

Filbertworm Injury to Walnuts

effective spray program not yet devised for commercial control of filbertworm infestations in northern California

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Prompt harvest of walnut crops provides—so far—the most effective control of the filbertworm—*Melissopus latiferreanus* Wlsm.—which at times causes serious damage to walnuts in northern California, particularly in portions of the Sacramento Valley.

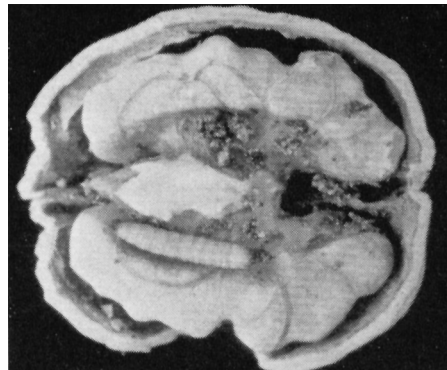
Infestations of filbertworms in walnut orchards arise from moths that have developed in other hosts and then migrated into the orchards. Hosts of the filbertworm include the fruit of Catalina cherry, filberts, and acorns, but the principal host is believed to be the green apples or galls of the California gallfly—*Andricus californicus* Bassett—which are abundant on oak trees.

Not Husk-feeders

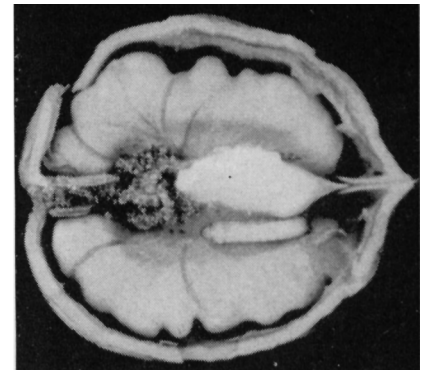
Adult moths are present in walnut orchards during most of the growing season. However, the caterpillars hatching from the eggs are unable to penetrate the unbroken husks of the developing walnuts, which are therefore free from infestation until the husks begin to crack at maturity. The larvae crawl through the cracks and enter the nuts at the stem end—usually without leaving any visible external evidence. Also, they do not feed upon the husk, so there is no staining of the shell. As a result, in most cases it is necessary to crack a nut in order to determine whether or not it is infested. The nature of the infestation makes it almost impossible, therefore, to detect and remove most of the infested nuts from the unshelled walnut crop.

Delaying harvest for as little as a week or two can result in a marked increase in the degree of infestation. The walnut crop should be picked just as soon as it is ready to be knocked. Rapid drying of the harvest nuts is also recommended because investigations have shown that the filbertworm cannot develop on cured nut meats and very small caterpillars are killed before they have an opportunity to do sufficient feeding to be noticed when the nuts are cracked.

The codling moth is often a problem in orchards where filbertworms are troublesome. Filbertworm larvae can be distinguished from codling moth larvae, particularly with mature caterpillars. Larvae of the codling moth are pinkish



Mature walnut, infested with the pinkish larva of the codling moth, showing feeding and excrement.

