

## FERTILIZERS AND IRRIGATION.

BY F. D. WAITE.

*Mr. President, Ladies and Gentlemen:*

My report on Fertilizers and Irrigation will not take up much time, but I trust we shall have a full discussion as to the merits of chemical fertilizers. In my mind there is nothing that is so necessary as the right kind of fertilizers, when, and how they should be applied, in order to grow the very best fruit and vegetables.

Thinking it necessary that I should give to this Society something new along these lines, I reviewed my file of this society's reports for the past twelve years, and after I had finished, it seemed that the ground had been completely covered, and that it would be a waste of time to rehash them all. Not that they are not valuable for they are, and I recommend that the members of this Society that have not a complete list of these books, apply to the Secretary for copies of as many as he can furnish, commencing way back in 1893, when Major Healy and others were discussing the merits of muck and stable manure (being a complete fertilizer for orange trees) up to the present time when the question arises, whether we shall (to get the best results) experiment with our individual soils, using pure chemicals, or purchase ready mixed fertilizers of standard formulas from reputable manufacturers.

Some well known growers have recently remarked that ten and fifteen years ago when blood and bone was used with a balanced ration of potash, we experienced less trouble with our groves, and new diseases were not developing as rapidly as they are today, and the question arises:

Are we pursuing the right course? Some tell us we should not use acid phosphate, that it contains so much free acid, that our soils will become poisoned. Yet our State Chemist tells us that available phosphoric acid is just as good from one source as another, and that when we buy the so-called dissolved bone black it is just as liable to be acid phosphate colored with lamp black, and we pay about seven dollars extra for the coloring. Prof. Rose also says that efforts have been made by agricultural chemists to distinguish them, so far without results.

As the situation exists to-day, we may buy a complete fertilizer which has on its tag, dissolved bone or dissolved bone black as its source of phosphoric acid. All our State chemist can do is to determine by samples sent him the true analysis as to its content, of ammonia, phosphoric acid, and potash.

The manufacturers that we deal with may be honest, and believe that which they sell us is the true article, as they have a guarantee from the dealers that sold them, and have no way themselves of telling one from the other. Some assert that the supply of bone does not equal the demand, then we had better buy acid phosphate and save seven dollars per ton, or buy steamed and raw ground bone, if we are afraid of filling our soils with acid.

I have recently corresponded with dealers who handle nitrate of potash and basic slag. With these two chemicals we can secure a fertilizer well balanced and absolutely free of all acids, and the slag contains 50 per cent. of lime.

At present I think all the basic slag is imported, and is a by-product in manufacturing steel from an iron ore containing a high percentage of phosphorous. To one ton of iron ore, 1000 pounds of rock lime is added, and this material having a great affinity for phosphorous, takes up this element from the iron, and when drawn from the converter, the slag is at the top and usually runs about fifty per cent. of the original charge.

At the steel works in this country I understand the slag is cooled with water which cracks it into small pieces, it is then used to balast railroads. We pay from \$20 to \$22 per ton in large lots for the imported product which runs about 17 per cent. available phosphoric acid, and 50 per cent. of lime. If the Alabama slag is of the same quality it seems to me that our Jacksonville manufacturers could give us a pure form of phosphoric acid, and at less expense than the high grade acid phosphate is now costing us.

During our meeting at St. Augustine Mr. C. G. White gave us the results of some very interesting tests made in growing Irish potatoes with slag phosphate, and says, "Slag phosphate does surprisingly well and as far as one test goes, sustains the European experiments as to its value on sour soils, also the results at the Ohio Experimental Station."

Why is it we have so little exchange of thought in regard to fertilizer? Is it because we are ashamed to admit a lack of knowledge, or that we are perfectly satisfied with our own mixtures or manufactured goods? Even if we are, I believe we should express ourselves more fully, thereby saving the Novice much time and expense.

