The Cherry Fruit Worm

(Grapholitha packardi Zell)

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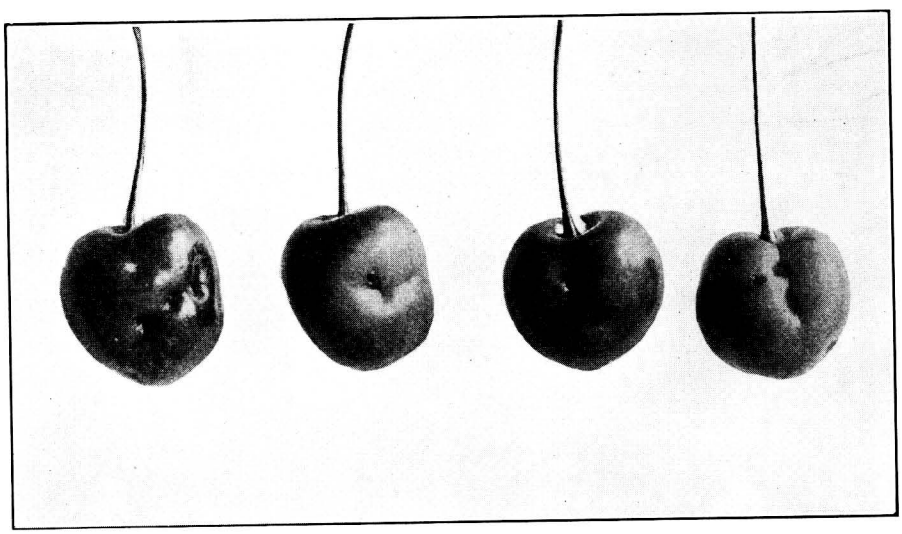
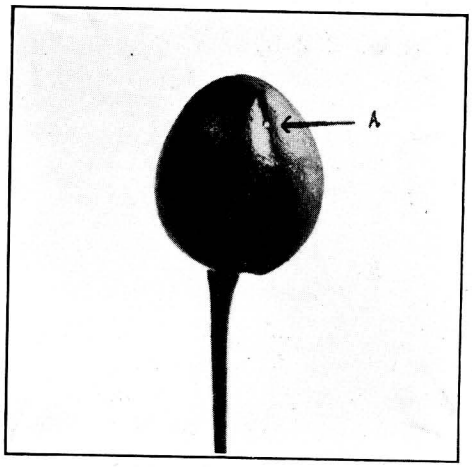
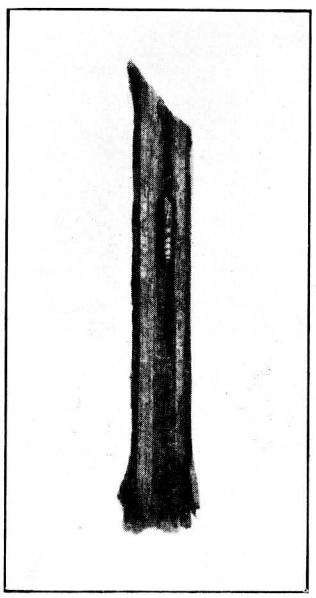
FOR several seasons past much damage has been occasioned on Vancouver Island by the larvae of a small Eucosmid moth which attacks sour cherries, living between the flesh and the pit. Its presence in cherries was noted first in 1917, it then occurred in small numbers only and was supposed to be the lesser apple worm from its close resemblance to that insect, which has also been recorded as breeding in cherries. The loss to cherry growers has, in some instances, been as high as thirty-six per cent. of the crop. Infested cherries are generally distorted or "monkey-faced," but many, on the other hand, are not, and show no indication of the presence of the worm within. A study of the insect was commenced in 1927, but it was not until the following year that a definite identification of the moth was obtained. Dr. J. McDunnough, of the Entomological Branch, Ottawa, identifies this moth as **Grapholitha packardi** Zeller. It is closely related to the lesser apple worm **(Grapholitha prunivora** Walsh) and the oriental peach



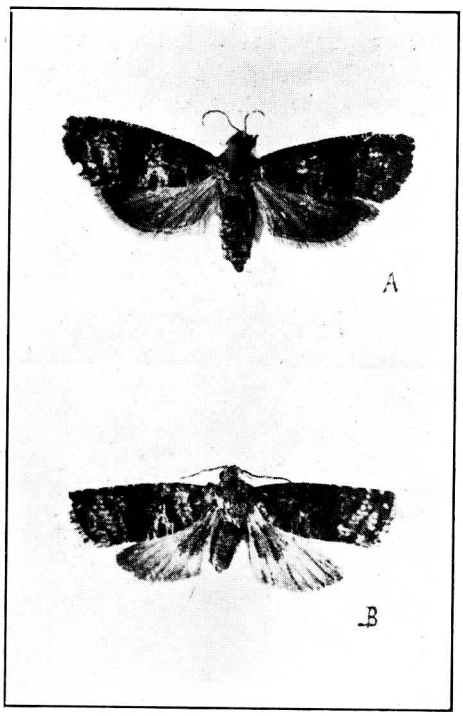
Cherries distorted by larvae of *Grapholitha packardi* and showing emergence holes.



Young cherry X-3 showing egg of *G. packardi* in position at A.



Stub of pruned branch cut open, showing pupa of *G. packardi* in position.



Grapholitha packardi Zell. (a) male moth; (b) female moth, showing secondary sexual characters. X-8.

moth **(Grapholitha molesta),** but is smaller than either of these. In Heinrich's revision of the North American **Laspeyresiinae** and **Olethreutinae** (U. S. N. M. bul. 132) it is mentioned as an enemy of apple and its food plants are stated to be apple and crataegus, and there are a few doubtful records from peach. The distribution is given as Texas, Mississippi, Missouri, Arkansas, Illinois, Michigan, Maryland, W. Virginia, Virginia, New Jersey, Delaware, Massachusetts and New Hampshire.