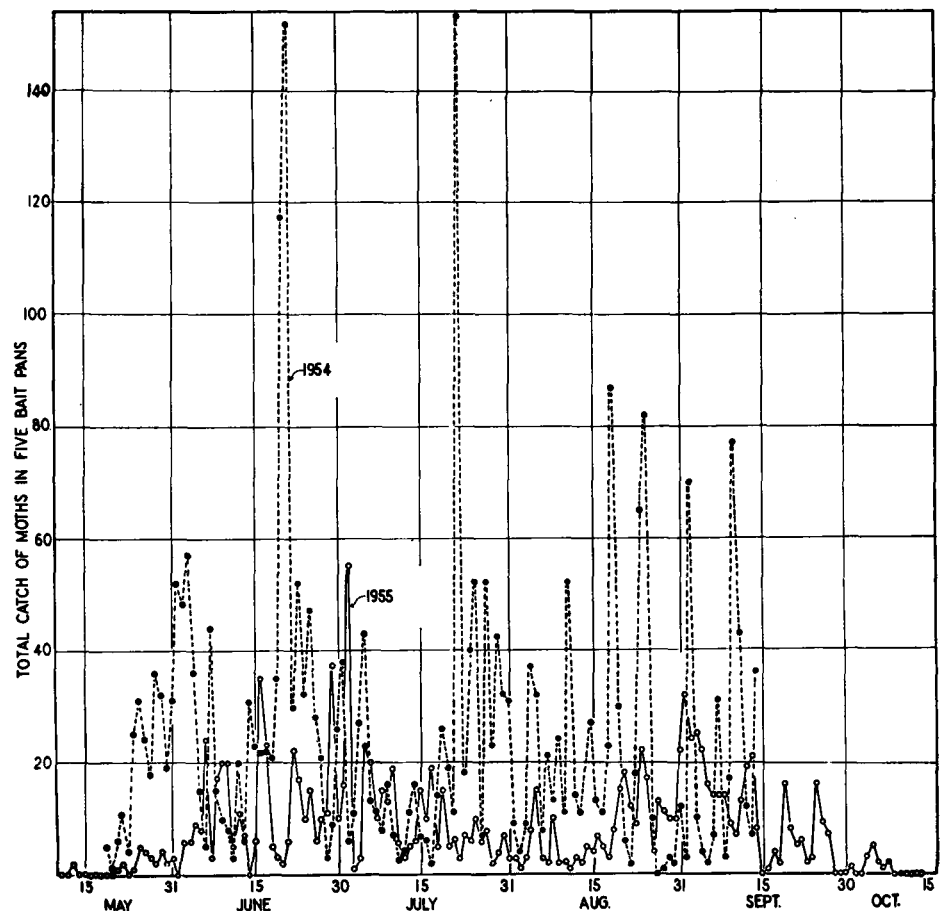


Mature nut showing feeding by the cream-colored, clear-amber-headed larva of the filbertworm.

and the head is amber with a mottled colored pattern. Larvae of the filbertworm are whitish and the head is a clear uniform amber color.

Although the codling moth can be effectively controlled with timely and thoroughly applied sprays, no spray program
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Trapping records of filbertworm moths in a walnut orchard near Gridley.



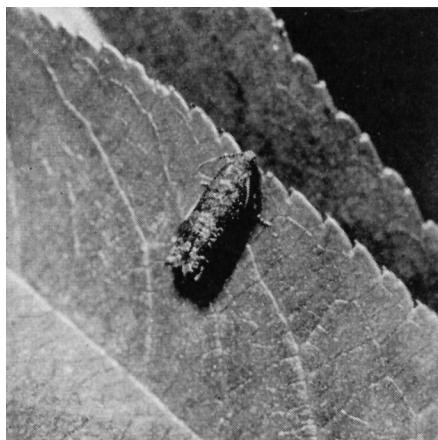
MOTH

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applied in the petal-fall period—did not adequately reduce the infestation. When trap counts began to soar in the second flight period, the tentative program was revised to include additional applications of DDT. A series of sprays or dusts were applied during the course of the second flight as follows: two standard sprays—50% DDT, two pounds per 100 gallons—10 to 12 days apart; or three dusts of 10% DDT—50 pounds per acre—at intervals of seven days; or any comparable DDT spray and dust combination dictated by irrigation schedules. Orchards where moderate residual infestations persisted later received two additional dusts during the third flight and, in exceptional cases, a final dusting was put on late-season clings at the outset of the fourth flight of the moth.

The experimentally treated orchards with high initial infestations passed the harvest period with only traces of wormy fruit, few twig-feeding OFM larvae, no

Adult or moth stage perched on peach leaf.



