

# Controlling San Jose Scale With Lubricating Oil Emulsion

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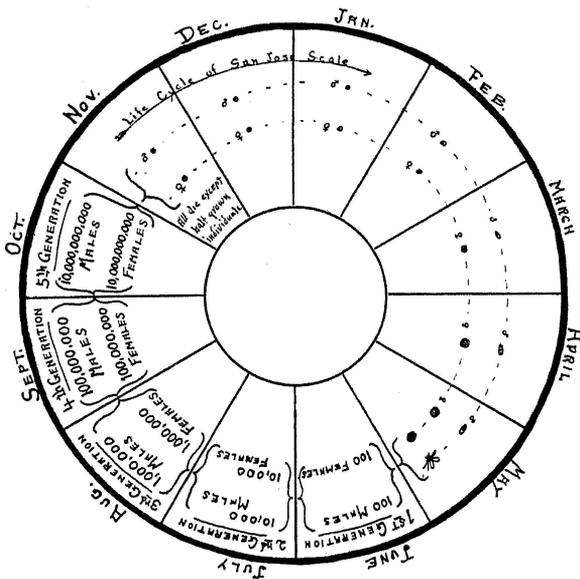


Fig. 1.—Life Cycle of the San Jose Scale.

Today in Missouri the orchardist's most vital problem is the control of San Jose scale. In the last three years in the Mississippi Valley it has been unusually destructive. Many of the best fruit growers have failed to control the pest, and some orchards have been completely destroyed. This has been due to natural conditions favorable to rapid increase, and to improper mixing and application of sprays. With the mild winters and favorable summers, the pest has reproduced and spread as never before. A few scales escaping the spray will soon cause a tree to become heavily reinfested.

So threatening had the pest become in some orchard centers of Missouri that, a year ago, the Plant Inspection Service inaugurated the present scale control program. An orchard survey, to determine the extent of scale infestation, was begun last summer. Over 10,000 acres of or-

chards were inspected in 30 of the most important fruit producing counties, and over 50 per cent of the acreage showed infestation. After the trees became dormant, demonstrations were begun to show the proper methods of controlling the scale. Careful applications of strong contact insecticides while the trees are dormant constitute the only known way of controlling this pest.

### DORMANT SPRAYS

For many years liquid lime sulfur has been the standard spray for the scale. Until recently all careful growers and the various experiment stations have found it effective. During the past three years most growers in this state have controlled the scale with lime sulfur though some have lost faith in it. Dry lime sulfur preparations have failed in our experi-

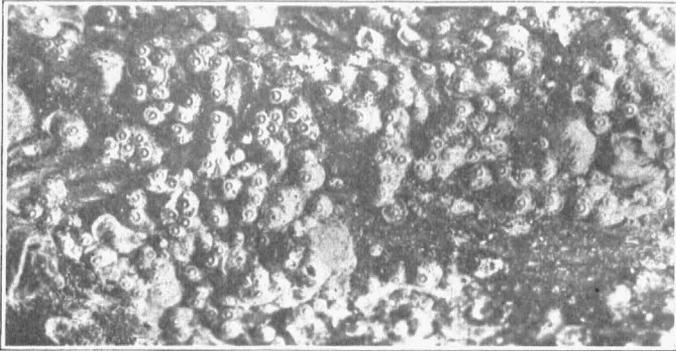


Fig. 2.—San Jose Scale; portion of peach limb showing scale incrusting it.  
(Enlarged)

ments to give satisfactory control. While liquid lime sulfur in our experiments has given satisfactory scale control, certain oil emulsions have usually given a slightly higher kill. Coal oil emulsion and certain miscible oils have given effective results. Scalecide, a well known miscible oil, has been extensively used and has given uniformly good control.

