Worms in Fruit

Time of Concern
Pink bud through harvest

Pest Cycle
This is a complex of insect pests that attack apples, pears, and stone fruit. Not all of these pests attack all fruit types. The specific pests included are codling moth (CM), most common in apples and pears; oriental fruit moth (OFM), in all tree fruit; and apple maggot (AM), in apples. Codling moth, oriental fruit moth, and apple maggot are fruit flesh eaters. Newly hatched CM and OFM larvae bite through the skin (Figure 1) and quickly burrow into the flesh of the apple toward the core (Figure 2). CM will also feed on the seeds inside the apple core. Oriental fruit moth will also feed on young shoot tips in peaches and apples (Figure 3).

Lesser appleworm (LAW) is also part of this complex in some areas. The LAW larvae will feed on the flesh just under the surface of the skin (Figure 4). We seldom target this pest since CM and OFM controls will control LAW.

Apple maggot adults puncture the skin (Figure 5a) and place an egg just under the skin. The larvae are “maggots” that tunnel through the flesh (Figure 5b).

Larvae of the obliquebanded leafroller (OBLR) moth feed on the skin of apples (Figure 6). The larvae also web themselves in the leaves and blossom clusters, and feed there before the fruit is accessible.

All these “worms” (except for AM) overwinter in the orchard as larvae in cracks in bark; apple maggot overwinter as pupae in the soil. OFM are the first to emerge as adult moths in early May, CM emerge as adults during bloom, and OBLR become actively feeding larvae during bloom. Apple maggot adult flies will emerge from the soil in mid-June through August.

CM, and OBLR have 2-3 generations per year; OFM, 3-4 generations; and AM, 1 generation. The newly hatching larvae of CM, OFM, and OBLR are the target life stage for control; the adult flies are the target for apple maggot control.

Damage

Figure 1. CM or OFM in apple. Photo: E. Tee.

Figure 2. CM feeding on seeds after tunneling into apple.

Figure 3. OFM shoot tip feeding.

Figure 4. Lesser appleworm feeding by larva just under skin.
Damage, continued

IPM Steps for Beginners
CM, OFM, LAW, and OBLR (caterpillars):

The key to managing these pests is proper identification and accurate timing of insecticide sprays. Use traps with insect specific pheromone lures to determine which pests are present at your location. Traps do not catch enough adults to decrease damage to apples. Traps are used to indicate when adults are flying and mating. They lay eggs after mating and egg hatch is predictable. The traps are for adult insects, though insecticide sprays will generally target newly hatching larvae, “worms”, that infest the fruit.

Figure 7 shows distinguishing characteristics of CM with the bronze patch on the end of the wing, and is about 1/2 inch long; OFM have a wavy gray pattern and are 3/8 inch long; LAW will get trapped in OFM traps since they are closely related. LAW have a more “patchwork” pattern with gold patches, and are about ¼ inch long. Many moth types will stick in the traps, even moths that look convincingly like the pest moths as in Figure 8. These “imposters” do not matter. Be careful to identify and count just the pest moths in your traps, especially for first trap catch.

1. Hang 1 trap for each of OFM, CM, and OBLR in the center of the orchard, more for >10 acre orchards (Figure 9). Check traps every 2-3 days until the first target insect is caught. Record the number of pest moths in traps, and clean insects out of the traps every week.

2. Use fresh lures for moth traps every 3 weeks for standard lures, or 8 weeks for the “extended-life” (L2) lures. Do not cross contaminate lures for different moths by handling different pheromone lures the same day.

3. Monitor traps until late September. Ifafter 2 years you don’t catch a certain species, you can conclude that you probably don’t have it at your site. Figure 10 shows the typical flight activity for the season for CM, OFM, and AM. Lesser appleworm usually follows the CM flight.

4. Remove wormy apples that drop, so they don’t add to the next generation of adults.

5. Spray insecticide 7-10 days after first adult catch. If trap counts exceed 5/week for CM or 10/week for OFM, continue insecticide applications on 14-day intervals.

6. Knowing what pests to target during the late spring and summer will help to determine the best insecticide choice—some insecticides are effective for all these pests, some better than others for specific pests. Review Choosing Sprays or the
**IPM Steps for Beginners, continued**

*Cornell Tree Fruit Guidelines* to determine the best insecticide choice for each and find the best one that is effective for all “worm” pests you have noted in your orchard. These pests are not problems in all orchards.

