Circular 101

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Connecticut Agricultural Experiment Station
New Haven

CONTROL OF APPLE MAGGOT

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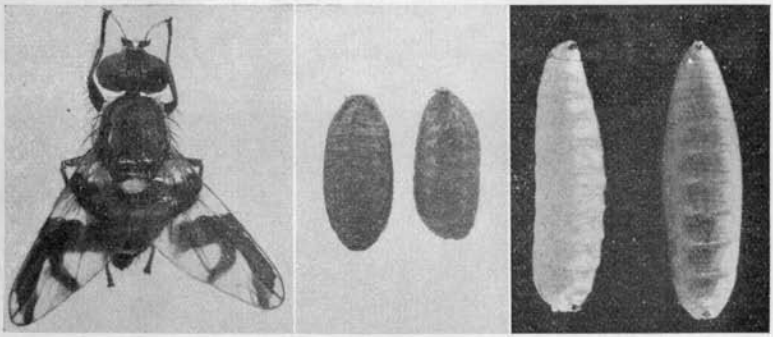

Figure 25. Apple maggots, puparia and adult fly, (five times enlarged). Left, fly; middle, puparia; right, maggots.

The apple maggot, *Rhagoletis pomonella* Walsh, infests many kinds of apples, particularly sweet, subacid and early fall varieties. Early Harvest, Sweet Bough, Wealthy and Northern Spy are examples of heavily infested varieties. Red Astrachan is sometimes heavily infested. Gravenstein is moderately or severely infested. Baldwin, Ben Davis, McIntosh, Greening and Wolf River are examples of moderate to lightly infested varieties, but McIntosh may be heavily infested if interplanted with early varieties subject to attack. Delicious is often more severely injured than other late fall varieties. Infested fruit usually drops to the ground and in general is worthless from a commercial standpoint. Figures 26 and 27 show infested apples. The fly, maggots and puparia are shown in Figure 25.

Life History

The individual life history consumes a full year, or in some cases more than one year. Flies emerge in June or July, feed for ten days or so, mate and then begin to lay eggs in the fruit. Maggots develop during late summer and fall and as they mature, leave the fallen fruit and enter the soil

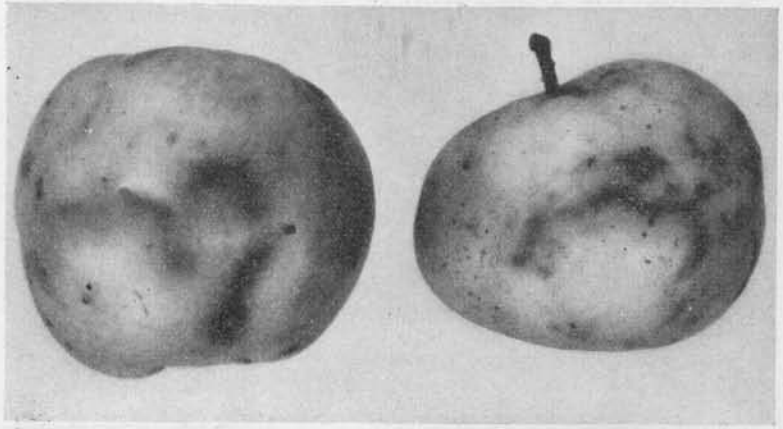

FIGURE 26. Infested apples showing typical depressions and "railroads."

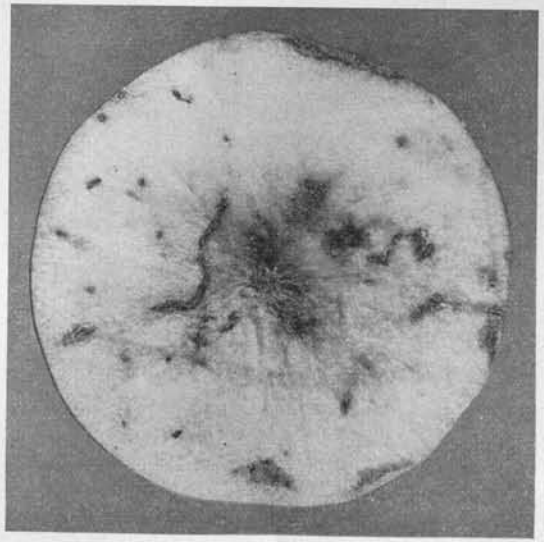

FIGURE 27. Cross section of an infested apple.

where they transform into hard-shelled brown puparia. They remain in this stage until the adults emerge the following year. A small percentage carry over until the second summer, or in more northerly localities until

the third to the sixth year. The percentage remaining for periods longer than one year is, however, relatively small.

