prepare the trees for winter, and give sweetness and flavor to the fruit. It will be observed that in this scheme there is a gradual decrease of ammonia from 6 to 3, and an increase of potash from 6 to 12. In ordering fertilizers, I consider not only the analysis, but also the sources of the elements used. I will not order any brand until I know what it is made of, and if I cannot find what I want, I have it made to order. We sometimes see in fertilizer books, "This is a purely chemical fertilizer." I do not want that kind. It may do for hammock groves, but it is not good for pine land groves. It tends to impoverish the land. I am not afraid of a little organic plant food. For phosphoric acid I prefer bone, lots of it, or Peruvian

guano. The nitrogen may be obtained from several sources—nitrate of soda, sulphate of ammonia, dried blood, bone, etc., but not sulphate of ammonia alone. It is not good for pine land groves, unless preceded or followed by basic slag or some form of lime. Last year I used the slag, applying it in December, a little while before the spring fertilizing.

The use of 25 pounds a year for each tree may seem to some growers a beggarly amount; but it is not. It is four tons to five acres, and I have never used more than that, even on trees bearing ten to twenty boxes each. But it must be remembered that I have an excellent quality of land. On lighter and poorer soils more may be required, say 500 pounds per acre. *The result is what tells;* and in my case it has been very satisfactory. A friend of mine, president of a fertilizer company wrote me some time ago that the results I obtained from such a small amount of fertilizer were *truly wonderful*. "Why," said he, "I know lots of growers who use 80 to 100 pounds per tree, and don't obtain half the results that you do."

Some may object to fertilizing in September. Of late years it has be-

come almost a rule to fertilize groves in November. The plan was invented, I suspect, by a New York fertilizer house, and the other houses soon caught on. Its object was to give them business during the slack time between June and January. Now I am heretic enough to believe that the practice of fertilizing in November is wrong. That is the very time when the trees want to be let alone. They are sleepy, and are just about to take their winter nap. The fertilizing is too late to benefit the present crop, and too early to benefit the next. We are told that "the roots go on growing during the dormant period." I don't believe it. You can't have root growth without top growth, and that is just what you don't want at that time.

In conclusion, I will say that the method outlined above is not only a common-sense method, but a scientific method. True science does not contradict common sense. It is not a new thing; it has been tested by experience, and I am very sure that if it were adopted by our growers generally, modified, if need be, to suit present conditions, it would give them healthier and better trees, diminish their expenditures, increase their income and improve the quality of their fruit.

HOW TO CULTIVATE

Judge Wm. C. McLean

Mr. President, Ladies and Gentlemen:

Owing to the fact that I will not be present at your meeting to be

held at Miami, I forward this communication. I regret exceedingly my inability to be present, and to renew pleasant ac-