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This subject has been discussed in the meetings for several years and many plans have been given in recent reports for surface and sub-irrigations. Probably the best plan for sub-irrigation is that in use at Sanford among the vegetable growers, and fully discribed in Year Book for 1903, page 60. It is just as necessary to have drainage, as irrigation, and if I could have only the one, I would choose drainage, but with this plan at Sanford it acts for both. Water from artesian wells being the source of supply.

These wells are less than half the depth of those in the Manatee section, I have never heard that the water from the Sanford wells has an injurious effect.

We, on the Manatee use surface irrigation from artesian wells, carrying the water either through cement pipes under ground, in ditches, or canvas hose to all parts of the grove.

Some assert that artesian water has killed a great many trees, we admit that in some cases this is true, but largely due to the lack of drainage. An excess of rain fall would probably have the same effect. We should be cautious as we approach the rainy season and not fill our soil too full of water, for if we do we shall certainly suffer from the result.

The following is a discription of the irrigating plant of the Wills grove at Sutherland Florida, as given me by Mr. Wills. The plant is supplied from a pond or small lake, with this as you will see, he can spray his trees with clear water for the red spider and purple mite.

SUTHERLAND, FLA., APRIL 24, 1906.

MY DEAR MR. WAITE: Our Irrigating Plant is equipped with a White-Blakleslee 20 horse power engine and a Rumsey rot-

ary pump, with a five-inch suction and a four-inch discharge maximum capacity of which, is 335 gallons per minute, with a guaranteed capacity of 250 gallons per minute. We have a four-inch main running through the center of the 30 acres under Irrigation and from this main are laterals every 150 feet, starting out with two-inch pipe and running down to one inch, with three-fourths inch stand pipes 150 feet apart over the entire 30 acres, so that a 75 foot piece of three-fourth inch hose connected with two opposite hydrants will meet each other. The spray rods are made of three-fourth inch pipe, six feet long tapered down to a point at the lower end to stick into the ground, with a T about 18 inches from the lower end for connecting the hose and on top of the spray rod is a McGowan sprayer. We run twenty sprays at a time with three-fourth inch hose moving them from center to center, when the ground is sufficiently moistened. Last year I found that our twenty spray rods were giving twelve gallons per minute all over the grove, it took us six days last May to spray the entire grove, with an amount of water equal to one inch of rain fall, according to figures given to me by Prof. Rolfs, that is, it will take about four or five hundred gallons to every 30 square feet to equal one inch of rain fall. The engine that we are using is made by the White-Blakleslee Manufacturing Company, of Birmingham, Alabama. We have a three-thousand gallon Tank thirty feet from the ground, connected with our Irrigating Plant, this gives us pressure enough to wash down our budded trees through one-hundred feet of three-fourth inch hose with a nozzle on same without using the Engine, two men working at a time.

With the Engine running we can easily wash down trees from thirty to thirty-five feet through ten or twelve lines of hose at a time. We are now trying to wash the spider off the grape fruit trees with the tank pressure, as we cannot get sufficient labor to work many nozzles at a time.

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#### DISCUSSION.

Dr. Bessey.—Mr. President, I would like to ask whether any one present is familiar with the recent work that has been done with the processes invented in Germany for combining calcium with nitrogen of the air; it has been shown that this compound can be produced very cheaply and very satisfactory results have been claimed for it.

No response.

Maj. Healey.—In the old days we used to fight this fertilizer business to a finish. We did not have quite so much science then as we have now. It strikes me that if these fertilizer men would give us an "electro-magnate" that would turn us out ten hours work for \$1.00, it would be of interest to us. The time was when this society was the best posted of any in the United States but that was the time before it fell into the hands of the fertilizer men. We thrashed out our own compost pile and I think we were capable of knowing how to combine the necessary elements to make up the necessary fertilizer for a large grove.

It is a curious proposition that of all the members here on the fertilizer committee that not a man has a word to say as to where the cheapest source of ammonia can be found. He says, if you will use my fertilizer you will get a cer-

tain percent. of ammonia and a certain percent. of nitrate. I know there are growers here who have been making nitrate with beggarweeds. The reason I do not use the cow pen is because I have not the cows.

