get together any quantity of absolutely perfect apples. Knowing this, an exhibitor should not be discouraged if his apples do not quite reach perfection in every respect. Nobody’s apples do that. So if your apples are not quite what you would like, neither are the other fellow’s just what he wants. And as judging is only a proper placing of comparisons in values on apples, yours may still rank high. So do not be discouraged if A. K. Bassett’s apples did get most of the money this time. Remember that every dog has his day, and the best prize fighter that ever lived was eventually licked. Don’t wait for these fellows to die, but go to it while they are still living and show them that better apples than their’s can be grown. Go home resolved that next year you, too, will go out in your orchard with your padded basket and search out some of these prize winners.

Always remember, that the close decisions usually hang on the items of type, finish, and uniformity.

THE SAN JOSE SCALE SITUATION

By S. B. Fracker, State Entomologist

Just a year ago in discussing some recently introduced insect and plant diseases I had occasion to quote to the Horticultural Society the words of Dr. McCubbin, of Pennsylvania, who described the history of recently introduced pests as containing “a period of carelessness and neglect during which the pest was introduced; then a period of loud voiced alarm, then a scurrying around to arouse public interest to secure funds to fight the introduction; this stage is followed by a series of futile attempts to eradicate the pest and finally the country settles decently down to live with it, either letting it have full course or trying by various means to render it as innocuous as possible—in any case promptly settling an appalling load on our national economy because of decreased production or costly annual control measures.”

This description gives in a word the history of San Jose scale in the United States. Introduced in the 70’s during the period when plant material from all over the world was welcome in the United States, whether infested or not, and distributed across the
country before nursery inspection regulations were established to interpose obstacles in the progress of such pests, it now covers the length and breadth of the United States. In the east the parasites have had full sway and have been allowed to control it as best they may for the past thirty years. In the Mississippi valley parasites have not made much headway, but extensive spraying has been followed of necessity in order to save the orchards. In the Rocky Mountain fruit district its control is now as much a part of routine orchard management as is the summer spraying program directed against the coddling moth.

In spite of both natural and artificial control, however, San Jose scale is now doing more damage in the United States and in one sense may be considered a more serious problem than it has ever been before. Parasites can never be relied upon to wipe out a pest. They can reduce its numbers so that it comes in alternate waves like the tussock moth, the corn ear worm, and the Hessian fly, but if they wiped out the pest completely, they would themselves starve, so that in districts where they are numerous they come to a balance with the host insect they are attacking and reduce their numbers without wiping them out completely.

The most interesting development in recent years is the apparent increasing resistance to control by concentrated lime-sulphur spraying. The reason for this may be either due to the fact that the more susceptible strains of the scale have been wiped out by lime-sulphur, leaving only the hardier specimens to propagate or it may be due to changed methods in the manufacture of lime-sulphur. In either case the insect is becoming more numerous and more injurious particularly in the latitude of the Ohio River valley, but to a large degree in such northern states as Wisconsin and Michigan.

A glance through the reports of the Insect Pest Survey Bulletin for the past two years shows that this is true in many parts of the country. In Connecticut the scale which had become scarce owing to the efficiency of parasites previous to 1922, now seems to be increasing. In Maryland it is reported to be on the upward swing in numbers due to the great reduction of natural enemies. In Indiana it has been increasing and is now doing a great amount of injury. In Missouri the commercial bearing orchards have trees badly encrusted so that a state-wide campaign has just been started, looking to the development of a more
general application of dormant spraying. In Chariton county the trees last summer were dying from the infestation and Scale-cide was tried while the trees were in full leaf and fruit. In northwestern Arkansas many trees have been killed by the scale and large numbers have been greatly weakened. This has apparently also caused excessive susceptibility to certain diseases, especially leaf spot. In Mississippi the scale is reported as abundant in every county and large numbers of requests for control methods are received each season. In Lawrence county, Ohio, the growers are complaining that San Jose scale is increasing in spite of careful spraying with lime-sulphur solution. In New York, Massachusetts, and Rhode Island the general impression among the fruit growers that this pest is coming back into abundance has been confirmed by recent surveys. Not until the past year has the scale been regarded as a serious pest on the peach north of the Ohio River, but this year several peach orchards have become alarmingly infested.

