

The Use of Lime and Sulphur Solution on Citrus Trees

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Lime and sulphur solution has been used for various pests on citrus trees for many years, but we have obtained some results which I think are sufficiently important at this time to present. This solution is very efficient for the control of all species of mites infesting citrus trees. This includes the six-spotted mite, which is commonly known as the red spider, the purple mite and also the rust mites.

Our results with this solution for the control of rust mites have been very interesting. On April 22, 1911, two trees in the middle of a large grove were sprayed with a dilution of one part lime and sulphur solution to 25 parts of water. The work was very thoroughly done, both the bodies of the trees and tops and under surfaces of leaves and the twigs were sprayed. No injury was done to the fruit on this date by this strength. The fruit from these trees remained bright throughout the year and were bright when picked in the following February. The fruit from the adjoining, which were left unsprayed, was only about two-thirds or one-half the size of the fruit which was on the sprayed trees, and were known to the trade as black russets. In the same grove one row of about twenty trees was sprayed three times with the dilution, 1-25, the first spraying being given May 13, the second July 7, and the third about the middle of August. The rust mites were very abundant at the time of the first spraying. They apparently covered the surfaces of the fruit and, according to my observations, this was the date of the maximum infestation for that year, about the opportune time to spray to do the most good. The fruit from the trees remained bright throughout the season, while the condition of the unsprayed fruit was as described above.

During the season of 1912 several experiments were conducted to determine more thoroughly the value of lime and sulphur for controlling the rust mites. At the time of the spraying on July 18 there were many eggs and adults present. The result of these experiments showed that it is unnecessary to use any dilution stronger than 1 to 75 to kill all rust mites and their eggs hit by the spray. All the fruit which was sprayed with the lime and sulphur solution 1 to 75, or stronger, remained bright until the first of December, when the observations cease. The unsprayed fruit had russeted considerably.

Lime and sulphur solution is also very effective when used for spraying against the six-spotted mite (*T. sexmaculatus*) and purple mite (*T. Mytilaspis*). Dilutions of 1 to 75 will also kill the eggs and adults of both of these species. It should be stated that in spraying for the six-spotted mite the spray should be directed to the under sides of the leaves, whereas, if the spraying is done for the purple mite it should be directed on the tops of the leaves.

Although lime and sulphur solution is not so effective in killing the purple scale as the oil sprays, our experience shows it to be suitable for this purpose. The fruit sprayed three times with 1 part of the solution to 25 parts of water had only about one-quarter as many scales per orange as were found on the unsprayed fruit. It is very doubtful if the weak dilutions required to kill the rust mite eggs will kill any stages of the purple scale other than the crawling young and the first and second larval stages. Since it is also more or less of a fungicide and therefore hinders to a limited extent the ac-

tivity of the parasitic scale fungi, it is of prime importance to know that it kills out the purple scale to a sufficient extent that they do not become abundant following its use.

The white flies are little injured by the solution even when used at the strength to be prohibitive on account of damage to the trees. Several experiments were performed using it 1 to 9, with no appreciable damage to the pupa. It is, however, more or less effective when the maximum number of young are crawling. According to our experiments 1 to 50 will do good work at this time. As yet I do not know of any experiments designed to determine its effectiveness against the Florida red scale.

It was noticed by the author as long ago as April, 1911, that lime and sulphur solution appeared to have some stimulating effect on the foliage. Two rows of about twenty trees each were sprayed March 31 with a solution of 1 to 50. At the time of the application the leaves were of the first spring growth, and all a light yellowish green. At the expiration of about two weeks they were very dark green, while the unsprayed leaves were of a lighter shade, and those sprayed with paraffine oil emulsion were somewhat lighter still. The difference in color between the unsprayed and those sprayed with the oil emulsion disappeared in about a month, but the difference in color in the leaves sprayed with lime sulphur solution persisted somewhat longer.

In the summer of 1911 those trees sprayed three times with 1 part of insecticide to 25 parts of water had much larger fruit than either the fruit sprayed with any of the oil emulsions or the fruit from the unsprayed trees. It was also fully two weeks earlier, according to color, than the fruit from adjoining rows sprayed with oil emulsion, or that which was left unsprayed. The lime and sulphur solutions do not make the fruit so large as to be coarse and unsalable.

The same effect was produced on those trees sprayed on April 22. This effect, in my opinion, is not due to simply killing the rust mites and scale insects, because the oil emulsions act effectively in killing out the rust mites and are more effective in killing out the scale insects. I am inclined to think that it is due to some stimulating effect on the physiological activity of the leaves. No observations are available when used as weak as 1 to 75, or frequently during one season.

