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THE SAN JOSE SCALE IN ALABAMA

Tuskegee Normal and Industrial Institute

EXPERIMENT STATION

Tuskegee Institute, Alabama

By

F. H. Cardoza

THE TUSKEGEE EXPERIMENT STATION

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The Tuskegee Agricultural Experiment Station

BULLETIN No. 9

NOVEMBER, 1906

THE SAN JOSE SCALE IN ALABAMA

By F. H. CARDOZA

This bulletin is written primarily for the colored farmers of Macon County and the state generally, and is meant to be not technical, but in simple language for the average farmer to understand and put in practice. Many of our rural citizens know absolutely nothing of the name, origin, life and the great amount of injury done to their trees by this insect, but only know that they lose trees year by year, and that they have to yearly buy new ones from a passing tree agent at a high figure. We will endeavor here to first describe this peculiar little pest, study its life history, and see what is best to be done to stop its ravages, or to prevent too much spread.

It is hard to make the average man believe that the San Jose Scale is a living insect, because it is no larger than a pin head, and he seldom, if ever, sees it move or go outside of its scaly covering. But it does move, though only for a couple of days, spent in looking for a home, then soon to settle permanently, with its mouth parts stuck tenaciously in the bark, covering itself with a scaly covering, sucking out the life juices of the tree until the under layer of bark turns red and gradually begins to dry up and decay.

The Scale insect gets its name from the fact, that it covers itself with a scaly exudation from its body for protection from its enemies generally. The Scale seems to get its first hold in the trunk, then working upward to the branches.

Take an ordinary pocket knife blade, scrape gently on the suspected limb, and if living scales are present, very small and tiny yellow particles are seen to be mashed quickly into an oily spot, and the Scale is no more. If the tree is still of a dark gray color, or even of the average green appearance, this knife rule is a safe method to follow for proving the appearance of the Scale insect. If all the Scale insects are dead on the tree, their covering

remains in flaky masses or singly, as long as the tree stands. The average and ignorant farmer here, can better understand what the Scale is by comparing it with the mites on poultry, and that the Scale can and does spread very rapidly by means of the wind, birds, larger insects of all kinds near by, livestock, fruit pickers and other agencies.

Here, in the extreme South, we have from three to six broods a season, making one generation or more go up into the millions of insects. The Scale begins its multiplication in the warm days of April in Alabama, and continues reproduction through September, or longer, so that a single Scale may cause a large tree to be entirely covered in one season.

The San Jose Scale also received its name from the city of San Jose, California, where the insect was first noticed at work in the United States. It now has a long list of food plants and can be found on nearly all kinds of fruit trees grown in the state and on some trees of the forest.

We can't speak here of improving the methods of orchard practice, as up to this time, there seems to be none of that in the rural districts, and instead, we see a wholesale and intentional neglect of all trees on the plantation or in the garden. This is due to the ignorance of the true value of the fruit tree in itself, and to the thought that when a tree is once planted it needs no more attention during its life.

If these two main considerations could be wiped out from the so-called practice of the Southern farmer, we would see more in our travels here and there, marvels of beauty and sources of pleasure and profit in the fruit trees of the state. In these days and times, too many forests are being cut down and land cleared for general farming, thus causing the Scale insect for one, to prey on the cultivated plants more largely for its food. So that the farmer who wishes to have the best success with his fruit trees, must use the most approved tools and methods or else suffer serious losses. He must make up his mind to learn the uses of spray pumps and spray solutions, and then start to using both regularly and intelligently to obtain the best results; namely, a large crop with greater profit, with longer life for the trees.