The fruit growers of Wisconsin and other northern states are sometimes inclined to complain about the short seasons of this climate, late spring frosts, and repeated hail storms. In the number of both insect pests and plant diseases, however, we are very fortunate. The scale which is the subject of this paper has never become established in any of the Wisconsin fruit districts. In fact, the only places where it has yet been a cause of serious injury are inside the city limits or in the large centers of population. It is now so numerous in Racine, Kenosha, Whitewater, and Madison, that its complete elimination appears impracticable. In Racine county it is also present in the villages of Rochester and Union Grove and on one or two farms. While it could be temporarily eradicated in some of these locations and while the department is engaging in spraying campaigns with that in view, keeping it out of this part of the state permanently is probably out of the question in view of the advantageous climatic conditions and the fact that it has been and will continue to be repeatedly introduced both by natural means and by such shipments of nursery stock as slip by the eye of inspectors of infested states.

North of the latitude of Madison and Milwaukee it spreads so slowly that apparently it can be readily eradicated when found. In fact, from the time the scale was first discovered in Wisconsin in 1896 and again in 1902, it must have been imported into
the state a great many times. Office records show that thirty-five separate introductions into fifteen different localities have been discovered and the host plants been destroyed. These localities are now free of the pest. The scale has succeeded in passing the winter and in multiplying to the extent of seriously injuring the trees and shrubs attacked as far north as Marinette and La Crosse and has occasionally been discovered on nursery stock from outside the state at such important points as Baraboo, Wausau, and Ashland.

This insect has secured so much advertising and is so well known in other fruit growing districts that it is often believed to exist where native scale insect such as oyster shell scale is the one actually present. In view of the present distribution of the scale in Wisconsin it is probable that not more than one-fourth of this audience has ever seen the insect except in exhibits and museums. There are several specimens on display in the exhibit at this meeting, and I hope that all the Wisconsin growers present will take this opportunity to examine it closely.

Every few months we see clippings from Wisconsin newspapers stating that one county agent or another has discovered San Jose scale in his county and is recommending control measures for it. In most cases these have proven to be incorrect. Fortunately this misidentification does no damage, as the measures suggested for San Jose scale are ones which are beneficial to the trees and are the same ones which will control oyster shell scale if that insect happens to be the one actually present.

On the other hand, mistaking San Jose scale for oyster shell scale and not considering it serious may result in serious loss. This has happened in a private nursery within the last two or three years where the gardener had noticed the scale present, but believed it was only oyster shell and did not take the situation seriously until a good deal of damage was done.

As seen with a reading glass or hand lens on the bark or fruit of a tree the scale is found to be a small round object about the size of the head of a pin with a slight prominence in the center. These minute round areas consist of wax, which covers the soft bodied little insect beneath. The latter passes the winter in the immature stage and matures in the spring. The females give birth to living young to the number of from 150 to 500. The multiplication during the summer is very rapid and while it is hindered by weather conditions in Wisconsin we have seen very
slightly infested shrubs and trees in the spring become completely covered with scale during a single season. Some years, of course, development is not as rapid as this.

As a control measure in the department we are confining ourselves to the oil solutions. As has already been mentioned, lime-sulphur is not proving effective. Several such oil sprays are on the market, Scalecide being entirely satisfactory but somewhat expensive. This winter we shall be using both Scalecide and Sunoco oil, a recently developed product which offers promise of being very valuable. For those who wish to try out the new engine oil emulsions the following description is quoted from the Extension Bulletin 114, of the Purdue University Agricultural Experiment Station. This material is effective in a much more dilute solution than other oil emulsions and will be found as effective for oyster shell scale as it is said to be for San Jose.