In all our tests and experiments extending over two seasons no injury has ever been obtained excepting when the solution was used too strong. In one instance 1 part of insecticide to 9 of water burned about a dozen fruit on the southeast side and in another instance 1 to 25 burned a few fruit on the southwest side. In another instance I saw a grove that had been sprayed in June with 1 part to 75 that had been badly damaged, perhaps as much as 20 per cent of the fruit has been burned. This burning did not occur on the orange where the drop of insecticide had collected, but always on the outside and on that side of the orange which was turned toward the sun. I concluded that this injury was either done by the sun or a combination of the action of the sun and the insecticide. The other two instances the injury was on the side of the tree which received the sun directly after the application. In another instance one part to 33 sprayed on nearly ripe fruit caused a few red spots to appear on the side

Vero Board of Trade Urging Congress to Cut Inlet to Indian River

At the July meeting of the Vero Board of Trade action was taken toward bringing about the opening of an inlet from the ocean to the Indian River between Vero and Fort Pierce. Resolutions were adopted calling on Florida congressmen and United States senators to use their efforts to obtain a government appropriation for this purpose. Such an improvement would mean a great deal to the fishing industry of St. Lucie county. The value of the fish shipped from the county has decreased materially since the Indian River inlet, four miles north of Fort Pierce, became closed. Vero fishermen have suffered along with others in the county and a determined effort is being made to bring about the means of restoring this important industry to its former proportions. The St. Lucie county Board of Trade has adopted similar resolutions and proposes to send a delegation to Washington to urge the appropriation.

The building of a county dock on the river at Vero was another matter taken up by the board of trade. E. J. Wood reported that the county commissioners had promised to make an appropriation to build such a dock but had failed to carry out their promise. Mr. Wood, F. Charles Gifford and J. M. Knight were appointed as members of a committee to attend the next meeting of the board of commissioners and request that action be taken on the dock matter at once.

STATE IS IMPROVING AND DEVELOPING.

From every city and county in the state, faithfully portrayed in the enterprising newspapers, come stories of improvement and development that are extremely encouraging, especially to those who have been identified for a decade with the upbuilding of Florida.

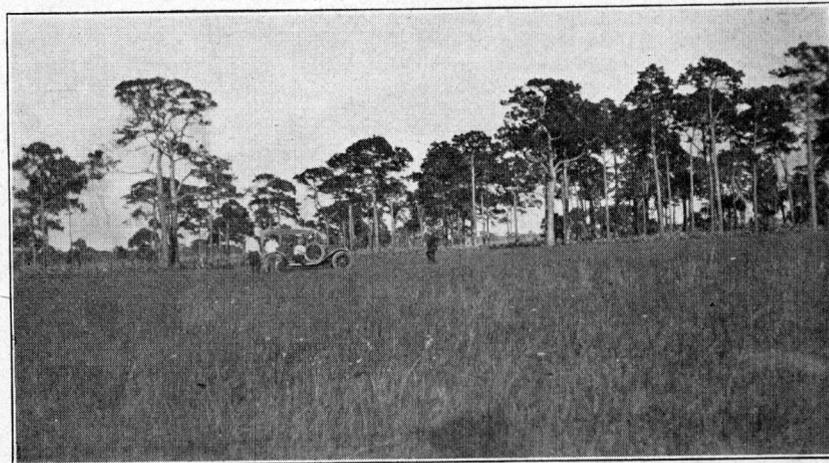
Here it is a new water works, there a new electric light plant, then it is sewers, gas, sidewalks, paved streets, good roads, canals, inlets, waterways and from every section comes the good news of new buildings, many of them very fine ones, that will compare favorably with the best sections in the country.

What does all this mean? It means a Greater Florida. It means that the development of one of the most fertile state's in the Union is well started on a permanent basis that will place it in a class by itself and make of it the garden spot of the world.

The tourists and winter visitors who have visited California in years gone by and then come to Florida are prone to make invidious comparisons. They say California is more beautiful, but that is only because it has had time for development. It is an old, settled state, while Florida is comparatively new.

The big land movement in Florida only began six years ago, and since that time millions of acres have been drained and improved and are now being rapidly settled upon. Up to that time it was a case of a few brave souls who loved the climate and who were making slow developments against great obstacles and with limited means and facilities.

The development in ten years, from 1910 to 1920, will show an increase of close to 1,000 per cent, and when the next government census is taken Florida will be well up among the leaders in the matter of products and even in population—Ft. Pierce News.



Lands in Indian River Farms at Vero.

where a drop of insecticide had collected. It would appear that if there is no fruit on a tree little or no injury can be done by the use of this solution, even when used as strong as 1 part to 9 of water. When used on ripe fruit it is very doubtful if it should be used stronger than 1 to 40 or 1 to 45. When used on fruit larger than 1 inch in diameter there is some risk in using it 1 to 25 or 1 to 33, but according to my experiments I have not had any injury at this strength. My experiments would indicate that in every instance where it was sprayed on the bloom at 1 to 33 the petals and small fruit fell in great abundance, and this injury proved to be so great that one tree had only about 25 per cent of a normal crop. In the other test the crop was only about 50 per cent of early fruit. Both of these tests were followed by heavy rains which no doubt was instrumental in

lessening the damage. According to my tests 1 to 50 did no injury on one tree and on another tree the damage seemed to be quite evident. According to my experiments there is more or less risk using it stronger than 1 to 50. Future experiments might show that it could be used stronger than this dilution on the bloom.

These tests were all made with commercial lime and sulphur solution, testing 32 degrees Baume. This material can be purchased from any of the dealers in insecticides, or can be made by the grower himself. It is advisable for the grower to make this solution since the saving would be approximately two-thirds. It will cost about \$3.25 to make it and about \$10.00 to purchase it from the dealers in this state. Instructions for making this can be had from the Bureau of Entomology at Washington, or this office.—Florida Grower.