

Spider Mites on Walnuts

continued experiments in northern California groves
indicate insect control program to keep mites in check

A. E. Michelbacher and O. G. Bacon

Spider mite injury has increased during the past several years in northern California walnut groves.

The destructive species are the Pacific mite and—to a lesser extent—the European red spider. The increase of the mites may be due in part to natural environmental conditions being more favorable or to some of the control programs directed against the codling moth and the walnut aphid.

Past experiments with DDT demonstrated that heavy applications resulted in an increase in the mite population. Levels were determined where the DDT dosage was effective against the codling moth without resulting in a mite problem. This is accomplished by one single application with conventional rig of one-half pound—approximately 4.5 pounds per acre—of 50% DDT wettable powder to the 100 gallons of spray to which two or three pounds of standard lead arsenate are added to insure control of the second brood of the codling moth. Where an air carrier type sprayer is used, excellent control of both broods of the codling moth is obtained with a single application of 50% DDT wettable powder at a rate of seven to eight pounds per acre without resulting in a mite problem. It therefore appears that the use of DDT as recommended in the walnut insect control program is not responsible for the increase in injury caused by mites.

Aphids and Mites

Benzene hexachloride—used in aphid control—will result in an increase in the mite population if a sufficiently high dosage is applied. The dosage needed for aphid control is much below the danger level. However, where it is incorporated in a codling moth spray containing DDT, there is an additive effect of the two materials which approaches a point where a slight increase in the mite population might be expected under environmental conditions highly favorable to the pest. This, while a factor, does not account for serious increases in the mite population.

In the walnut insect investigations every effort has been made to develop a program which will not result in a serious increase in the mite population. In experimental plots, recommended treatments performed well, both with conven-

tional and with air carrier type sprayers. Success in part was due to thorough application resulting in effective control and reducing to two or three the number of applications necessary to control walnut insects for the entire season.

During the 1951 season mites never approached a destructive level in any of the experimental treatments. Light infestations of the Pacific mite appeared after the middle of August but the mites were completely checked by natural enemies of which the lady bird beetle, *Stethorus*, appeared to be the most important.

Besides the codling moth spray, part of the experimental area received one and the rest two treatments of parathion applied with an air carrier sprayer at the rate per acre of one pound of 25% wettable powder in 50 gallons of water. Where the second application was applied on August 17, the treatment resulted in a kill of what few motile mites were present. This suppression of the mite population probably aided in checking the pest and substantiated the findings of previous years. In one block where EPN 300 was used at four times the concentration of parathion, the controlling influence was definitely better than that obtained with parathion.

Few Treatments Needed

Probably the most outstanding feature of the insect control program was its effectiveness, which made few treatments necessary. The fewer the number of applications in an insect control program, the less is the impact upon natural enemies. In many cases where effective control is obtained, natural enemies are able to re-establish themselves in the orchard again before the pest population becomes destructive. Sometimes they may even be present in sufficient numbers to prevent the pest population from rising to a destructive level.

Poor control, on the other hand, makes frequent applications necessary. The new aphicides are very destructive to natural enemies, and repeated treatments may nearly eliminate natural enemies from an area. Both parathion and TEPP at proper dosages are effective against active mites but not the eggs. It is almost certain that treatments with these materials that result in poor aphid control will also be in-

effective against mites. If this is the case, increases in the mite as well as the aphid population can be expected.

Thorough Control Essential

Treatments for aphid control with benzene hexachloride, parathion or TEPP should not be applied unless a grower is certain that the population will all but be eliminated. One of the greatest offenders in ineffective control are smoke machines using TEPP. They should be used only when weather conditions are nearly perfect and the smoke is largely confined to the orchard being treated. A dense drift of smoke through a nearby orchard might adversely influence the natural enemy-mite balance. Such a disturbance might result in an increase in the mite population and support the statement that the mite infestation in the treated orchard is no worse than that in an adjacent untreated orchard. The fact is that an orchard subjected one to several times to a dense smoke drift can not be considered untreated. The treatment probably was ineffective, but present knowledge indicates that this is the kind which is likely to result in serious harm. However, not all increases in mites are associated with insecticidal treatments, for destructive mite populations develop in many areas where little or no control is applied.

The dust deposit from frequent applications of insecticidal dusts used in aphid control—such as nicotine dusts—can result in serious mite infestations. However, there is no reason why insecticidal dusts should not be used so long as the treatment results in effective control so that frequent and repeated applications are not necessary.

Occasionally serious mite infestations occur where walnuts are planted next to a crop heavily infested with mites.

Where serious mite infestations threatened several commercial plantings control was obtained by using a 15% aramite wettable powder at the rate of 1½ pounds to 100 gallons of water. Good control with aramite is dependent upon thorough coverage. Further study with this acaricide—as with others—is needed for more information on dosage, formulation, and effectiveness of different means of application.

