Codling Moth Control Sprays

new insecticides tested in field investigations in southern California for effectiveness against several pests of walnuts

J. C. Ortega

Improper timing—or complete omission—of DDT treatment was the major contributing factor to the relatively high infestations of codling moth in walnuts in some areas of southern California during the 1954 season.

Delayed spring foliation raised some growers' doubts as to the ability of the trees to produce a normal walnut crop of good quality and size. Therefore, several growers—to cut costs—omitted the DDT-codling moth treatment, particularly where infestation had been lowered to about 1% or less by several successive years of treatment.

Also, the 1954 walnut aphid populations were unusually slow in building up to damaging proportions, and some growers waited until the populations were sufficiently high before applying a combination codling moth and aphid treatment. Unfortunately, this was too late to obtain satisfactory results for the control of the codling moth.

It has been demonstrated conclusively that an effective codling moth treatment—as compared to no treatment or an inadequate one—actually pays for itself by reducing the number of pounds of wormy walnuts. Experience obtained during the past two seasons in southern California has shown that delayed foliation does not necessarily mean a short crop of low-quality, small-sized walnuts. In 1954, some groves produced near record crops of good size and quality.

The side problems which may arise from the use of DDT must be considered in the planning of a control program. An abnormal increase in the populations of spider mites and the walnut aphid can be expected following a DDT treatment unless adequate precautionary measures are taken. Where the European red mite is a problem, preventive control measures—such as adding a miticide to the DDT-codling moth spray — are highly effective. At the time of the spray, mite populations may be so low as to be practically nonexistent. In the majority of instances, preventive control measures have held European red mite numbers well below the damaging level for a complete season.

Effectiveness of Certain Materials in Controlling the Codling Moth in Southern California. Treatments applied by air carrier equipment on May 17, 1954. Finished sprays applied at the rate of 400 g.p.a. One pound of parathion (25% wettable) added to all DDT-treated replicates.

Treatment	lbs. actual/acre	% wormy of total crop[1] replicate			
		A	B	C	D
None	–	6.06	4.06	6.90	2.49
DDT[2]	6	0.77	0.33	0.50	0.33
DDT	3	0.77	0.75	0.15	2.18
Chlorthion	6	2.03	1.87	1.23	2.36
Diazinon	3	0.33	1.18	0.41	1.39

[1] Includes preharvest drops, first, second, and third harvests.
[2] Standard treatment.

Seasonal control of the walnut aphid presents a more difficult problem because most of the currently available aphicides give only temporary protection. However, the systemic insecticide, schradan—octamethyl pyrophosphoramide—was very effective in controlling the walnut aphid. Further work with schradan on a semicommercial scale will be necessary to determine its effectiveness under a wide variety of conditions.

Field investigations were conducted in 1945 to find a material as effective in controlling codling moth as DDT; nonphytotoxic; reasonably safe to use; potentially as economical; compatible with other materials which may be used with it; and would not give rise to the side problems usually encountered with DDT.

The standard DDT treatment was applied in a grove first treated with DDT in 1947, and since 1949 treated at least once each year. Three pounds of actual DDT per acre were not as effective as the standard dosage of six pounds per acre. Working with higher initial codling moth infestations, three pounds of actual DDT per acre have not been adequate for consistently effective control of high initial populations of codling moth.

Chlorthion, a relatively new material, is safe for humans to use. It is not very effective in controlling the codling moth, but it did have a marked effect on the European red mite and aphid populations.

In earlier experiments, diazinon gave very promising results in controlling codling moth. It was about as effective as the DDT treatment at comparable dosages—3 lbs. actual per acre. Also, it is highly toxic to adults of the European red mite and the walnut aphid.

A check of the aphid population in the test orchard on June 17, 1954—in each of the replicates—found only three aphids and no European red mites. Ten leaflets on each of five data trees per replicate were examined. Three months after treatment another check was made and the results are tabulated in the larger table on this page.

In the plot treated with chlorthion—least effective for codling moth control of the materials tested—aphid and European red mite populations were low, but it was noted that there was a great deal of variation between replicates where the same materials were applied.

In general, aphid and mite populations in these investigations remained low during the three-month period.

The time of treatment depends on the development of the walnuts and the codling moth. If both are normal, the first application of a two-treatment program should be applied—in most localities—before May 10, and the second treatment three weeks later. Where only a single treatment is necessary, it should be in mid-May when the nuts are about ½" in diameter.

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Average Number of Aphids and European Red Mites per Leaflet Three Months after Treatment with the Indicated Materials. Finished Sprays Applied at the Rate of 400 g.p.a. One Pound of Parathion (25% Wettable) Added to All DBT Treatments. Column 1 Aphids, Column 2 European Red Mites.

	Pounds actual/acre	Replicate A		B		C		D	
		1	2	1	2	1	2	1	2
None	–	5.0	1.4	7.6	0.8	9.5	1.8	8.0	0.8
DDT	6	0.3	2.6	0.6	0.02	13.4	13.6	11.2	0.3
DDT	3	16.0	0.2	2.8	0.5	0.9	0.3	31.7	5.6
Chlorthion	6	0.1	0.3	0.7	0.5	0.3	0.3	3.0	0.1
Diazinon	3	1.9	0.3	1.4	8.1	1.9	0.4	8.4	0.3

RANGE

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wild-rye were found in the measured areas. Purple stipa was entirely lacking.

