

Walnut Aphid Control

comparative study of control treatments made during heavy infestations in 1956

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An early infestation of the walnut aphid—the most severe during the past 10 to 15 years—occurred throughout much of the Central Valley in 1956.

By mid-April it was not unusual to find early variety walnut leaflets infested with 50 or more aphids. Where control measures were neglected, the aphid population resulted in a dwarfing of the leaflets, later reflected in nuts of low quality.

Control investigations were conducted at Modesto, Walnut Creek, San Jose and most extensively at Linden.

Systemic and nonsystemic aphicide programs were compared at Linden. In most cases, the particular aphicide tested had been applied to the same plots for a period of years, making it possible to determine whether the treatments exhibited any year to year influence on control.

The most outstanding control was obtained in plots treated with OMPA. Those plots remained virtually free of the pest for the entire season. No early aphid infestation developed in 1956 in any of the plots treated with OMPA in 1955. The protection afforded was somewhat proportional to the dosage applied in 1955. Even at the lowest amount applied, the aphid population had not reached a destructive level by May 1, when the plots received an aphid-codling moth treatment for 1956. The aphid control obtained in the 1956 season more or less paralleled the dosage applied. With the lower amounts some aphids made their appearance in late season. These aphids gave rise to sexual forms which laid overwintering eggs to produce some degree of infestation in 1957.

Systox was not nearly so effective as OMPA. By the end of August 1956, large populations were beginning to develop in the Systox plots.

The control obtained with the nonsystemic aphicides was the poorest. However, considerable promise is shown by one program using BHC for early season control, with an application of Systox at the time a second treatment was needed.

In early summer, aphid control was aided by high summer temperatures which killed many of the pests, particularly in the experimental orchard at Linden being prepared for irrigation during an unusually hot period. Dryness and high temperatures are a combination of factors that favor high mortality.

The quality of walnuts for the several treatments was determined by a crack test of 300 walnuts from each plot—600 walnuts averaged—because practically all the treatments were replicated twice. The best quality was secured from the plots treated with OMPA. The next best were the nuts from the Systox plots. However, the comparison may not be a fair one, because in mid-February parathion treatment for frosted scale in the Systox plots resulted in a near elimination of the overwintering walnut aphid eggs. Also, the control of the scales probably aided in increasing the quality of the nuts, because the high scale population in some of the OMPA treated plots—beyond a doubt—reduced the quality. The poorest quality walnuts were from the plots treated with nonsystemic aphicides. The lowest quality of all was from the plots treated with nicotine, probably because it was not applied until April 24, a week prior to the codling moth spray.

At the time of the codling moth spray—May 1—the average number of aphids per leaflet was 88. Where there is a serious aphid infestation, control measures can not be safely delayed until it is time to apply the codling moth spray, because the most serious damage by the aphid is done while the leaves are expanding. It is then that destructive leaf stunting occurs, which is reflected later in soundness of nuts, lightness of meat color, size, and weight of edible meats.

Modesto Tests

At Modesto, OMPA was applied at four different dosages: at 0.43 pound per acre; 0.60 pound; 1.00 pound and at 2.10 pounds per acre. All treatments except the 0.6 pound dosage were applied to plots that had received OMPA in 1955. The 0.6 pound treatment was applied to a plot that had received Systox for the past several years and was heavily infested with soft scales and—in the early season—with aphids. Aphid control in all the plots was good. The plots treated with the 1.00 and 2.00 pound dosages remained free of aphids for the entire season. The 0.6 pound dosage showed a much higher seasonal aphid population trend than did the plot that received only 0.43 pound of OMPA. The vigor of the trees may influence the absorption and

the effectiveness of OMPA. The trees receiving the 0.6 pound dosage were in poor condition when compared with trees in the other blocks. The leaves were stunted and the trees exhibited a marked lack of vigor.

Walnut Creek Tests

At Walnut Creek excellent control of the aphid was obtained in two experimental orchards where OMPA was applied at the rate of 0.8 pound per acre. In one orchard, OMPA was compared with Systox. Control obtained with Systox was very good, but OMPA gave better results. At harvest the quality of the nuts from both plots was excellent although the lightness in color of the nut meats favored the OMPA treatment; 86% graded light as compared to 80% for the Systox.

San Jose Tests

OMPA was tested in two orchards at San Jose. In orchard *A*, 0.87 pound of actual OMPA per acre was applied on May 15 and on May 18, 1.10 pounds were applied. In orchard *B*, one pound of actual OMPA per acre was applied on May 22. The results were excellent, but unlike in other areas, some aphids were found on most of the surveys. Sometimes fairly large numbers were found in the tops of large trees, although the population remained at an extremely low level about the skirt of such trees. However good, the general control did not equal the results obtained with similar dosages in other localities. It is possible that the equipment used in the San Jose trials was not as efficient as that used elsewhere and coverage—particularly in the top of large trees—was faulty. It is also possible that the foliage had reached a degree of maturity that reduced the effectiveness of the treatment. A third factor that might be involved is that the walnut aphid may be exhibiting some resistance to OMPA because it is in the San Jose area that the walnut aphid is definitely resistant to parathion and malathion.

