CITY fruit

Apple Maggot Fly
Chemical-Free Control

Apple maggot fly arrived in King County in 1985. So far it has been limited to western Washington.

photos by David Smith

Attracting Beneficial Predators

Plants in the Apac family (plants with feathery foliage, like carrots, fennel, parsley and lovage) attract parasitic wasps.

'Sacrificial' plants, like nasturtiums, attract aphids, which in turn attract beneficial insects. 'Banker' plantings, like hedgerows, serve as reservoirs for beneficial insects.

"When you kill the natural enemies of insects, you inherit their work."

— Huffaker

Apple Maggot Fly, *Rhagoletis pomonella*, mainly attacks apples. The fly uses visual and olfactory cues, not pheremones, to mate. Thus, it's attraction to apples is visual.

The larvae tunnel through the fruit, leaving small brownish, threadlike trails. As the maggots grow, the tunnels become more conspicuous; eventually the apple becomes soft and rotten. Apple maggot fly larvae are found only in the apple flesh, not the core (unlike codling moth larvae).

Life Cycle. In order to reduce infestation by apple maggot flies, it's important to understand—and interrupt—the insect's life cycle. Like the codling moth, it has several stages: adult, larvae and pupae.

Adult. Adult flies emerge as the soil warms in the spring—sometimes by the end of May—and continue to emerge throughout the summer. They can be active into late October. The peak time for adult apple maggot flies is late July/early August. Adults are about ¼" long with a black body and distinctive white bands on the thorax and abdomen and a distinct banding pattern on the wings. They typically feed for seven to ten days before mating.

Larvae. After mating, the female fly seeks out fruit and inserts an egg just under the skin, laying up to 300-500 eggs. These eggs hatch into larvae in about a week. All damage is done during the insect's larval stage. Larvae are maggots, about ¼" long and creamy white, with no legs. They tunnel through the fruit for a period that can take up to seven weeks. Temperature and fruit hardness influence how fast the larvae develop.

Pupae. Mature larvae leave the fruit, usually after it has fallen to the ground. They enter the soil to pupate. Pupae usually stay in the soil for one winter, but some remain for two or more years. They appear to be curled up into a tiny red bullet.

Sanitation. Harvest all infested fruit before the maggots emerge. Pick up all fallen apples at least twice a week and dispose of these safely. Do this for two years. This interrupts the life cycle by destroying maggots before they become pupae.

Choosing Cultivars

Apple maggot flies prefer Gala, Holstein or crosses with Cox's Orange Pippin parentage. They are less attracted to Liberty, Jonamac and Spartan, or apples with McIntosh parentage.

Natural Predators. Most insect pests have some soil contact, especially in the pupal or larval stages. Natural predators eat these. The following predators eat insects:

- Chickadees, especially in early spring;
- True bugs (Pirate bug, Big eye bug)
- Lacewings, especially the Brown Lacewing. Lacewings are voracious, eating up to 100 insects per day. Lacewings can be purchased in the egg or larvae stage.
- Ground beetle & Rove beetle (black, shiny beetles) predate in the soil, at the soil line.
- Parasitoids – act as both predator and parasite, often wasps.

Traps. There are different kinds of traps, all exploiting the apple maggot fly's drive for food and reproduction. Most traps use a sticky coating to capture the fly. The most common sticky substance is Tangle-Trap.

Yellow panel traps: These look and smell like the fly's food; insect honeydew and bird droppings. Panel traps come in various configurations and are coated with Tangle-Trap to capture the flies.

Apple Maggot Fly: Chemical-Free Control

A Red Ball Sticky Trap

Tree Health

Healthy trees are more resistant to pests. Keep the fruit tree well pruned, watered and mulched.

'Footie socks' on Apples

Population control

Apple maggot flies are weak flyers, typically traveling no more than ½ mile. Their natural dispersal is slow. If the population is cleaned out of an area, it can take 2–3 years for the fly to return. This means picking all the apples and cleaning up all dropped fruit to remove the hosts.

Traps, continued.

Red ball traps: These resemble apples and attract mature mating insects.

Hybrid traps: The Ladd trap uses a bright yellow plastic panel with red hemispheres attached to the center.

Homemade traps: Delicious and Gala apples coated with Tangle-Trap attract and capture apple maggot flies. Eight-ounce red or yellow plastic Dixie cups hung upside down and coated with Tangle-Trap also work, as long as a volatile lure is hung nearby.

Trapping. A mix of trap types is best. Sticky red ball traps attract male and female, sexually mature adults that are mating and laying eggs. Sticky yellow panel traps attract male and female juvenile flies looking for food.

When? Install traps by the first of June. Leave them up until harvest.

How many? For backyard trees, place 1-2 traps per dwarf tree. For larger trees, place 4 – 8 traps per tree (or about one trap per 100 apples.)

Where? Hang traps at head height in the fruiting canopy of the south side of the tree. Put the trap toward the outside of the tree and clear away nearby foliage so the trap can be seen. Hang the red ball traps near other fruit, not alone.

Re-applying? Some traps are disposable; they are pre-coated with sticky substance and must be replaced every two weeks. Other traps require that the sticky substance be re-applied every two weeks.

Barriers and Bags. Barriers must be put in place before the first apple maggot flies appear. It's most efficient to bag apples when they are thinned—about three weeks after petal fall, when the apples are the size of a dime.

Which fruit: Bag only the good fruit—that is, fruit that is hanging free from branches and exposed to the sun. Consider removing all non-protected fruit to cut down on the population of apple maggots. Remove the lower, shaded fruits.

Types of barriers:

- Japanese 2-ply apple bags
- Sandwich bags of waxed paper or clear plastic
- White or tan paper sacks. May need to be replaced after rain. Apples won't redden.
- Clear poly bags with drawstring closures
- Disposable nylon footie socks
- SurroundR Kaolin spray

Sprays

Nematodes can be watered into the soil around the tree or sprayed on the trunk. This is best done in the spring using live nematode material. It eliminates local insects, including apple maggot pupae. It only attacks insect pests, not beneficial insects.

Kaolin clay spray *(tradename SurroundR)* is a spray of fine white clay particles that forms a barrier film that disguises the host tree, because flies taste with their feet. To maintain the barrier film, the spray must be applied every two weeks and after each heavy rain. If properly applied, it works well to control apple maggots.

Dormant oil is a natural, environmentally safe, highly refined oil spray applied in early spring to smother overwintering eggs and insects. Apply in early spring before leaves or flowers show signs of breaking dormancy; that is, before "bud break."