

Walnut Aphid Investigations

tests in northern California during the 1953 season stressed need for thorough treatment for control

A. E. Michelbacher and Clarence Davis

Systemic insecticides have been extensively investigated for control of the walnut aphid at Linden for the past two years and in the Walnut Creek, Yuba City, and San Jose areas during 1953.

Demeton has resulted in excellent control of the walnut aphid when applied in the codling moth spray or during the spray period. However, some leaf injury has been noticeable when used at a dosage of more than $\frac{3}{4}$ pound of actual material per acre. The injury has been most noticeable on the north side of the trees but in no way has demeton appeared to adversely affect the quality of the harvested nuts.

A single treatment has held the aphid population to an average of less than one per leaflet until midsummer. Through late August and September the population usually increased, and the rate of increase was somewhat proportional to the dosage.

There is no evidence that demeton imparts an off-flavor to the nuts, and it is doubtful that there is any serious residue in the harvested nuts.

OMPA, which was used for the first time in the 1953 experimental studies, resulted in almost complete elimination of the aphid for the entire season when used at a dosage of 2.5 pounds actual material per acre and applied with the codling moth spray. With this aphicide, no residue problem is indicated.

Infestations

Severe infestations of the walnut aphid will lower the quality of the harvested crop, but small populations can be tolerated. Populations as high as 50 aphids per leaflet before codling moth spray time have apparently had little adverse effect upon the harvested nuts. All available evidence at this time also indicates that large populations late in the season cause little harm.

If an aphid-control program is started, it should be thoroughly conducted. Satisfactory results can be obtained only where suitable insecticides are used at proper dosage and applied with efficient equipment for thorough coverage under favorable weather conditions. Ineffective control can and often does result in more damage by aphids than if nothing had been done. Most of the newer insecti-

cides adversely affect natural enemies of the aphid, and for this reason the aphid population should be all but eliminated. The kill should be so complete that a day or two following application not a single live aphid can be found in a treated grove. In the absence of natural enemies, the aphid population doubles about every three days.

Resistance

The finding of a strain of walnut aphid resistant to parathion in the San Jose area has complicated the control program. This probably means that this strain will develop resistance to all the phosphate aphicides, such as malathion and demeton. It hardly seems profitable or wise to try to meet the problem by increasing dosage. That might simply add to the problem.

Where a resistant strain is known to occur, a wholly different aphicide probably should be used. This entire matter is in need of investigation.

Where resistance does not occur, much might be done to prevent it by the alternate use of different materials. For instance, parathion or malathion might be used in the first application and nicotine in the second. Benzene hexachloride would also be a possibility for the first spray, and in this case either parathion, malathion or nicotine could be used in the second treatment. Another way to avoid selecting out a resistant strain of the aphids would be to treat only when absolutely necessary.

Treatments

Under ideal conditions, not more than two or three treatments should be needed to control the aphid satisfactorily for an entire season. Much depends upon how well the materials are applied, the size of the orchard, the aphid control in surrounding groves, and the degree of migration from sources outside the orchard.

An aphicide should always be used in codling moth sprays that contain DDT. Where DDT is used without an aphicide, there is always the danger of a serious aphid infestation developing. When used with an aphicide, DDT appears to improve the control if the sprays are thoroughly applied.

Where aphicides were incorporated with a codling moth spray in the 1953 tests and applied with a conventional sprayer, the amounts of aphicides used per 100 gallons of mixture were as follows:

Parathion, 25%
wettable powder 2½ oz.
or
Malathion, 25%
wettable powder 8 oz.
or
Benzene hexachloride
(6% gamma isomer) 1 pound
or
14% nicotine dry
concentrate 1 pound

Where air carrier sprays were used either for codling moth-aphid control or for aphid control alone, the amounts of aphicides per acre were as follows:

Parathion, 25%
wettable powder 1 pound
or
Malathion, 25%
wettable powder 3 pounds
or
TEPP, 40% $\frac{3}{4}$ to 1 pint
or
Benzene hexachloride
(6% gamma isomer) 7 pounds
(Because of the danger of imparting an off-flavor, benzene hexachloride should not be used more than once or later than in the codling moth spray)
or
14% nicotine dry
concentrate 7-9 pounds

When applied in combination with the codling moth spray, the amount of water used per acre should be 200 gallons. When used alone for aphid control, the volume of water should range from 50 to 150 gallons depending upon the capacity of the air carrier sprayer.

Dusts can be effectively used to control the walnut aphid, and—as with sprays—thorough coverage is necessary. Adequate coverage can be obtained only where the dusts are applied with suitable equipment under favorable weather conditions.

A. E. Michelbacher is Associate Professor of Entomology, University of California, Berkeley.

Clarence Davis is Research Assistant in Entomology, University of California, Berkeley.