Codling Moth on Walnut

1951 tests compare effectiveness of conventional and air-carrier sprayers on Payne walnuts in northern California

A. E. Michelbacher and O. G. Bacon

Codling moth investigations in 1951 resulted in a reduction of the recommended standard lead arsenate in mixtures applied by conventional sprayers.

The amount was reduced from three to two pounds of standard lead arsenate in 100 gallons of water.

The 1950 recommendations of spray mixtures used in air carrier sprayers were confirmed in 1951.

The 1951 investigations were conducted on an experimental-commercial scale in the Linden and San Jose areas.

Nut size can be used in determining the best time to spray. The first brood of codling moth larvae does not enter the nuts until some time after the average cross-sectional diameter of the nut has reached one-half inch. Therefore spraying can be delayed safely until the nuts have reached this size. Depending upon the season, the spray date at Linden varies from the latter part of April to about May 15. At San Jose the spray date is usually about two weeks later.

A single well-applied treatment should give adequate control for the entire season. It is recommended that an aphicide—for aphid control—be added to all codling moth treatments.

The sprayers used had 25-foot towers and were equipped for automatic spraying. The spray was applied at a pressure of 600 pounds and each tree was circled. There were 18 large trees to the acre and approximately 55 to 60 gallons of spray were applied per tree.

Three principal treatments were tested. All treatments contained one-half pound 50% DDT wettable powder, one-half pound safener, and one-third gallon light summer oil emulsion per 100 gallons of water. They varied in the amounts of standard lead arsenate added. When three pounds of standard lead arsenate was used, 0.5% of the nuts were infested; with two pounds, 0.66% were infested; and with 1½ pounds the infestation was 0.3%. Check plot infestation was 3.22%.

Because all three treatments resulted in about equal control it is believed safe to lower the standard lead arsenate per 100 gallons from three to two pounds.

The addition of one-half pound of 50% DDT wettable powder probably insures good protection, because this amount of DDT alone controls the first brood of codling moth. At this dosage there is little evidence that DDT favors an increase in orchard mites or frosted scale.

The check—control trees—used in this experiment consisted of a block of six unsprayed trees. The percentage of infested nuts in the check—3.22%—would have been much larger if the entire orchard had been left untreated, as indicated in the number of first brood larvae at the start of the season. There is no question that the excellent control throughout the orchard was reflected in a marked decrease of infestation in the control trees.

An experiment was conducted in which the safener was omitted from the mixture. In this plot 0.6% of the nuts were infested as compared to 0.8% in a companion plot in which a safener was used. There was no evidence of any injury where the safener was left out of the spray mixture. If this can be substantiated by further investigations it may be safe to drop the safener from the recommended program.

In preparing the recommended mixture, the dry ingredients are slurried, and added to the spray tank with agitator going when the tank is one third to one half filled with water. The oil is added when the tank is three fourths full.

Continued on page 14

RECOMMENDATIONS

For codling moth and aphid control applied by conventional sprayer:

Standard lead arsenate . . . 2 pounds
DDT, 50% wettable powder . . . . . ½ pound
Safener—a commercial basic zinc sulfate product containing 50% zinc expressed as metallic . . . . . ½ pound
25% wettable parathion powder . . . . . 2⅔ ounces

or

Benzene hexachloride (6% gamma isomer) . . 1 pound
Light summer oil emulsion containing 80% oil . . . . . ⅓ gallon
Water . . . . . 100 gallons

For codling moth and aphid control applied by air-carrier sprayer:

DDT, 50% wettable powder . . . . . 10 pounds
DDT depositor . . . . . 3 pounds
14% nicotine dry concentrate . . . . . 9 pounds

or

25% wettable parathion . . . . . 1¼ pounds

or

Benzene hexachloride (6% gamma isomer) 9 pounds
Light medium summer oil emulsion . . . . . 3 gallons
Water . . . . . 500 gallons
(to be used at approximately 400 gallons per acre)