**Apple maggot:**

1. Monitor adult flies with red sticky ball traps baited with ammonium scent on the edge of an orchard facing wild hawthorn or wild (unsprayed) apples.
2. Figure 11 shows the apple maggot fly is about ¼ inch long, with a dark F shape on the wings. There are other flies with different patterns on the wings, so look closely for that F shape. The females have 4 white bands on their black abdomen, males have 3 bands on their abdomen.
3. Hanging 3-4 red sticky maggot traps per tree, baited with ripe fruit scent can “trap out” enough flies to eliminate spraying AM in small plantings. In large plantings, they’re used to monitor adults to time sprays.
4. Catching Apple Maggot flies (5/baited trap) on sticky traps (red ball coated with Tanglefoot) indicates that a spray is needed in a week. If traps have Tanglefoot, without bait, 1 fly per trap indicates a spray is needed.

**Overlapping Flights of CM, OFM, and AM**

![Graph showing overlapping flights of CM, OFM, and AM.](image)

*Figure 10. This graph shows weekly adult trap counts throughout the season for CM, OFM, and AM. Under high insect pressure, it may be necessary to spray every 2 weeks through August to prevent wormy apples.*
### Table 1: Schedule for actions to prevent wormy fruit

<table>
<thead>
<tr>
<th>Trap and pest</th>
<th>Set up trap</th>
<th>Spray if …</th>
<th>More Precision</th>
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</thead>
<tbody>
<tr>
<td>OFM</td>
<td>Tight cluster through September</td>
<td>Petal Fall or Find 1 worm in 300 fruit or &gt; 10 moths/week summer through September</td>
<td>If &gt; 30 OFM/week in spring, apply insecticide at petal fall, that will also control plum curculio and European apple sawfly. Then if &gt;10 moths per trap/week, treat within 7 days on a 2 week interval.</td>
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<tr>
<td>CM</td>
<td>First bloom through September</td>
<td>Find 1 worm in 300 fruit Or 7-10 days after &gt; 5 CM moths/week</td>
<td>Spray 200-250 DD50F after first moth and spray again in 2 weeks. If traps continue to exceed 5 per week, continue spraying on 2 week interval. Watch for late 2nd peak in June, if counts remain high, treat a third time. Then wait until the next flight starts in late July, treat 200-250 DD50F after the start of second flight and repeat after 10-14 days.</td>
</tr>
<tr>
<td>AM</td>
<td>Mid-June through August Maintain fresh thin coat of Tanglefoot on surface of trap. Remove trapped insects weekly.</td>
<td>Catch 5 adults on baited trap, then treat. If no bait on trap, treat within 7-10 days after 1 fly caught, then on 10-14 day schedule to protect through August.</td>
<td>After the insecticide residue is depleted 7-14 days after the application (depending on insecticide) or after 1 inch of rainfall, start to monitor traps again and treat after reaching threshold, 5 flies per trap with lure or 1 fly per trap without lure.</td>
</tr>
</tbody>
</table>

### Ready for More Precision?

If your orchard has more than 5-10 acres of apples, with high trap numbers for CM or OFM (more than 20 per week), install mating disruption pheromones and use degree day model in Table 1 to schedule insecticides.

**Fact Sheets for More Information:**
- Oriental Fruit Moth: [nysipm.cornell.edu/factsheets/treefruit/pests/ofm/ofm.pdf](nysipm.cornell.edu/factsheets/treefruit/pests/ofm/ofm.pdf)
- Codling Moth: [nysipm.cornell.edu/factsheets/treefruit/pests/cm/cm.pdf](nysipm.cornell.edu/factsheets/treefruit/pests/cm/cm.pdf)
- Apple Maggot: [nysipm.cornell.edu/factsheets/treefruit/pests/am/am.pdf](nysipm.cornell.edu/factsheets/treefruit/pests/am/am.pdf)
- Obliquebanded Leafroller: [nysipm.cornell.edu/factsheets/treefruit/pests/oblr/oblr.pdf](nysipm.cornell.edu/factsheets/treefruit/pests/oblr/oblr.pdf)