Unless the work of spraying is worth doing well and at the right time, it is not worth doing at all, and the San Jose Scale will compel you to spray it evenly and often; that is, in the fall and just before the buds swell in spring. Just one healthy mother Scale left untouched is sufficient to cause a tree or plant to be-

come almost literally covered again in one season, and it is estimated that a tree three years old can hold over a million of these insects, being the result of having from three to six broods a season in this climate. This fact of rapid multiplication has made the problem of killing out the pest altogether entirely impossible, and all we can safely do is to try hard every year to lessen the chances of the Scale in spreading too much and getting too far beyond our control. It is, therefore, the purpose of this bulletin to impress upon the minds of our farmers the actual saving value and the beneficial results that are assured to the individual who sprays with a vengeance, hence spraying is your best friend. It also shows the point of view as to their duty towards the fruit tree and themselves. We value the life of the tree, the good it will bring us now and in the future, more than we do the life of the insects inhabiting the tree.

The lines written here for the information of the practical farmer are not theories, nor ideas advocated which have only been tried and proven satisfactory by the Tuskegee Station, but also by nearly every other Station in the Union. It takes the progressive and thinking farmer to adopt these suggestions and live up to them. It is an education to the ignorant man, simply to get acquainted with the various processes of spraying, the machinery and the solutions used. But the work should be done intelligently, and if this bulletin is closely studied, the reader will then get the where, the when and the how, as to achieving success along these lines.

The farmer must eventually come to the point that it is just as important to give a thorough spraying to his fruit trees every fall and spring as it is to first plow his land to make his cotton. If he has already been growing his good fruit without spraying, it is only a question of time when the Scale will get a foothold by some unseen means and cause the farmer untold trouble in a short time. This is the experience of the fruit growers everywhere; so spray as directed further on, whether you have Scale insects now or not, and thus start to avoiding both it and some diseases that you are bound to have more or less, especially with peach and plum trees. In this rural region the trees of any kind have all been allowed to grow to suckers and very low side shoots, causing the tree to have more of the appearance of a rose bush than a fruit tree, and then when the Scale begins its ravenous work, the tree has very soon all the more ghastly appearance.

One would sometimes think that the old custom of sprinkling ashes around the fruit tree was first begun at the top and ended at the bottom.

But it is the pernicious Scale that has been allowed to go too far before attempts are made to check its ravages. We can only entirely prevent the further work of the Scale pest by cutting down and burning the orchard and promising to plant none in its place. If a tree is very badly infested to the extent that the wood has begun to die and you see the sap circulation is being greatly lessened, then dig out and burn. But if the tree is still badly infested and the wood still apparently in fair condition, then use honest efforts to control the pest by cutting back the tops of the tree one-fourth or one-third, spray thoroughly and watch for great improvement next spring. Before spraying in a general way, it is suggested that the trees be intelligently pruned or trimmed in and out, then the trash collected and burned, making the spraying work far more easy. There is certain to be more or less pruning to do on fruit trees almost the year round, by endeavoring to keep down water sprouts, suckers, dead wood and extra limbs that really tax the strength of the tree and the best development of first-class fruit.

Whether spraying slightly infested or badly infested trees in Alabama, we need to start when the leaves have about all fallen and the tree is thoroughly matured for the season, and then again just before the buds break open in spring. Experience as well as good judgment prevents our ever repeating the spraying for Scale in the summer time. We find here, for example, that with both the oil mixtures and the lime, salt and sulphur wash, spraying while in full leaf in the growing state does more harm than good. The chief reason why summer treatment is of so little value with these two most important insecticides, is, that the foliage of most fruit trees (especially the peach) is seriously injured by even weak strengths; and secondly, that it is impossible to get next to more than one-half the number of Scales then living on the tree. If we give a thorough spraying in the fall and early spring, when it is safer and best, we don't need to worry ourselves with summer treatment.

