FLUCTUATIONS IN SAN JOSE SCALE INFESTATION

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San Jose scale is an ever present menace to fruit trees of Illinois, apple and peach especially which may require annual spraying in order to hold it in check. It is especially severe in the southern third of the state, doing its greatest damage south of a line between St. Louis, Mo., and Vincennes, Ind.

Because of the fact that some growers would like to omit the dormant spray for scale in seasons when the infestation is light and take special pains when it is severe, the Illinois Natural History Survey has conducted an annual survey of conditions in apple and peach orchards in southern Illinois and reported the results at fruit meetings and through the press. From 150 to 200 orchards are examined, about equally divided among apple and peach, in the principle fruit-growing counties of southern Illinois. Usually about 15 or 16 counties are included in the survey, extending from Marion and Richland counties in the north to Pulaski and Massac in the south. Frequent inspections are made in other regions north of this territory, but since infestation is much less severe there, they are not included in this discussion. As nearly as possible the same territory is covered and very frequently the same orchards are inspected each year, so as to increase the probability of accuracy of the information secured on yearly trends.

After inspecting each orchard the infestation was set down as "Moderate to Severe" or "None to Light". This appears to be the most practical method of recording the extent and prevalence of the insect. Because of the nature of the insect and the enormous number of individuals, there is no easy way of recording by percentages. "Moderate to Severe" was made to refer to the infestation in one or more parts of the orchard but not all over the orchard, since the oil sprays now available for the grower make a heavy infestation over an entire block of trees unlikely. Also most growers have found from sad experience that a single spot of heavily infested orchard may mean a great loss to the entire block of trees by the end of another season, if not thoroughly sprayed with a sufficient strength of oil in the dormant season that follows the discovery of the infestation. Figure 1 shows the effects of scale on a single peach tree.

Figure 2 shows the percentages of peach and apple orchards over a 15-year period in which a moderate to severe infestation of San Jose scale was found in some part of the orchard. It may be seen that in these fifteen years (1930-1944) there were high peaks of infestation about every third year. In those years from 40 percent to 50 percent of the apple orchards and from 58 percent to 72 percent of the peach orchards had "Moderate to Severe" infestations. These years were 1931, 1934, 1937, 1941, and 1944. The only exception to the three-year rule was in 1940, and this was true only because the infestation in 1941 was still

FIG. 1.—Results of heavy infestation of San Jose scale. Some of the infested branches began to grow in the spring but they finally died.

higher than the high percentage in 1940.

It will be observed that the infestations in peach orchards are almost invariably higher than in apple orchards. This was found to be true, not only in orchards side by side, but even in those interplanted, peach and apple together. This may be due in part to the factor of plant susceptibility. We know that certain trees or even varieties of fruit are much more susceptible to the attacks of certain insects and diseases than others. It may also be due in part, and possibly quite largely, to the fact that growers apply sprays for various insects and diseases to apple more than to peach, and that helps to hold the scale in check. Summer oils used for coddling moth control are probably a factor in checking the scale during the season. These are never applied to peach.

In attempting to explain the tremendous variations from year to year, especially the big decreases following the peak years, some of the various factors which affect infestation of San Jose scale are here considered:

1. Winter mortality.—Every winter appreciable numbers of scale insects are killed by low temperatures. Counts of survival over these years, although not made regularly, have been found to range from 2 percent live to 75 percent live in the spring, after the cold of winter has passed.

2. Length of breeding season.—San Jose scale, unlike some insects, continues to reproduce as long as the weather is reasonably warm. In some long, mild autumns, I have found crawling nymphs in the middle of December following mild weather in November. At other times there is little reproduction after the middle of November, even in the extreme southern areas of the state.

3. Parasites and predators.—This is a very important factor. Some years very high percentages of scale have been found destroyed by their insect enemies. Sufficient study has not been given to the enemies of this

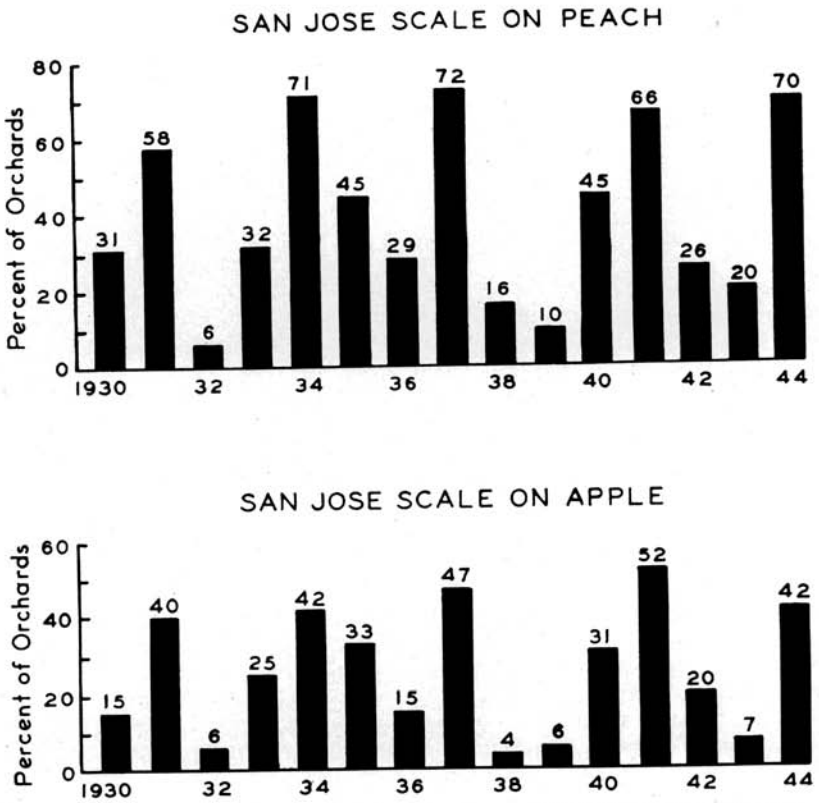

FIG. 2.—Percentage of orchards showing moderate to severe infestation of San Jose scale during the years 1930-1944.

particular insect, but in general it has frequently been found that the increase in the host insect will bring about so great an increase of its enemies that it is reduced to a point that results in lack of food for the parasites. In other words, these parasites and predators do such a good job that they destroy their means of livelihood and they themselves die off. It is entirely possible that this happens to a considerable extent with the San Jose scale.

4. Control by the grower.—During the winter following every year in which scale becomes serious, growers make particular effort to do a thorough job of spraying. Whereas some years they might omit the dormant spray, at least in some blocks, this particular season every tree is sprayed and often a stronger than usual dosage of material is used. Growers may not realize, without being told, the seriousness of the situation, since San Jose scale is a very tiny insect lying flat against the bark, and many people cannot see it until thousands of individuals are massed on a branch. Every effort is made to publicize the scale situation in these peak years. It is entirely possible that the special efforts made by growers to reduce the population is another important factor in these fluctuations.