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THE CONTROL OF THE FILBERT MOTH  
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In 1929 the filbert moth Melissopus latiferreanus (Walslim) was found infesting filberts in Oregon. In 1930 the State Emergency Board allotted to the Oregon Experiment Station a small sum of money for the purpose of making a survey of the extent of damage caused by this insect to filberts. Infested nuts were found in every filbert-growing section of the state. In most cases the infestation was spotted and light.

Since 1930 the filbert moth has increased in numbers until in 1936 it was the limiting factor in filbert production in a number of orchards. In 1937 money was made available and the study of filbert insects begun. Considerable data on the life history, seasonal history, parasites and control of the filbert moth have now been obtained.

Life History:

Before applied control tests can be intelligently undertaken, the life history of the insect must be known. Considerable information was obtained on life history of the filbert moth by casual observations during the period 1930-1936. Detailed life history studies were undertaken in 1937 and continued to the present time. These studies indicate the life history of this moth on filberts to be as follows:

The winter is passed by the larvae in silken cocoons. These cocoons may be found in the leaves and debris on the ground or in the soil. The larvae change to pupae in the over-wintering cocoons. Usually pupation begins late in May, and by the end of June most of the larvae have changed to pupae.

The adult moths begin to emerge toward the end of June. During the 1937 to 1941 seasons, most of the moths had emerged by the last week in July. In 1942 there was a change in the seasonal history of the moth. The emergence period was greatly extended and the emergence was broken up into two peaks--one occurring early in July and the second and largest during the third week of August.

The adult moths vary considerably in color, ranging from gray to almost red. They are about the size of a codling moth. The hind wings are almost black. Across each fore-wing are two golden bands, one near the middle and one near the apex. These bands have a metallic lustre, giving them the appearance of hammered gold.

Mating takes place soon after emergence, and egg laying may begin the following day if weather conditions are favorable. Moths are active only on warm, sunny days, and egg laying takes place during the hottest part of the day. The eggs are laid singly on the leaves, with an occasional egg laid on the exposed portion of the nut. The eggs are flattened, milky-white discs about 1.6 mm. in diameter. They hatch in 8 or 9 days under ordinary Oregon weather conditions.

The newly hatched larva moves about in search of a filbert. In this moving about, some feeding is done, usually on the undersides of the leaves. When a nut is reached the larva tunnels through the husk next to the filbert shell until it reaches the basal scar. When this is reached the larva tunnels about until the micropyle is located. The micropyle is in the center of the basal scar and is much softer than the rest of the shell. Entrance to the nut is made through the micropyle. However, entrance is not always completed--often the larvae perish before completing entrance, and occasionally a larva will migrate to another nut.

On entering the nut, the larva begins to feed on the kernel. It may tunnel into the center of the kernel or excavate an irregular cavity in the side. The larvae become full grown about the time the nuts are mature. On reaching maturity the larva usually leaves the nut by enlarging the entrance hole in the micropyle, although in soft-shelled varieties the exit hole is often made through the side of the nut. After leaving the nut, the larva enters the soil where a cocoon is spun in which to pass the winter, thus completing the life cycle of one generation.

A few of the first worms to leave the nuts pupate soon after spinning their cocoons, and moths emerge and lay eggs which hatch at about the time harvest begins, thus giving rise to a partial second brood. So far this second brood has been very small and of no economic importance.

#### Parasites:

Of all the parasites found attacking this insect, the egg parasite, Trichogramma evanescens (Westwood), seems to be the most important. During some seasons as many as 15% of all the filbert moth eggs examined were destroyed by this parasite.

#### Control:

Lead arsenate spray used at the rate of three pounds of lead arsenate to one hundred gallons of water, plus a spreader, is the recommended spray for the filbert worm. There are several excellent commercial spreaders that may be used. The spreader and amount recommended by the makers of the brand of lead arsenate used is suggested.

### Timing of Sprays:

The spray is applied just before the eggs begin to hatch in order to have a poison dose on the leaves, especially the undersides, at the time the newly hatched larvae are moving about in search of a filbert. As stated in the discussion on life history, some feeding is done by the larvae on the leaves. If the leaves have been thoroughly sprayed, the larvae will thus pick up a poison dose and be killed before reaching the filbert. In our experimental work for the seasons 1937 to 1941, we found that one spray applied after the moths began to emerge and before any eggs had hatched gave good control. As it takes the eggs about eight days to hatch under ordinary conditions, the grower may start his spraying soon after the moths begin to emerge and lay eggs, and have approximately a week in which to apply this spray.

Due to the extended egg laying period in 1942, one spray did not give as good control as in previous years. If the seasonal history of the moth continues to be drawn out and split into two peaks as it was in 1942, two sprays will be necessary--one applied just as soon as the first moths emerge and the second at the beginning of the second peak in August. The Entomology Department of the Oregon State Agricultural Experiment Station will watch the seasonal development of the moth and send out warnings when it is time to spray. You can obtain these warnings through your County Agent.

### Thoroughness of Spray Application Essential:

Thoroughness of application cannot be over-emphasized. Both the upper and lower surfaces of all the leaves, as well as the nut clusters, should be thoroughly covered with the spray. To accomplish this, the spray is directed from the center of the tree outward, as well as from the perimeter of the tree inward. Special attention is given to the upper part of the tree. Preliminary investigation indicates that more eggs are laid in the upper part of the tree than are deposited on the lower branches.

### Sanitation:

The grower helps to reduce his filbert worm infestation by certain orchard practices. Many of the blanks and nuts that drop prematurely contain worms. The picking up and destruction of this premature drop eliminates many worms which otherwise might be a future source of infestation. Growers who dry their filberts near the orchard should make the drying shed as nearly moth- and worm-proof as possible. Many worms escape from the dryer to reinfest the orchard, while those that spin cocoons in cracks of the walls and floors, behind boards, etc. in the drying sheds may emerge as moths the following year and escape into the orchard. Pieces of burlap or worn-out sacks placed inside the doors will trap many of the worms; and screening of the windows may prevent the escape of moths.

### Sterilizing Sacks:

Many worms leave the nuts enroute from the orchard to the packing plant and take refuge in the seams of the sacks, under patches, etc. Sterilizing the sacks at the plant before sending them back to the orchards would prevent sacks containing worms from going into worm-free orchards.