Spraying should be practiced only in such weather as will allow the tree to dry quickly after applying the liquid mixture, and hence give it a chance to stick well and get in its deadly work on this very worst of orchard pests. Preferably a dry, sunny and quiet day is best. If we are compelled to spray on a windy day,

direct the nozzle so that the spray goes with the wind, to keep the face cleaner and the mixture from burning the eyes of the workman. We give this information to beginners as a piece of valuable and painful experience, and hope that they will use it freely, so as to avoid any discomfort. We also advise that the worker apply vaseline to the face, wear a pair of rubber gloves or a pair of leather gloves soaked in machine oil; also a large rubber coat if obtainable. If not the latter, wear a suit of overalls and wash the suit as often as necessary. Use a pair of blue or black goggles also. These few items for protection are mostly used when spraying on a large scale; but each person can suit himself in whatever, if any protection he may use against the spray mixture, particularly the lime, salt and sulphur wash.

It is also best not to spray fruit trees of any kind while they are wet, or when a rain is in sight, because the likelihood is that the trees won't dry quick enough and the mixture will easily wash off. In case of the kerosene oil mixture, this is doubly necessary to follow, or else the oil would soak the bark and kill the tree outright.

Now, it may be asked how does the Scale get its food, and how does it cause so much damage in the end?

The Scale is a sucking and not a biting or chewing insect, getting its living solely by sucking the sap through its mouth parts, which are stuck through the outer bark into the soft under bark (cambium layer), there to stay without moving as long as it lives.

There are many spray preparations that may be used for the Scale; but as is usually the case in all mixtures, there is one that does the work best. This station has not thought it necessary to try the many patented mixtures for the control of this insect, rather depending on outside stations for such information as they give in their trials of such mixtures. But we have done considerable experimenting with the most important and reliable insecticides with the intention of seeing which kills the Scale most effectively, and acts all round in the cheapest and safest manner for the farmer of this state.

The first of these is the Kerosene Emulsion, the old time tree wash that has seemingly done a great amount of good for many years, but further experiments by us here, do not convince us that this wash is best to use on either a small or large area for the Scale, for the reason that it doesn't kill one-half the insects on the tree, even when using 20 per cent. oil in the mixture, and

when the best care and skill are used throughout. It is also rather more costly and laborious to make than other insecticides spoken of later.

Second, the mechanical mixture of kerosene and water has been tried here long enough to know its true value, and not recommend it to the farmers of Alabama for the San Jose Scale, because of the extreme uncertainty of the working parts of costly pumps used to apply this particular oil and water mixture, and the unsatisfactory results obtained on that account. The pumps may be new and the per cent. parts most carefully adjusted, but when the oil and water are put in their respective places in the barrel, the handle of the pump begins to work, and the mist begins to fly, then does the unevenness of the mixture show itself. One minute all oil may be coming from the nozzle, and the next all water, but the all oil is dangerous to the peach and plum, those trees which are most numerous in the South.

It is therefore our purpose in this bulletin, to show the farmer of Macon County and of the state generally, the good and valuable points in the lime, salt and sulphur wash, which has been used with such great success at the Institute orchard of 10,000 trees, where the author's experience and observation justifies these remarks.

We believe it will here pay best in every sense, to advise our farmers, who have far more sense than they are usually given credit for, to confine our spraying practice to one mixture, one poison, to one solution that has been tried and proven the all round, best effective remedy for the Scale pests, as have yet been tried, repeatedly and yearly carried out, in the largest and best orchards of the entire United States. The material for this last named wash is easily obtainable from your town stores, or can be shipped to you at a comparatively small cost by the factories. The spray when made should not cost more than three cents a gallon, and less than that if made in barrel quantities. Whatever its cost may be, it is better to invest a few cents or dollars in this mixture, saving the tree and the crop, and hence producing fruit that quickly catches the eye of the customer, demanding far better prices than the fruit picked from unsprayed trees.

Not only will this wash or mixture effectively control the Scale nuisance, but it will also prove a most beneficial treatment for one of the worst fungus diseases attacking the fruits commonly grown in Alabama, namely, peach leaf curl. It gives the trees, later, a clean and healthy appearance.

The lime, salt and sulphur mixture is used as a strictly winter or dormant treatment, when sprayed all over the tree. There is no particle of danger to the tree, young or old, if the orchardist waits till the tree is thoroughly dormant, or entering its winter sleep, and which generally starts in this state near November 15th. If only one spraying is given to the tree, it is best to wait until late winter or early spring, just before the flower buds begin to swell, as it is then that the most good is done. Don't spray when the flower buds are opening as the bees will be killed and we need the service of all bees.