For the past two years the workers at the Federal Entomological Laboratory, Bentonville, Arkansas, have been testing the lubricating oil emulsion for the control of scale. They have found it very effective. Tests in Missouri have gone far enough to prove that it will give almost 100% kill without any apparent signs of injury to the trees. A 2 per cent emulsion is recommended. At this strength lubricating oil emulsion costs between one-third and one-half that of commercial liquid lime sulfur. The commercial stock emulsion is now quoted at 30 cents a gallon which makes 33 gallons of spray at a cost of less than one cent a gallon. This spray recommends itself to the fruit grower, who has scale, for its effective kill, remarkable cheapness and ease of application.

It has been used against San Jose scale for only two years and there

are many things yet to be found out about it. In this state we are advising those growers who have not been controlling the scale effectively with liquid lime sulfur to turn to the oil emulsion. On the other hand we are not urging those growers who are getting results with the liquid lime sulfur to turn to the oil at this time simply because it is cheaper, for the fungicidal properties of lime sulfur enhance its value to the orchard.

### LUBRICATING OILS THAT MAY BE USED

Up to the present time the oils used in making lubricating oil emulsion have been very commonly called red engine oils. Practically every oil company manufactures these oils and they are usually sold under a definite trade name. They are cheap lubricating oils with a paraffin base. Diamond Paraffin Oil, Red Engine Oil, Nabob and 180 Red Neutral have given good results and can be obtained from local oil stations at prices ranging from 16 to 20 cents a gallon in 50-gallon quantities.

### SOAP

The soap which is used in making the lubricating oil emulsion spray is a potash fish-oil soap and is sold under the name of Potash fish-oil soap. It must be a potash soap. Ordinary fish-oil soap will not give satisfactory results. This soap can be obtained from most any chemical company, for about 10 cents a pound in 50-pound quantities.

### MAKING THE STOCK SOLUTION

The following formula is recommended by the United States Department of Agriculture:

Paraffin lubricating oil .....	1 gallon
Potash fish-oil soap .....	1 pound
Soft water .....	$\frac{1}{2}$ gallon

The soap, oil and water are placed in a vessel and brought to a vigorous boil by placing over a fire or by using live steam. While still hot the solution is passed through a force pump at least twice, under at least 60 pounds pressure. An emulsion can not be obtained without the use of a pump. Ordinary stirring with a paddle is not sufficient. After the solution is thoroughly emulsified it will keep indefinitely providing it is not allowed to freeze. It will freeze at a temperature of about 18° F. and freezing will break down the emulsion.

### DILUTION

It has been found that a 2 per cent solution of oil will give efficient results. Therefore the emulsion is used at the rate of 3 gallons to 100 gallons of water. Wherever possible soft water should always be used as hard water may cause a slight breaking down of the emulsion. In case it is necessary to use hard water a stabilizer can be added which will prevent this breaking down. A half-gallon of water containing one-fourth

pound copper sulphate and one-fourth pound lime will soften 50 gallons of water and prevent the breaking down of the emulsion.

Where lime sulfur spray has been previously used in a spraying machine, the tank and pump should be thoroughly washed out, preferably with hot water and lye before the oil emulsion is used, as lime sulfur will break down the emulsion. The lubricating oil emulsion spray can be used as a dormant spray on all deciduous fruit trees.

### APPLYING THE SPRAY

The San Jose scale feeds by extracting sap. Sprays kill the pest by coming in contact with its armor or its body beneath the shield-like armor. In order to be effective, therefore, the solution must be strong enough to kill and the spraying must be so thoroughly done that every scale is touched. To do this be sure your dilutions are correct for each tank of solution, and then spray until every particle of twig, limb, and trunk is covered. Use high pressure and angled nozzles and spray rods. Spray clear through the tree from three or four positions around the tree. See that the tips of all twigs nearest to you are hit. Do not waste time and material but be sure the job is completed on each tree before moving to the next. On the average an 18- to 20-year-old apple tree will require from 6 to 10 gallons of spray. Some of our growers are at this time fighting with their backs to the wall and it is for these growers first of all that this circular is written. However, all growers whether scale is already in their orchards or not can well afford to give thoughtful attention to the scale and its control.

For further information and assistance address the Missouri Agricultural Experiment Station, Plant Inspection Service, Columbia, Missouri.