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Update on Pest Management and Crop Development

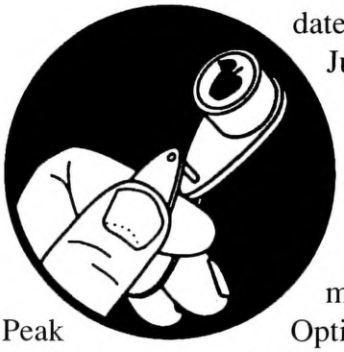
FRUIT JOURNAL

July 7, 2003 VOLUME 12, No. 17 Geneva, NY

INSECTS

HOT ITEMS

ORCHARD RADAR DIGEST



Geneva Predictions:

Roundheaded Appletree Borer

RAB egglaying begins: June 15. Peak egglaying period roughly: July 3 to July 17.
Egg hatch begins: June 30. Peak hatch roughly July 18 to August 6.

Dogwood borer

1st dogwood borer egg hatch roughly July 5. Peak egg hatch roughly August 8.

Codling Moth

Codling moth development as of July 3: 1st generation adult emergence at 96% and 1st generation egg hatch at 70%.
The rain-adjusted second spray date if using Imidan, Avaunt, or azinphosmethyl to control 2nd generation CM is around August 6.
2nd generation 30% CM egg hatch: August 16 (= single spray date where one spray needed to control 2nd generation codling moth).

Lesser Appleworm

2nd LAW flight begins around: July 14.

Obliquebanded Leafroller

1st generation OBLR flight, first trap catch: June 17.
If using BT insecticide, optimum date to begin 2 to 4 weekly low-rate applications for small OBLR larvae is roughly: July 2.
Optimum first sample date for summer generation OBLR larvae: July 10.
If 1st OBLR larvae sample is below threshold, date for confirmation follow-up sample: July 14

Oriental Fruit Moth

2nd generation OFM flight begins around: July 6.
Optimum 2nd generation - first treatment date, if needed: July 12.
Optimum 2nd generation - second treatment date, if needed: July 23.

Redbanded Leafroller

2nd RBLR flight begins: July 7.
Peak catch and approximate start of egg hatch: July 19.

Spotted Tentiform Leafminer

Rough guess of when 2nd generation sap-feeding mines begin showing: July 10.
Optimum first sample date for 2nd generation STLM sapfeeding mines: July 17.

continued...

IN THIS ISSUE...

Highland Predictions:

Roundheaded Appletree Borer

RAB egglaying begins: June 14. Peak egglaying period roughly: July 2 to July 14.

Codling Moth

Codling moth development as of June 28: 1st generation adult emergence at 98% and 1st generation egg hatch at 77%.

The rain-adjusted second spray date if using Imidan, Avaunt, or azinphosmethyl to control 2nd generation CM is around August 2.

2nd generation 30% CM egg hatch: August 11 (= single spray date where one spray needed to control 1st generation codling moth).

Lesser Appleworm

2nd LAW flight begins around: July 12.

Obliquebanded Leafroller

1st generation OBLR flight, first trap catch: June 16.

If using BT insecticide, optimum date to begin 2 to 4 weekly low-rate applications for small OBLR larvae is roughly: July 1.

Optimum first sample date for summer generation OBLR larvae: July 8.

If 1st OBLR larvae sample is below threshold, date for confirmation follow-up sample: July 11.

Oriental Fruit Moth

2nd generation OFM flight begins around: July 4.

Optimum 2nd generation - first treatment date, if needed: July 6.

Optimum 2nd generation - second treatment date, if needed: July 17.

Redbanded Leafroller

2nd RBLR flight begins: July 6.

Peak catch and approximate start of egg hatch: July 16.

Spotted Tentiform Leafminer

Rough guess of when 2nd generation sap-feeding mines begin showing: July 8.

Optimum first sample date for 2nd generation STLM sapfeeding mines: July 14.