Now we are here to get at the manner of producing a crop from the ground. We are the ones who produce it and the other fellow is the man who lives on the producer (applause). He sells us the stuff, we give him our check, it is placed in the bank and we have to pay it. You can make your soil just as rich with one tenth of the money if you choose to do it. I have land on which I have raised three crops of corn. When I first began to use it, it would not produce more than five bushels of corn to the acre, but now I am getting at least twenty bushels to the acre without one pound of fertilizer. If you can do this in a corn field, it can be done in any other field. I know, no man can gainsay the fact that this is a true statement.

Professor Blair.—I would like to see Maj. Healey raise velvet beans on pineapple land.

Maj. Healey.—If I were raising pineapples, I would raise them the same way I do velvet beans. I have no wish to say what a gentleman should do with his soil, but I wish to say that if you will raise three crops of velvet beans on it, you will have better success with your pineapples.

Now as stated before, we were not so poor in the old days, we found how much of the chemical fertilizer to put on the soil without knowing its use. I say to this audience that I have land that I wish I did not own, for just as long as it is there I am fool enough to do something with it. It was one time what was called

when I was young, an orange grove. It is a sad sight now and I presume it will always be a sad sight to my pocket book. I own it under the "homestead act" and you understand how that is. I said that it was really a good looking grove and since 1895 I have never put one pound of fertilizer on it, it has been made on velvet beans and beggar weeds. There is potash enough in that to make a grove.

Much to my surprise one of my men said to me last year that there were some oranges on my grove, I went over and looked through the grove and sure enough there was a good crop of fruit and I concluded to ship them and am sorry, for they brought me some money and that was an inducement for me to go to work and make another orange grove. This proves to you that while you can put the enormous sum of eighty pounds of fertilizer to the tree, yet you can get good results from the velvet bean and beggar weed.

Now Mr. Chairman, I hope this fertilizer question will be taken up by this audience and let us see if we can get down to absolute facts, and see if the old time fool orange grower cannot thrash this down to \$50 per year for oranges.

Mr. Wood.—Mr. President, I note that on the first paper on this subject the writer recommended the plowing under of green crops. My opinion is that it is much better to let the crop die on the ground.

Prof. Stockbridge.—I am quite sure that the author of that paper through an oversight inadvertently used the word "green" when he should not have done so. In the country from whence he came they term green crop what we call cover crop, and that is what he meant to say.

Professor Blair.—Just one word, I

want to say that the value of both the beggarweed and velvet bean was especially pointed out in a previous paper.

Mr. Hart.—I just want to say that according to my knowledge of things, it is easy to make land rich by growing velvet beans or beggarweed, though I would not advise the former in orange groves. Beggarweed is a profitable crop when the trees are small but when they get larger and shade the ground it will make little growth. In previous years the policy of growing velvet beans for orange trees has been discussed; the beggarweed I indorse fully wherever it may grow, whether in orange groves or any where else, but we have to use commercial fertilizers with it to properly balance the ration. I do not believe we can get the nitrogen we want from beggarweed or velvet beans, after the orange trees interlock their limbs.

Mr. Hubbard.—At the risk of repeating what may already be known by the members, I will relate the experience of Mr. Butler in the raising of beggarweed for nitrogen. He had good trees but no fruit. He had an analysis of the soil made and also for 100 boxes of oranges to the acre. The top foot of soil contained about enough ammonia for one to two crops, phosphoric acid for 3 crops and potash for only 1 1-2 crops. He then began to use commercial fertilizers, He studied this question and decided to use beggarweed to gather nitrogen for the reason that it did not produce any soldier bugs to work on the fruit, the consequence was that after three or four years using only phosphoric acid and potash he gathered so much nitrogen that he had to take a mower and mow down the beggar weed to prevent die back taking his trees.