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Apple Maggot *Rhagoletis Pomonella* (Walsh)



Figure 1. Apple maggot injury on exterior surface of fruit (Note the pitted and "dimpled" surface of the tissue) (Whitney Cranshaw, Colorado State University www.Bugwood.org)



Figure 2. Apple maggot injury to interior flesh (Note the corky appearance of the damaged tissue) (A. Merwin, 1996)

Injury: In the fruit growing areas of New York State the apple maggot (AM) or "railroad worm" is one of the most serious pests of apples. All apple varieties are attacked, but summer varieties and early fall varieties are especially subject to injury. The insect also attacks certain varieties of European plums.

Signs of the infestation on the fruit are minute egg punctures in the skin and pitted areas on the surface (**Fig 1**). In late season varieties, the injury usually appears as corky spots or streaks in the flesh (**Fig. 2**). In the varieties ripening from July to September, open tunnels may occur. Rot producing organisms follow the maggots, causing rapid decay of infested fruit.

Life History: The adult apple maggot is a black-bodied fly slightly larger than the house fly (**Fig. 3**). The female is larger than the male, and has four white bands across the abdomen, while the male has only three white bands. The wings of the fly are crossed by four dark bands. The adult flies emerge from their overwintering puparia (cocoon-like structures) in the ground during the latter half of June and continue to emerge through the middle of August.

The flies require approximately 10 days after emergence to feed, mate, and lay eggs. During this time they may be seen resting on leaves or fruit of apples and other host plants, lapping up drops of honeydew or moisture with their fleshy mouthparts.

The female has a sharp ovipositor with which she punctures the skin of the apple and inserts her minute whitish egg into the pulp of the fruit. A large number of eggs may be deposited in a single fruit, and fruits of late varieties become dimpled and pitted as a result.

The eggs hatch in 4 to 6 days, young maggots beginning at once to tunnel through the fruit, causing brown trails. Severely infested fruits often fall to the ground early. The numerous trails in the fruit reduce the inside of the apple to a brownish pulpy mass and render it unfit for consumption.

The full grown maggot (about 3/8 inch long) leaves the fallen fruit and burrows into the soil to a depth of 1 to 2 inches. Here it changes to a puparium, in which stage it overwinters. The following year the cycle starts again.

Monitoring: Monitoring for these insects will help you determine when AM is active in your area, and this information will help you with management decisions. Home gardeners may use visual traps to effectively monitor apple maggot populations. Red sphere traps and yellow sticky boards are two types which are currently available, but red spheres are better and more accurate. Synthetic volatile lures are now available, which greatly increase the efficiency of traps.



Figure 3. Female apple maggot fly (Note the 4 white stripes on the abdomen) (A. Merwin, 1996)

To determine when AM flies are first present, traps should be placed out in mid June (Southeastern NY) to late June (Upstate NY). Hang traps at head height, clearly visible on the outside edge of the tree canopy. Traps should be checked 1-2 times per week for AM flies.

If a cumulative average of 5 AM flies per baited trap is caught, a spray of a suitable pesticide is recommended, and the traps can then be ignored for 10-14 days (the period of time the spray residue will protect the fruit). Begin checking traps again after the protection period. Trapping can be stopped by August 30.

Traps should be cleaned of insects periodically and recoated with stickum if necessary. No treatment is recommended until a cumulative total of 5 AM flies per trap are caught.

Management: Apple maggots are very difficult to control with insecticide sprays. Adults insert eggs directly into the pulp beneath the skin of the fruit, and the maggots never leave the apple until they are

fully grown. Likewise sprays applied to the soil are not effective, as the flies can migrate in from hedgerows or abandoned fruit trees nearby.

Picking up and destroying fallen apples at weekly intervals from early August through harvest destroys the larvae within the fruit, and reduces potential for maggot injury the following year. This is most practical where trees are isolated and wild or abandoned trees are not nearby.

For one to a few dwarf trees: use red sphere sticky traps for both monitoring and control. Unbaited red sphere traps should be hung in trees at a rate of 1 per 100-150 fruit to help control adult flies; or use 1 trap per dwarf tree, 2-4 per medium tree, and 6-8 per full size tree. Follow manufacturer's directions for placement. Traps for controlling adult AM flies should be placed by at least mid-July (in Eastern NY) to late July.

In a limited spray program: an application of Surround (Kaolin), during mid-July in South-eastern NY, or the first week of August in Upstate NY, may be sufficient to reduce damage to an acceptable level. Combine with the use of red sphere sticky traps, three or four per tree, to control adults. Scrape off flies and resurface with stickum one or two times per week.

Proper timing of the spray applications and thorough coverage of fruit and foliage are as important as the insecticide used. The spray should be applied until it starts to drip from fruit and foliage.

In conventional spray programs: the first spray is applied 7-10 days after the first AM fly has emerged, using traps to monitor the population. The flies do not begin to lay eggs for 10 days after emergence, and during this time feed on moisture present on the fruit foliage. Spray with Surround or a multipurpose fruit tree spray every 10-14 days from mid-July to late August, or begin in early July on Long Island and in southeastern New York.

Reprinted from *Apple Maggot Rhagoletis pomonella* (Walsh); Family: Tephritidae (Fruit flies). 4/1972, Prepared by Carolyn Klass, Senior Extension Associate, Department of Entomology, Cornell University.

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The Pesticide Management Education Program (PMEP), in cooperation with the New York State Department of Environmental Conservation (NYSDEC), maintains a web site with a searchable database for pesticide products currently registered in New York State. Individuals who have Internet access can locate currently registered products containing the active ingredients suggested above at <http://pmep.cce.cornell.edu/pims/current> (NYS PIMS).

This publication contains pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are still possible. Some materials mentioned may no longer be available and some uses may no longer be legal. All pesticides distributed, sold or applied in New York State must be registered with the New York State Department of Environmental Conservation (DEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional DEC office. READ THE LABEL BEFORE APPLYING ANY PESTICIDE.

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