OR

DDT, 50% wettable powder . . . . . 20 pounds
DDT depositor . . . . . 3 pounds
14% nicotine dry concentrate . . . . . 18 pounds

or

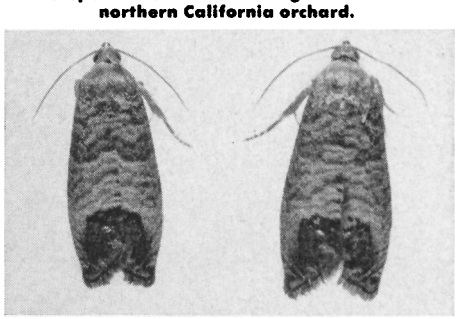
25% wettable parathion . . . . . 2½ pounds

or

Benzene hexachloride (6% gamma isomer) 18 pounds
Light medium summer oil emulsion . . . . . 3 gallons
Water . . . . . 500 gallons
(to be used at approximately 200 gallons per acre)

Overwintering codling moth larva in walnut bark.

Two specimens of the codling moth from a northern California orchard.



WALNUT

Continued from page 5

In areas where the codling moth is not a serious problem, the DDT wettable powder may be omitted from the spray, but the amount of standard lead arsenate should be increased from two to three pounds.

The air carrier used at Linden was equipped with a volute, and had an air capacity of at least 40,000 cubic feet per minute.

Various concentrations of insecticides and different volumes of spray per tree were tested. With some of the DDT sprays, a liquid depositor—multifilm L.—was substituted for dry DDT depositor and oil. There were 18 large trees to the acre.

Mixed with 500 gallons of water were:

10 pounds 50% DDT wettable powder
3 pounds DDT dry depositor
3 gallons light summer oil emulsion.

Applied at approximately 24 gallons per tree—about 400 gallons per acre—this spray gave the best control—0.25% infested nuts.

When in the same mixture the amount of 50% DDT wettable powder was raised to 20 pounds, and the rate of application lowered to 11 gallons per tree—approximately 200 gallons per acre—control was almost as good—0.4% infestation.

Substituting liquid depositor for the DDT dry depositor and oil resulted in less efficient control. Mixed with 10 pounds 50% DDT wettable powder, and applied at a rate of approximately 23 gallons per tree, 0.7% of nuts were infested; 20 pounds 50% DDT wettable powder at 11 gallons per tree gave 0.75% infestation.

A standard lead arsenate-DDT combination resulted in the poorest control—0.9% infestation. Applied at 24 gallons per tree the mixture consisted of:

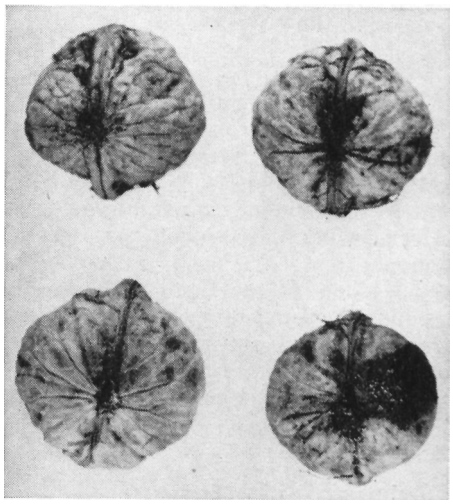
30 pounds standard lead arsenate
5 pounds 50% DDT wettable powder
5 pounds safener
3 pounds DDT dry depositor
3 gallons light summer oil emulsion.

Commercial tests at San Jose gave similar results. All sprays were applied with an air-carrier sprayer at the rate of 350 gallons per acre. Best control—0.8% of infested nuts—was achieved by:

8 pounds 50% DDT wettable powder
2 pounds DDT depositor
2½ gallons light summer oil emulsion
400 gallons water

When the amount of 50% DDT wettable powder was reduced to four pounds, and 24 pounds of standard lead arsenate added 1.6% of nuts were infested. When 24 pounds standard lead arsenate was used alone, infestation of nuts rose to 2%.