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ROLLER

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practicable after an average of 25% of the eggs in the egg-masses have hatched and not later than 50% egg hatch. This interval usually occurs about seven days—25% hatch—to 14 days—50% hatch—after egg hatching commences. All timing experiments have shown that treatment applied early—at the beginning of the egg hatching period—is more successful and desirable than a late treatment—at the completion of the egg hatching period.

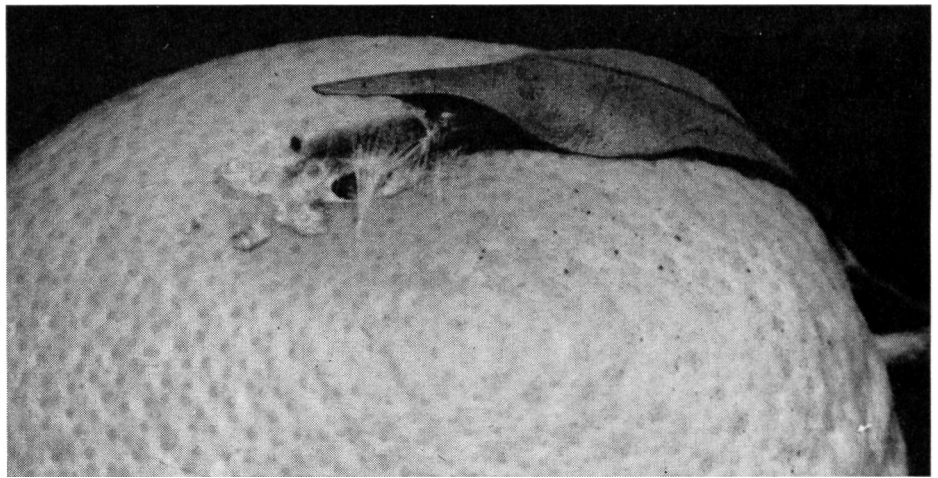
Egg hatching continues for an interval of approximately five weeks, although most of the eggs commence to hatch at the same time in any one area so that about half the total number of larvae have emerged within two weeks of the initial hatch. Therefore it is necessary to: 1, set up the check trees before mid-March so that egg hatching will not have begun; 2, choose six average-sized trees in each five acres of grove—these trees should be at least four trees within the border of the grove; 3, place numbered tags or other means of identification on or near 10 egg-masses in the top of each of the chosen trees; 4, determine the total number of eggs in each egg-mass when the masses are first chosen so that the percentage of hatch can be obtained; and 5, record the accumulated total number of hatched eggs—exit holes—every two days.

Insecticide Formulations

Larvae of the fruit tree leaf roller can be controlled by sprays and dusts.

For application with a speed-type sprayer using 500 gallons of water per acre, or with a spray-duster or boom

Fruit tree leaf roller, adult moth.



Larval injury to Valencia fruit, showing larva, injury, and nest on fruit.

sprayer using 300 to 500 gallons of water per acre, one of the following insecticides may be used:

DDT, 50% wettable powder, 6 pounds.

DDD, 50% wettable powder, 6 pounds.

Parathion, 25% wettable powder, 3 pounds.

EPN, 25% wettable powder, 3 pounds.

Fruits should not be picked for 30 days after a parathion or EPN application.

For application with a fish-tail duster—high capacity fan type—at the rate of 75 pounds per acre, 5% DDT or 5% DDD may be used.

These formulations may be made stronger, or other insecticides added, if other citrus pests are also a problem.

Orange Tortrix

To control the orange tortrix together with the leaf roller, the dosages for spray application should be raised to nine pounds of DDD, 50% wettable powder, or six pounds parathion or EPN, 25% wettable powder. For dust application, 5% DDD at the rate of 90 pounds per acre should be used.

To reduce tree smutting by black scale, wettable sulfur may be added to the leaf roller spray formulas, or dusting sulfur used in place of part or all the diluent in dusts.

Aphis Control

Aphis may be controlled by combining one quart of 20% TEPP per acre to the leaf roller spray formulas. Two quarts of 40% nicotine sulfate are also effective but more expensive.

Parathion, used at higher dosages in addition to controlling the leaf roller larvae, will also check California red scale, katyids, and will reduce citrus aphis.

Citrus tree deficiencies may be corrected by adding the appropriate minor element to the leaf roller formula. Neutral

preparations of zinc, copper, and manganese are compatible with all four suggested insecticides.

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PERISHABLES

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face exposure such as leafy vegetables or small fruits, and can best be controlled by lowering the commodity temperature and holding the product in an insulated or closed compartment.

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The above article is a condensation of the more detailed report: Air Transportation of Fruits, Vegetables and Cut Flowers: Temperature and Humidity Requirements and Perishable Nature. L. L. Claypool, L. L. Morris, W. T. Pentzer, and W. R. Barger, U.S.D.A., H. T. & S. Office Report No. 258.

WALNUTS

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To reduce the danger of mites becoming a serious problem, a grower should keep his orchard in a vigorous growing condition and never let it suffer for want of water. In his insect control program, he should avoid frequent treatments, by using effective insecticides at adequate dosages and applied with efficient equipment under weather conditions that will insure satisfactory control.

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