"The emulsion is easy to prepare and has a big advantage in cost, a 2 per cent emulsion, such as was used in the dormant sprays, costing less than $1.50 for materials to make 200 gallons of spray.

The 2 per cent emulsion is prepared as follows:

Liquid potash fish-oil soap..................................................4 pounds
Oil (such as Diamond Paraffin, Red Engine, and Nabob oil, obtainable at most oil supply stations).................4 gallons
Soft water.................................................................2 gallons

"If soft water is not available, use lye or sal soda (about a pound per 100 gallons) to soften it. Under some conditions to assure a more mixable emulsion, we have found it desirable to double the amount of soap to 8 pounds in which case the water should be reduced to 1½ gallons.

"The three ingredients are placed together in a suitably sized kettle or cooking vessel and gradually heated by fire or with steam until the mixture comes to a boil. A light brown or cream scum will soon appear on the surface. After boiling a few minutes the scum will begin to disappear as the liquid itself becomes visible by a spot near the middle, this spot gradually enlarging as the area of scum decreases in size. At this stage the heat is removed and the mixture pumped back into itself twice or from one container to another twice, under pressure of 50 or 60 pounds while the liquid is still hot. For this purpose a nozzle or two nozzles with the disks removed are quite suited. Care should be taken to pump the liquid while hot and it should be remembered that too much pumping may break up the emulsion. The hot liquid may destroy pump packing and it is therefore best to pump the stock solution with a hand pump if available.

"The above stock solution will remain in a perfectly emulsified condition indefinitely and can therefore be made up in
quantity but it is advisable not to carry it over from one season to another, and stock solutions should always be gently stirred after standing as a certain amount of the liquid soap settles to the bottom of the container. For a 2 per cent emulsion, the stock solution is diluted with water, using six gallons of stock to a 200-gallon tank. If the water is hard, it is advisable to soften it with caustic soda, sal soda or lye at the rate of about a pound per 100 gallons, the water to be first softened and the stock emulsion then added. In Arkansas it has been found desirable, to assist in holding the emulsion thoroughly mixable, to use weak Bordeaux mixture, such as a $\frac{1}{4}$-$\frac{1}{4}$-50 formula, instead of water, as the diluent.”

**DISCUSSION OF DR. FRACKER’S PAPER**

**Dr. Fracker:** It is customary in a talk of this kind to draw some conclusions upon which the members of the society can act. That warning is this: That when scale insects are found in the orchard do not assume that because oyster shell is the most common species in the vicinity, the one you discovered is the oyster shell. The owner permitted these specimens in my hand to exist too long and they spread down the row and in other places. The owner was familiar with both scales but took it for granted that this was the oyster shell.

On the other hand, it also does some damage to report that San Jose scale has been found, when it is not that. Every few months we get clippings saying that some county agent has reported San Jose scale, and giving directions for control. The control measures for both are practically the same and no particular damage is done but at the same time it gives the public a little misinformation. We can determine definitely in a few minutes by specimens just which is present. To the grower it makes much more difference. San Jose scale multiplies much more rapidly, will kill trees in a few years and is much more injurious when it becomes prevalent. The owner should get the jump on it at once, but the oyster shell can be let run several years and the trees sprayed only occasionally.

**Mr. Kern:** How will one shrub or tree transmit that San Jose scale to another one?

**Dr. Fracker:** The scale you see is a waxy covering over a minute insect. The young are born alive in the spring. They have an active stage of from twelve to twenty-four hours. Those young, as they are born, are so small that on a white piece of paper with close examination you could just barely detect a speck there. I remember in the laboratory a few years ago being able to detect a most minute speck but by using a microscope could see an insect running as fast as it could go. Of course the microscope increased the speed as it did the size of the insect.