During the summer season the majority of the flies emerge from the soil in July. The work of Porter indicates that in the Wallingford district the majority emerge the latter part of July (Figure 28) although maggots breeding in early varieties may produce flies that emerge earlier in the year as shown in Figure 28. Research workers have indicated that maggot flies will also emerge earlier from sandy soils than from heavy loams. It is advisable to have some means of knowing definitely when flies emerge in the orchard if sprays are to be timed correctly. Traps (Figures 29 and 30) are convenient for this purpose and should be placed under the trees where infested fruit naturally falls. They should be filled with maggoty apples in early fall and the apples removed after the maggots have left them to enter the soil.

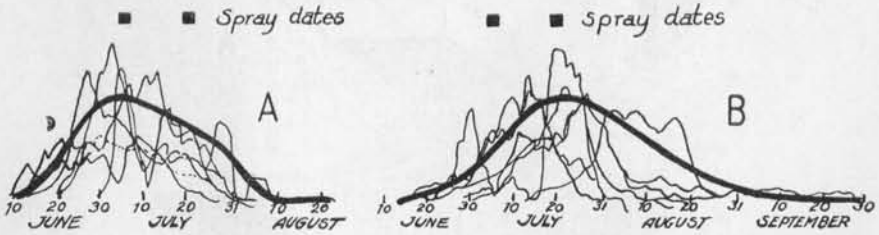

FIGURE 28. Chart of emergence of apple maggot flies at Wallingford, Connecticut, from data by Porter. A. Emergence from early or summer apples. B. Emergence from fall or winter varieties.

The extent of flight as determined by Phipps of Maine, indicates that the majority of the flies do not travel more than 300 yards. It is probable, however, that they sometimes travel much greater distances.

Control Measures

Maggot flies obtain food and moisture from the surface of the fruit and leaves and for this reason stomach poisons are used to kill them.

At present arsenical stomach poisons are generally employed for maggot control. Both calcium and lead arsenate have been used successfully and lead arsenate dust is reported to be effective. Other poisons tried so far have not proved satisfactory although some are promising.

Spray or dusting operations should include bearing trees whether they contain a crop of apples or not, because of the habits of the flies, which feed on the foliage of non-bearing as well as bearing trees.

Maggot infested apples or apples in which maggots are just beginning to work may be saved by placing in cold storage for a month before using or sending to market. This destroys young maggots and eggs.

Where severe infestations occur it is advisable to remove or spray neglected trees near the commercial orchard, and collect and destroy wind-

falls of heavily infested varieties. Collected fruits may be buried in a trench with two feet of closely tamped soil above, or if it is necessary to dispose of large quantities they may be dumped in a concrete or dirt pit and covered with crank case oil in late fall or early spring. The number of flies emerging from the soil the following summer can be appreciably reduced by these measures.

The main difficulty in successful maggot control is to prevent spray residue accumulation on the fruit, and yet to apply enough poison to control the insect.