FILBERTWORM

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has been developed which shows any real promise in controlling the filbertworm. Lead arsenate sprays, applied in August and September when the filbertworm larvae are entering through the cracks in the walnut husks, have given the best results. Such sprays applied during the 1955 season reduced the degree of infestation by about one half; this, however, is not enough reduction to give commercial control.

Infestations in walnuts vary greatly from year to year, and ecological investigations are needed to determine the reasons for this. Natural enemies may possibly play an important role, and in some years parasites may reduce the moth population to such an extent that few migrate to walnut orchards.

Observed Effects of Repeated Treatments with DDT Applied to Peaches for Control of Oriental Fruit Moth

Variety	Sequence of DDT Treatments	Days Between Last Dust and Harvest	Harvest Data*			
			Date of Harvest	Per Cent Wormy Peaches	DDT Residues—PPM	
					Fresh	Canned
Fortuna	SSDDD	41	July 21	0.0	2.9	..
Elberta	SSSDD	28	Aug. 3	1.0	4.4	..
Gaume	SSSDDD	17	Aug. 18	0.4	3.3	<0.1
Halford	SDDDDD	33	Sept. 9	0.3	3.0	0.7

S = Spray, D = Dust. *Chemical analyses by Toxicology Laboratory, Department of Entomology, Berkeley. Pilot plant canning by Department of Food Technology, Davis.

peach twig borers, and with acceptable DDT residues on samples of harvested fruit. Spot checks and reports from various sources indicated that peaches harvested from treated orchards throughout the areas of infestation at Kingsburg and Exeter were satisfactorily free of worms.

In the light of recent experience, it seems likely that a second year follow-up with a less drastic series of treatments will leave only trace populations to be controlled thereafter.

The 5th and 6th DDT treatments described above were applied experimentally against heavy infestations under constant surveillance. This program is not suggested as practical for general use. A more compact schedule, with adjusted timing and few applications, will be developed for trial next season.

Cause of Flare-up Unknown

Traces of the OFM appear to have persisted in some areas of the state's main peach belt for ten years or longer, and just why these quiescent infestations have flared up in some orchards but not others is not understood. The OFM was first found in California in 1942, in Orange County. Soon thereafter—1943-46—an official survey conducted by the State

Department of Agriculture demonstrated its presence in fourteen counties. Significant infestations were found in southern California. Extremely light or trace infestations were pinpointed in the San Joaquin Valley, and rare, single specimens were trapped in a very few orchards in the Sacramento and Santa Clara Valleys.

Many of the locations in the Central Valleys having formerly demonstrated traces of OFM do not now show impending trouble with reviving infestations.

Since it is not now possible to define the conditions under which the OFM can flare up, all peach growers—especially those whose orchards are located in Kings, Tulare, and southern Fresno counties—should be alert for signs of trouble with this pest. Unusual amounts of worm-infested fruits should be examined carefully for fruit moth larvae.

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To determine the seasonal population trend of filbertworm moths, bait pans were established in a walnut orchard near Gridley. The seasonal catch for 1954 and 1955 is shown in the graph on page 11. The filbertworm population was extremely large in 1954 and the infestation in the harvested crop—as much as 30% to 40% in some orchards—was the most severe since the beginning of the walnut insect investigations in 1944. Despite early harvest, 26% of the nuts in the orchard where traps were operated were infested. In 1955, the moth flight was much less than in 1954 and the degree of infestation in the harvested crop was greatly reduced. In the experimental orchard, the procedure of early harvest was again followed and the infestation amounted to only 3%.

The value of bait pans is clearly indicated, since the trend of infestation is

established early in the season and so the possible degree of infestation in the harvested crop can be predicted well in advance of harvest.

Early harvest in itself, however, is not sufficient to reduce the infestation below an economic level in outbreak years—as in 1954. If an effective spray control program is devised, bait pan records can be utilized each year to forecast the population trend of the filbertworm and thus to indicate the necessity of control treatment.

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