These young crawl onto the feet of birds; they are blown from
one tree to another. If there are tall trees over a hedge or a nursery, if the tall trees are infested the hedge or nursery is almost sure to be from the scale being blown off. In cities we find it most largely on trees around chicken yards. Sparrows are frequently around chickens yards, they fly down and up and over to the next chicken yard. In surveying from one property to another we can jump two or three and come to another where there is a chicken yard and it is present. It is not carried by sparrows any long distances, however. I do not believe we are getting any material spread from infested sections of Illinois by that means but for perhaps one hundred yards or a quarter of a mile it is a most effective way of introduction. The way it would be introduced into orchards would be from nursery stock purchased by yourself or your neighbors. Mostly it is spread by the wind and birds.

**Mr. Hauser:** Any danger of getting it on western fruit?

**Dr. Fracker:** The western apples are carefully graded and the San Jose scale mark is one of the surest things for throwing an apple out of the grade valuable enough to ship east.

**Mr. Kern:** Is there any danger, then, if I had an orchard infested, with a farm adjoining forty or eighty rods from me being infested through birds?

**Dr. Fracker:** Yes. When it gets into a general fruit growing district, as the fruit growing districts of the Ohio river valley, southern Illinois and Indiana, it is practically impossible to keep any orchard free. They have to be sprayed every year. A rough guide that has been used in the west is that San Jose increases the cost of production 15 per cent. That is just rough. The dormant spray is the most expensive spray that you can put on. If San Jose is present the spray may have to be applied each year.

**Mr. Toole:** I was up at the Minnesota meeting last year and heard the talk of the entomologist up there and the impression was given out that Minnesota was practically free but a great deal of it was present in Wisconsin. It led the Minnesota people present to believe that it was so prevalent here that it would be rather dangerous to buy nursery stock here. Is the situation so bad?

**Dr. Fracker:** The Entomology Department of Minnesota has become alarmed on account of the situation at La Crosse. We had gone at the La Crosse problem in the same way we did at Beloit. Why we did not get the same 100 per cent results there I do not know. Immediately across the river from La Crosse is a fruit district and the growers are aware of the fact that scale is present in this one place. They know it has survived two years. In Beloit it was completely eradicated. The fact that the park
board themselves had never heard of it and did not take the situation very seriously is one factor. However, that is the only place where San Jose scale is present in Wisconsin within seventy-five miles of the Minnesota line anywhere. The only danger of securing San Jose scale in stock from Wisconsin nurseries is when Wisconsin nurseries are acting as dealers and passing on stock from other states. As you know, Wisconsin nurseries buy a large number of their apple trees which are grown in other states. Not all of that stock is seen by our inspectors, perhaps we would not catch individual scales if it was; but many Wisconsin nurseries handle stock from other states and occasionally some that has been infested. In fact every year we pick up San Jose scale in from one to nine different locations, in different parts of the state. Those are introductions.

GREETINGS

JOHN D. JONES, JR., Commissioner of Agriculture
(From Reporter's Transcript)

Mr. Chairman, Ladies and Gentlemen of the State Horticultural Society: I wonder just what sort of message it would be possible for the Commissioner of Agriculture to deliver to this assembly which might be of interest. Wisconsin, of course, is noted for its agricultural achievements, particularly along dairy lines. To such an extent is that true that Wisconsin today is the outstanding dairy state in the nation, having supplanted some of the older states, notably New York; being far in the lead of Minnesota and a state to which those interested in dairy cattle and in dairy products come from all over the United States and from various parts of the world. Into my office this morning came a man who had just sold two pure-bred animals to Japan and wanted to get the necessary papers in order that those animals might be shipped.

In view of this outstanding position that dairying occupies in the state of Wisconsin have we a right to assume that the business of fruit growing—those interested in fruits and flowers which beautify—have they much of a place in our agricultural scheme? I want to say to you ladies and gentlemen—and I am glad that the ladies are with us because their presence always has a salutary effect on all deliberations, refining and seasoning, flavoring and sometimes spicing them, if you please. In fact, you recall the story of the man who was asked if he ever lost con-