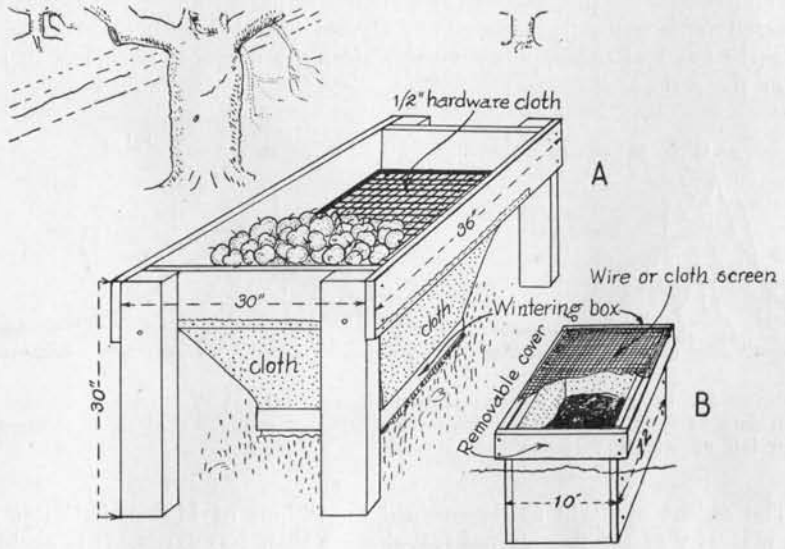

FIGURE 29. Phipps maggot trap. Larvae leaving apples in tray pass through the hardware cloth and into the wintering box (A). The stand with apples should be removed after frost and the over-wintering box (B) provided with a 14 - 16 mesh screen about June 1. Trap slightly modified from the original.

Recommendations for Connecticut

Sprays and dusts

FOR SUMMER AND EARLY FALL VARIETIES: Dust with 90 - 10 lime calcium arsenate dust; or 80 - 10 - 10 sulfur-lime-lead arsenate dust. Apply during the first week in July and again about July 20. The second application can probably be omitted in cases of light infestations. Calcium arsenate lime spray (2 pounds calcium arsenate, 6 to 8 pounds hydrated lime[1] and 100 gallons water) may be used on varieties that ripen late enough to allow two months between the last spray and the picking dates.

[1]Fresh high calcium hydrated lime (calcium oxide 75 to 80 per cent and not over 5 per cent magnesium oxide) finely ground and free from grit.

FOR LATE FALL AND WINTER VARIETIES: Spray with lead arsenate, 3 pounds to 100 gallons, the first week in July and again about July 20. If the infestation is severe, a third application may be needed about the first of August, but this is not usually necessary. In light infestations a single application during early July (July 6 to 10) is sufficient to obtain control. At least two months should be allowed between the last spray and picking dates. Sulfur-lime-lead arsenate dust (80 - 10 - 10) may be substituted for the August spray application, and is preferable in dry seasons. If spray is used, the amount of lead arsenate should be reduced to 2 pounds to each 100 gallons. A fungicide is commonly combined with lead arsenate for control of fungous diseases, and for this purpose lime sulfur or a wettable sulfur should be used. With calcium arsenate only wettable sulfurs should be employed.

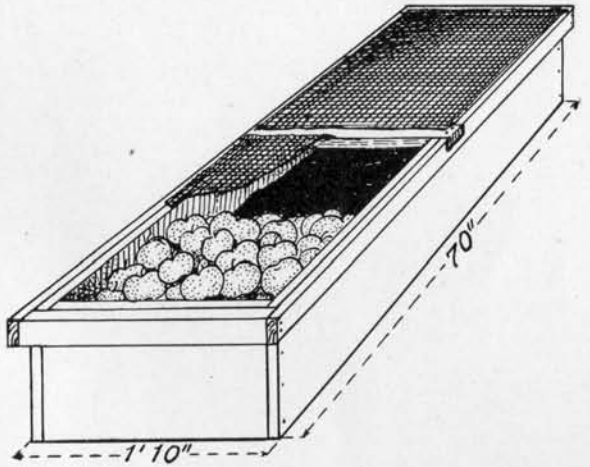

FIGURE 30. A convenient type of ground cage with tight telescope cover. The cover should be left off until June, and the apples removed in late fall.

Supplementary Measures

Attend to all neglected apple trees within 300 yards of the orchard and either spray or remove them. Removal is the surest remedy if it can be done.

If fruit appears to be infested at harvest, place immediately in cold storage and hold at least one month before using.

Collect windfalls of early varieties and destroy them. In order to be successful, this measure should be repeated several times a week and is applicable mainly to heavy infestations or to small plantings where a few trees are involved.