We find that there is a large amount of variation in the quantities of lime, salt and sulphur used to prepare this wash, but our experience here gives us excellent results with the following amounts:

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| Unslacked lime..... | 25 pounds, |
| Sulphur (flowers of)..... | 16 pounds, |
| Salt..... | 10 pounds, |
| Water to make..... | 50 gallons. |

The ordinary molasses or oil barrel is used to hold the 50 gallons of prepared mixture. If the reader doesn't want so much mixture, and desires to spray only a few fruit trees, etc., why take one-half, one-fourth, or one-eighth of the above amount, and proceed in the preparation of the mixture just the same as for a barrel or more.

We would suggest that you first put half of the amount of lime in a large kettle, caldron, or boiling pot, with half of the amount of water used, already hot, and slack carefully. Then stir up your sulphur fine, add a little hot water to make into a smooth paste, and put this into the lime solution. Then start this mixture to boiling as soon as possible, and continue the boiling until the mixture has become a deep orange-red color, and also rather thin. This appearance will prove that all the sulphur has melted thoroughly, and becomes the vital part of the spray. The salt should be added while the mixture is still boiling, taking anywhere from one-half hour to two hours. Don't allow the mixture to burn while boiling, stirring frequently, and put more water in, if necessary, to avoid burning. Add the rest of the water already hot, to make up the 50 gallons, or the amount previously desired; strain carefully through a fine tin or iron strainer into a separate barrel, and spray while yet warm. Don't try to strain through any kind of cloth, as that is a failure. It makes no difference if the day is cold, as the mixture, if applied hot,

works very well. We do not advise farmers to use caustic soda in this wash in order to avoid boiling the mixture as it is more costly and does not give as good results as a boiled solution of the lime, salt and sulphur alone.

Now as to how this mixture is to be applied, probably involves the biggest problem with some of our worthy farmers, and we are compelled to call your attention to several small and large pumps made by Goulds and Company of Seneca Falls, N.Y., and the Deming Company of Salem, Ohio. There are also other good companies making this kind of spray pumps. In their catalogue is the large and celebrated "Pomona" pumps for large orchards, but the great majority of the fruit growers will want the small knapsack or bucket pumps costing from \$5.00 to \$10.00, depending on the number of trees you have and the amount of money you wish to spend. The pumps come complete with hose and fine spray nozzle. Always get the pump having the most iron and brass parts. If you do not use one of the pumps, then it is left to use whitewash brushes and water buckets as best you can, but we couldn't believe that you would reap much satisfaction by the latter method.

Always clean your pumps, however small or simple, most carefully (including every detail part) after using, and thus avoid their clogging up, rusting and being eaten up by the lime-salt-sulphur mixture. Keep the strainers clean also.

The wash may seem disagreeable to use, but we should become used to it, as it has proven the very best remedy against the Scale that has yet been tried or used. It doesn't kill the Scale all at once, but gradually eating into the insect until it leaves only the scaly covering behind. When the trees have dried from their drenching of spray, they look white all over (see cut), and it is then easy to see any vacant places left without treatment. The untreated spots may be sprayed as soon as noticed.

In conclusion we would urgently advise our farmers to do all they can to preserve and improve the appearance and the life of their fruit trees from the San Jose Scale in particular, as the meanest and most dangerous of orchard pests; and if every fruit grower in the county and state would do this work of spraying only twice a year in an effective manner, we would soon have a better looking lot of sound, strong and healthy trees, capable of bearing more and better fruit, in so far as effected by such beneficial spraying. Of course spraying should be accompanied by intelligent pruning, fertilizing and cultivation, and thus complete a round of work that is not hard or irksome, if we love trees and like good fruit.



A WELL SPRAYED ORCHARD