The 1956 studies expanded information concerning factors that influence effectiveness of OMPA, such as age of foliage, vigor of trees, rainfall, and thoroughness of application. OMPA is most readily taken up by young foliage before it hardens. Apparently there is more danger of treating the tree too late than too early. The 1956 investigations strongly indicated that the most satisfactory results are obtained when the trees are in a vigorous state of growth. Heavy rains closely following application will wash the insecticide from the foliage before it has been absorbed. This is particularly true if the foliage is reaching

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mined by local economic conditions reflecting the relationship between price of hogs and price of feeds including garbage. The results in all trials indicate the palatability and suitability of cooked residential garbage as a swine feed.

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deeply and allowed to dry thoroughly before being replanted to lettuce. Often lettuce can produce a satisfactory crop—even with a heavy infestation of aphids—if it can be made to grow rapidly. Even, adequate irrigation and the elimination of cracks through which winged aphids can enter the soil often assist in averting damage.

Some varietal differences in susceptibility to the lettuce root aphid have been observed. Imperial strain E-4—currently not an acceptable commercial variety—is the most resistant variety found to date, and attempts are being made to incorporate that resistance in the commercial variety Great Lakes.

Based on the results of the investigations in 1956, it is possible to control the European lettuce root aphid by a preplanting soil treatment with parathion at five pounds of actual chemical per acre. However, parathion is a highly toxic organic phosphate insecticide and all precautions and rules on the label should be followed and permits from the County Agricultural Commissioner are required before it can be purchased or used. Parathion should only be used for summer and fall harvested acreages and ordinarily only where there is a history of aphid attacks. Protection will probably last for only a single crop.

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The analyses for the presence of parathion were made by Professor W. M. Hoskins and the Insect Toxicology Laboratory, University of California, Berkeley.

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alcohol can be used satisfactorily. This solution will keep indefinitely without losing its effectiveness, but should be tightly sealed and stored in the dark.

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California Agriculture, May 1956, page 7, published a description of mist equipment.

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rooting habit of the strawberry, because most of its feeder roots are rather shallow. When the strawberry beds were formed the top soil—which had a good potassium content—was piled together. Therefore, most of the strawberry roots were in soil with an adequate potassium supplying potential. This contrasts with the apricot trees, which had no roots in the cultivated surface and were unable to obtain adequate supplies from the deeper layers of soil. The fact that the apricot requires large amounts of potassium as shown by leaf analyses may also be pertinent.

The reason for the failure of the strawberry plants to absorb potassium from the added fertilizer is not so clear. The large amount applied to the beds should have encouraged luxury consumption.

This trial does not provide any basis for considering the use of a complete fertilizer for strawberries under similar conditions. Further trials are in progress in other districts to determine what may be expected on other soil types and under different climatic conditions.

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maturity. Thorough application is most essential, and special care must be exercised when trees are in full leaf.

Although OMPA is the most effective aphicide for the control of the walnut aphid, it can not be used commercially because it has not been nationally registered by the United States Department of Agriculture for use on walnuts, nor has a tolerance been established by the Food and Drug Administration as authorized by the Miller Amendment.

However, satisfactory control can be

expected where Systox is applied twice at a dosage of 0.25–0.37 pound—1–1½ pints of two pounds per gallon emulsion—per acre for each treatment if applications are made with an air carrier sprayer. The first application should be made in the spring and the second in July or August, when the aphid population begins to increase. To avoid injury from Systox it should not be applied until after the leaves are fully expanded. Further, applications should not exceed a total of 0.75 pound—three pints—in a single treatment or during a season, and no treatment should be made closer than three weeks before harvest.

An effective treatment is to use BHC or nicotine in the first treatment, followed by a 0.25–0.37 pound application of Systox when needed in June or July.

Walnut Aphid Control Treatments

Where air carrier sprayers are used, the aphicides listed below have given adequate aphid control when incorporated with the codling moth spray. If used alone, the aphicide should be applied in from 50–150 gallons of water per acre, depending on the air capacity of the sprayer.

Aphicide	Amount per acre
Parathion, 25% wettable powder	1.0–1.5 lbs.
or	
Malathion, 25% wettable powder	3–4 lbs.
or	
TEPP, 40%	¼–1 pt.
or	
Nicotine, 25% dry concentrate	5–6 lbs.
or	
BHC—12% gamma isomer	3.75–4.00 lbs.
or	
Systox	0.25–0.37 lb.

Where conventional sprayers were used, the aphicides gave good control when applied as full coverage sprays. The amounts used per 100 gallons of spray were:

Aphicide	Amounts per 100 gallons
Parathion, 25% wettable powder	3 oz.
or	
Malathion, 25% wettable powder	8 oz.
or	
Nicotine, 25% dry concentrate	10 oz.
or	
BHC—12% gamma isomer	8 oz.
or	
Systox—two pounds per gallon concentrate	¼ pt.

Because of the danger of BHC imparting an off-flavor to the harvested nuts, it should not be used more than once in a season, or later than May, and never at a concentration greater than that recommended by the manufacturer.

In areas where the walnut aphid is resistant to phosphate aphicides, other treatments than parathion, malathion or TEPP should be utilized.

Control of the walnut aphid can be obtained with dusts, where they are thoroughly applied. A 4% malathion dust or a 1% TEPP dust or a 2% nicotine dust applied at the rate of 40–60 pounds per acre have resulted in satisfactory control.

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