Life History

The eggs of the moth are laid on the fruit, usually in the suture near the apex. Some, however, are laid at the stem end. Occasionally more than one egg is laid on a cherry, and we have found as many as four, but this is rare. The egg is half a millimetre in diameter, circular, flattened, opalescent, and nearly the colour of the unripe cherry. It is very hard to see with the unaided eye, especially when the suture is deeper than usual and the egg is laid in it. In 1927 eggs were deposited about June 15, but this season (1929(being backward, none were found until June 24. The incubation period has been found to be ten or eleven days, dependent upon temperature. On hatching, the young larva bores into the fruit and commences to mine around the stone. When the cherries are nearly ripe it will be found to have established itself between the flesh and the pit. At first the larva is white, translucent, with a black head. Later, it assumes a pinkish tint and grows to a length of 7 to 8 millimetres. It possesses an anal comb very closely resembling that of the lesser apple worm. Unlike the lesser apple worm there is only one generation in a year. The larvae reach maturity in about thirty days, and then leave the fruit and search for permanent quarters in which to hibernate. In most seasons the larvae leave the cherries before the latter are ready to pick and the exit hole can be readily seen, but should the season be cold and backward the development of the insect will be delayed and the majority of the worms will be still in the fruit at picking time.

The larvae, on leaving the fruit, search for a dry twig or piece of bark in which to burrow. The favourite location seems to be the dead stubs of pruned branches. They bore down the centre of these for one and a half or two inches and remain there for the rest of the larval and the pupal period. We have found them in dry stems of bracken and occasionally in crevices of the tree trunks, but the stubs of pruned branches are preferred. The entrance to the burrow is stopped with a plug of silk. We have no evidence that the larvae ever leave these quarters to feed again. Pupation takes place within the twigs during the second week in May, and the duration of the pupal period this season was found to average 42 days. The development of the insect is greatly

affected by temperature. Material collected as late as May 17 emerged in the laboratory, where the temperature was much higher than outside, on June 3, and material collected earlier still emerged correspondingly earlier in the laboratory, but those kept under outdoor conditions did not emerge until June 14. The first appearance of the moths in the field was slightly earlier than this, as the pupae in the twigs are exposed to the direct warmth of the sun, and this hastened their development. Emergence this year was delayed by the backward season, but in the previous year (1928) emergence was at least a fortnight earlier, and in 1927 moths in fresh condition were collected in the field on May 25. The variability of this emergence period is a point which has to be carefully studied, as it has an important bearing upon the time for applying control measures. The height of emergence occurred this year on June 23 and 24.

During the day the moths rest on the trunk and branches of the trees, from which they are easily dislodged. They become very active about 4 o'clock in the afternoon, when the weather is warm and the sun not too bright. They may be seen at that time flying about the foliage and settling upon the fruit.

The moth measures 6 mm. across the expanded wings. The following description of **Grapholitha packardi** is taken from "The Lepidoptera of New York and Neighbouring States" by William T. Forbes: "Dull blackish; head and palpi grey (unlike **L. caryana** and **L. prunivora**); forewing with lead-grey fasciae, leaving a distinctly defined but not contrasting brownish erect median fascia, and a similar sub-triangular patch at the anal angle. Speculum with a couple of faint dots only. Hind wing very pale grey with dark border and veins."

An important point mentioned by Heinrich is the occurrence of secondary sexual characters in the male. These are a patch of black or brownish scaling at the inner angle of the hind wings and a similar patch upon the under surface of the fore wings. This character is said to be shared by no other North American species of **Grapholitha** or **Laspeyresia** so far as is known.

The native host has been found to be the wild cherry. The varieties of cultivated cherries affected are Morello and Olivet, with a decided preference for the latter, and it has been found to a small extent on the Lambert. Just how serious the pest may become can be judged from the fact that in 1927 fruit in the Oldfield orchard at Elk Lake, near Victoria, showed an average infestation of from 36 to 45 per cent. in different sections of the orchard, while individual trees had an infestation as high as 81 and 90 per cent.

Control Measures

On account of the probability of residue remaining on the cherries, arsenical sprays have not been considered. Only two methods of attack have so far appeared feasible, the use of repellents for the adults, and ovicidal sprays. Fairly good results have been obtained by the use of a strong nicotine sulphate and soap spray as a repellent. In some orchards where the infestation is not heavy this spray has proved sufficiently effective in keeping down the pest, but where the moth is well established and conditions seem to favour its increase, better results have been obtained by the use of a "summer" oil emulsion combined with nicotine sulphate. The formula which gave the best results in experimental work during the present season was "Volck," 1/3 pint; nicotine sulphate, 1 oz.; calcium caseinate, 1 oz.; water, 4 gallons. Volck is a light oil emulsion or "summer oil." This spray was applied on June 26th, just after the height of emergence. On the trees sprayed with this formula the infestation was 2.36 per cent., compared with 19.08 per cent. on unsprayed trees. On trees sprayed with nicotine sulphate and soap, using ¾ pint nicotine sulphate to 40 gallons of water and 5 lbs. of whale oil soap, the infestation was 8.06 per cent. The Volck nicotine sulphate combination appears to have a repellent as well as an ovicidal value. Further experimental work may discover other combinations which will be equally effective. The best results appear to be obtained by spraying when the emergence of the moths is at its height. The date will vary according to the season and is a matter requiring careful observation. Clean culture in the orchards will tend to diminish the hibernation quarters of the larvae and the destruction of all wild cherries growing nearby will have a beneficial effect.