In both the Linden and the San Jose tests best control resulted with the DDT spray where the amount of 50% DDT wettable powder applied per acre ranged between 7½ and 8 pounds. In no case did any of the treatments result in a serious increase of orchard mites or frosted scale.



Typical exit holes made by codling moth larvae in the blossom end—top—and stern end—bottom—of walnuts. Note frass on nut at the bottom right.

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

O. G. Bacon is Assistant Professor of Entomology, University of California College of Agriculture, Berkeley.

GRAPE

Continued from page 6

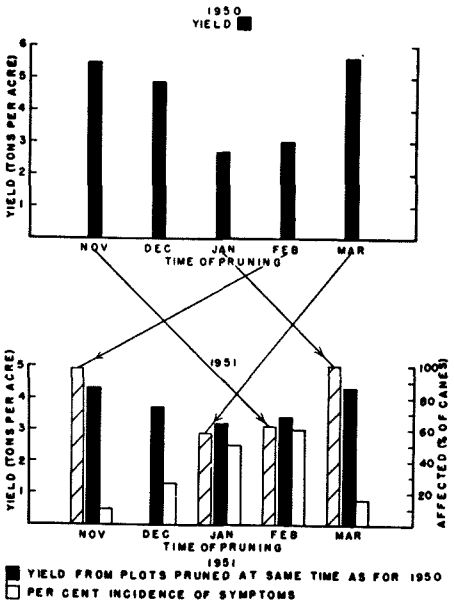
on the comparative status of bud and shoot development in the spring.

The symptoms were not so prevalent or so severe in any of the plots in 1951 as they were in comparable plots in 1950. This may be due to seasonal variation.

The data presented in the chart in the column on the right show that in 1951 there again existed a relationship between time of pruning and incidence of symptoms. This relationship was the same as for the 1950 season indicating that midwinter—January and February—pruning times are unfavorable in southern California head-pruned vineyards subject to the described symptoms. Improvements in yields ranged up to 1.1 tons per acre in 1951 favoring very late or early pruning times. The two-year average shows an increase of two tons per acre per year in favor of late and early pruning as compared with January.

The increasing effect on yield by a favorable pruning time is greater following a low yield. The decreasing effect on yield by an unfavorable pruning time is somewhat greater following a high yield.

The general pattern of response to pruning times was observed in two other Mataro vineyards subject to the condition and similarly in two Muscat of Alexandria vineyards in southern California during the 1951 season. In two additional Mataro vineyards the symptoms were rare in all plots.



The season before the trial began, this vineyard was pruned in February which gave the unusually low yield of 1.2 tons per acre for 1949, a very severe season for symptoms. Top: Yields resulting from different times of pruning for season of 1950, a severe year for symptoms. Bottom: Yields resulting from different times of pruning for season of 1951, a moderate year for symptoms, incidence of which is shown.

The existance of a relationship between the incidence of the symptoms and the time of head pruning—removal of the apical portion of the previous year's cane—and the concomitant effects of pruning time upon time of leafing-out, constitute evidence in support of an interpretation of this vineyard malady as one involving the physiology of the vine and the relationship of the vine with its environment.

Available evidence does not establish that bud mites are the sole or the principal cause of such growth abnormalities. According to present information, no feature of the life history or seasonal history of bud mites would account for a relationship between pruning time of the vine and injury by mites. It is not inferred that bud mites can not cause symptomologically related disturbances, but their importance as a factor in grape production is subject to re-evaluation.

Martin M. Barnes is Assistant Entomologist, University of California College of Agriculture, Riverside.

Chester L. Hemstreet is Farm Advisor, San Bernardino County, University of California College of Agriculture.

Charles L. Turzan is Senior Laboratory Technician, University of California College of Agriculture, Riverside.