Induced Increase of Soft Scale

imbalance between scales and natural enemies on walnut trees in northern California results in scale population increases

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The principal natural enemies of soft scales attacking walnut trees in northern California are small winged parasites easily killed by trace amounts of insecticides. If undisturbed, the parasites are able to maintain the scale population much below an economic level.

Three species of soft scale—the frosted scale, the European fruit lecanium, and the calico scale—occur on walnut in northern California. All three species have but a single generation a year. The eggs hatch in May and June and the young settle on both the lower and upper surfaces of the new leaves. Although capable of movement they stay pretty much in one place. In the fall most individuals move back to the twig growth before the leaves drop. They cast their skins and remain principally on the undersides of the twigs throughout the winter as elongated, oval, brown individuals that measure about 1/16″ in length. In March they cast their skins again after which growth becomes rapid. Eggs are produced in April and early May after which the scale mother dies. The eggs hatch and another generation is started. Development is one to several weeks more rapid in the case of calico scale and the European fruit lecanium than it is with the frosted scale.

Heavy infestations of soft scales seriously injure the trees. Vigor and size of leaf are greatly reduced which are reflected in a lowering of the quantity and quality of the nut crop.

Under most conditions it is difficult to determine accurately the real damage caused by a single sucking pest because of the presence of others. With walnuts the situation is usually complicated by the presence of the walnut aphid, spider mites, or armored scales.

Two methods were used in determining scale populations in experimental plots. During the dormant season and until the eggs hatched, the number of alive individuals on selected samples—of the basal 2″ of the past season's twig growth on the lower branches of the trees—were counted. In cases where effective control measures had been applied, the count area was increased to 10″ and the number of individuals present per 2″ was calculated. Further, post treatment surveys were not made until spring—after the scales had begun to make rapid growth—so the few survivors could be seen more easily. On each survey, 25 twigs per plot were examined, and in some cases the number was increased to 50.

Average Number of Live Scales per Leaf Sample in Plots Treated with Different Aphicides in the Experimental Orchard at Linden*

Insecticide	No. of years applied to plots	Av. no. live scales per sample	
		Frosted & European fruit Lacanium complex	Calico
OMPA	1	1.04	0.04
OMPA	2	1.13	0.10
OMPA	3	0.14	0.17
Parathion	3	0.02	0.01
Malathion	3	0.10	0.03
BHC-demeton .	2	1.00	0.06

* Leaf samples 15 millimeters in diameter.

After the eggs hatched and until the leaves dropped from the trees, the scale population was determined by counting the number of individuals found on sections of the next-to-terminal leaflets. Three sections, each 15 mm—millimeters—in diameter, along the mid rib of a leaflet were counted for scales on both the upper and lower surfaces. At least 75 sample areas were examined in each plot on every survey.

In the experimental areas, the plots were practically free of all pests with the exception of soft scales. An application of schradan—OMPA—had freed the plots of the walnut aphid for the entire growing season. Such plots, where heavily infested—20–40 individuals per leaf sample—looked unproductive when compared to surrounding plots where both scales and aphids were controlled.

The parasites of the soft scales are adversely affected by insecticides. DDT and similar materials used to control codling moth or the walnut aphid have a definite adverse effect on the parasites, especially when the parasites are in the adult stage.

The systemic insecticides, demeton—Systox—and schradan—OMPA—have been associated with the increase in the scale problem, although they appear to exert a strong suppressing action on the scale population. The suppressing action of OMPA is more marked than that of demeton. Highly destructive scale populations developed in experimental plots in every case where demeton was used—in combination with the codling moth spray—to control the walnut aphid.

Except in the case of the calico scale, OMPA tends to hold the soft scale population in control. The beneficial action becomes more marked with increased dosage. However, there is little suppressing action when OMPA is applied to foliage that has hardened or where large scale populations are already present. The peculiar action of OMPA tends to increase the calico scale population with the number of years that OMPA is applied. Plots treated with schradan can be distinguished from the other treatments by a higher incidence of the calico scale.

Why systemic insecticides should result in an increase of soft scales is not known. Some physiological or physical action might be involved or the chemicals may in one way or another interfere with parasitism. It is possible that scales surviving specific treatments suck up sufficient amounts of the systemic materials to become toxic to many of the developing parasites.

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Continued from page 9

fall and winter months when little or no new growth is made. A late growth flush could be damaged by frost.

Machine topping of oranges and grapefruit has lagged behind the topping of lemons because the lemon topping machines used sickle-bar mowers—for cutting units—which are much too light to cut the larger limbs of oranges and grapefruit. However, topping machines are available now that use saws from 14″ to 32″ in diameter as cutting units. Saws 24″ in diameter—or larger—can cut limbs as large as 6″ in diameter.

The winter and spring of 1957–58 was the first year that extensive machine topping trials were made with large orange and grapefruit trees and it is too early to evaluate the treatment.

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