On most ranges where there is a Klamath weed problem, both desirable and undesirable forage plants are present. Where a well-adapted forage grass, such as California oatgrass, is available, grazing use should be aimed toward encouraging this plant.

On most Klamath weed ranges of California, Medusa-head will thrive and provide serious competition to the more desirable forage plants. Range improvements can only be achieved where better annuals and perennials replace the undesirable plants.

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GERANIUM

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These rooted cuttings may be planted in ground beds or raised beds treated with chloropicrin or methyl bromide, as in the case of the mother-block beds.

Each plant in the increase-block should be identified by the numeral indicating its source mother-block plant.

In the event that virus symptoms appear on any of the plants in the increase-block, all plants of the same origin—including the mother-block plant—should be immediately rogued.

The increase-block should be kept free of insects in the same manner as the mother-block because it is designed to furnish cuttings for use in planting in the field.

When the cuttings in the increase-block are of sufficient size, they may be planted in the field. Field cuttings should never be used for replanting in the mother-block or the increase-block. If the field planting becomes diseased and is plowed up, or if diseased plants are rogued or plants are lost, replanting should be delayed—for at least three months—and then only cuttings from the increase-block should be used.

Cutting knives or clippers used on all cuttings in this system should be soaked in a 1:1000 mercuric chloride solution and wiped dry with a clean paper towl or toilet tissue between use on the plants. Two knives, or clippers, should be available; one set remaining in the disinfectant while the other is in use. Because there is danger of mercury poisoning by absorption through the skin, the operator should wear rubber gloves or use care that the solution does not come in contact with cuts or abrasions in the skin. Skill and careful work are required in the mother-block and in the increase-block, and only an operator with those qualities should work in blocks, performing all operations himself.

Overhead watering must not be used.

All flowers should be removed from the mother-block and the increase-block to reduce Botrytis gray mold.

A number of California growers have set up a procedure for developing disease-free cutting stock and have found a substantial increase in growth of plants and yield of cuttings per plant, as compared to their field-grown material. Also, by using this system, geraniums may be grown intensively on much smaller acreage and yield a much higher return per acre compared with present returns. Perhaps of greater importance is the fact that by selling healthy cuttings, the California producer will capture a much larger share of the market for geraniums in the country.

This system of propagating disease-free cutting stock was set up for geranium production but it may easily be adapted to many other crop plants which are vegetatively propagated.

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AZALEAS

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when the plants are taken into the greenhouse for forcing. The first step is to remove from the plants all flowers and buds beginning to show their natural color. Removal and replacement of the surface litter help eliminate the shooting spore stage.

The most important control in the greenhouse is to reduce the humidity. The spores responsible for the secondary spread are extremely susceptible to dryness, and merely lowering the humidity to only 80% or 85% is enough to give a sure control of the disease.

The best control is to prevent the entrance of the fungus into a planting. Because the fungus is found only on the flowers or as resting bodies in the soil, new plants should not be brought in when in flower or if there is any color in the buds. Bringing in only bare-rooted plants will eliminate the soil as a source of the fungus.

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WALNUTS

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Where the basic lead arsenate treatment is used, it should be applied at four pounds per 100 gallons—by air carrier-type or the conventional high pressure spray rig—at the rate of 800 gallons per acre.

Where DDT is applied by a conventional high pressure spray rig, only 1½ pounds of DDT 50% wettable powder per 100 gallons are necessary when the finished spray is applied at 800 gallons per acre—only one half of the amount of material—listed in the dosage table—is necessary for European red mite and aphid control.

Dosage Table for Combination Codling Moth, European Red Mite, and Walnut Aphid Control. (With DDT applied by air carrier-type equipment only and the finished spray applied at the rate of 400 gallons per acre.)

Codling moth	European red mite	Walnut aphid
DDT 50% wettable powder 3 lbs/100 gals	Systox 21.2% emulsifiable 8–12 oz/100 gals or Ovotran 50% wettable powder 1½–2 lbs/100 gals or Aramite 15% wettable powder 3–4 lbs/100 gals	Not necessary if Systox is used for mite control or Parathion 25% wettable powder 1 to 1½ lbs/100 gals or Malathion 25% wettable powder 1 to 1½ lbs/100 gals or TEPP 20% 8 oz/100 gals or Nicotine sulphate 40% 8–12 oz/100 gals

WARNING

Parathion, systox and TEPP—like certain other organic phosphate insecticides—are extremely toxic to human beings. Precautionary recommendation on manufacturer's label must be followed without exception or modification.

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VALENCIA

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The lack of a significant increase in the large-sized oranges in the moderately dry treatment as a result of the 2,4-D spray indicates that soil moisture is an important factor in obtaining consistent results with growth regulator sprays for increasing fruit size. While the results so far are impressive, they represent only one crop and should be considered as a progress report in this investigation.

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