INFER TROUBLE

MODEL BUILDING

❖❖ **Oriental Fruit Moth.** We are still between the 1st and 2nd brood flights of OFM; the 2nd flight should have already started within the past day or two (see Orchard Digest in this issue), but so far the trap catches around the state have not picked up much evidence that this is occurring, with the exception of the Geneva site, where we started getting higher numbers on 7/3 (see Pest Focus in this issue). As noted last week, this delay is a region-wide trend caused by unknown factors, but probably has to do with our highly unusual spring weather. We are still advising that sprays be withheld until approximately 175–200 DD after the first moths of the 2nd flight start being caught, which should coincide with the 10% hatch period. [Note that the provisional model calls for applications at 1150

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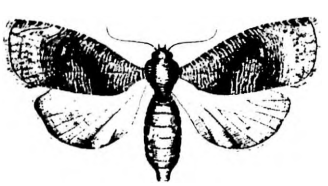
(peaches) and 1450 (apples) DD (base 45°F) from biofix.] Our numbers as of Monday, July 7 are:

SITE	BIOFIX	CUM DD-45
Highland	4/21	1374
Geneva	5/1	1118
Lyndonville	5/4	1119
N. Appleton	5/6	999
Williamson	5/8	1011

Codling Moth. Most sites in western NY should be at or just past the general window for a second application of a suitable material for the 1st brood of CM. We have found this to be a very sporadically distributed pest in NY, with some sites catching essentially no moths, and others (e.g., some in Wayne Co.) exhibiting a brief but impressive secondary flight peak (what the western states refer to as the "B peak") last week.

Obliquebanded Leafroller. Most sites would have reached the predicted 1st hatch of the summer OBLR brood last week (about 350 DD base 43°F after the first moth catch), so this would have been an advised spray timing for growers on a Bt program. As of yesterday, July 7, Geneva's total was 479, North Appleton 578, and Highland was 603, so this general range coincides with the 25–50% hatch period of OBLR. Growers using a Spintor program would be on schedule with an application this week, and plans for a follow-up spray 10–14 days later. ❖❖



HIDDEN AGENDA

SAWDUST MAKERS (Art Agnello, Entomology, Geneva)

❖❖ Apple-boring beetles are some of the most difficult fruit insects to control, owing to their concealment during the majority of their developmental period. The following information is taken from IPM Fact Sheet No. I-26, Apple-Boring Beetles:

Although the number of wood-boring beetles attacking fruit trees is relatively small and their infestations sporadic, four species found in N.Y. are capable of seriously damaging or killing trees when they do occur. There are some differences among them in biology and life history, but they are addressed here as a group because of similarities in their general activities as a pest class. Taken in order of importance and pest frequency, they are the roundheaded appletree borer, *Saperda candida*, flatheaded appletree borer, *Chrysobothris femorata*, broad necked root borer, *Prionus laticollis*, and tilehorned prionus, *Prionus imbricornis*. With the exception of the flatheaded appletree borer, which is a buprestid (metallic wood-boring beetle), they belong to the cerambycid (long-horned beetle) family, and the last two are closely related species in the group known as Prionus root borers. All are native to and widely distributed throughout the U.S. and southern Canada. They all damage deciduous fruit and shade trees by tunneling as larvae into the conducting tissue of the lower trunk, crown and roots, and compound the injury by providing an entryway for destructive fungi. There is a broad host plant range for each of these pests; plants attacked by all four species include apple, cherry, peach, and plum, with the roundheaded and flatheaded borers also occurring in quince, pear, flowering crabapple, mountain ash, shadbush, cotoneaster and hawthorn. The flatheaded borer and one or both of the two Prionus species are also serious pests of numerous other trees, including

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pecan, hickory, poplar, willow, chestnut, oak, maple, dogwood, linden, and several shrubs.

Adults

The adult roundheaded appletree borer is an attractive (to some) beetle about 5/8-1 inch long, olive brown with two longitudinal white stripes running the length of the body, gray antennae, which are stout, many-segmented, and approximately body length; its legs are also gray, the underside of the insect is silvery white, and its entire body is covered with fine hairs that give it a neat appearance. This species requires 2-3 years to complete its development, depending on location; most (perhaps two-thirds) occurring in N.Y. probably require 3 years. Beetles emerge mostly at night through round, pencil-size holes from the bases of infested trees over a period of 2-3 weeks, usually during mid-June in N.Y., although they have been noted in the trees as much as a month earlier. After emerging, the adult feeds on the leaves, twigs and fruit of host plants. Mating occurs about one week after emergence, and the female lives approximately 40 days, normally hiding by day and secretively laying eggs, usually in young healthy trees. The female makes a longitudinal cut in the bark with her mandibles near the base of the tree, inserting a single egg between the bark and xylem, and cementing it in place with a gummy secretion.

The flatheaded appletree borer adult is a short-horned beetle measuring approximately 5/8 inch in length. It is flattened above and vaguely resembles the elaterid (click) beetles, but has no similar jumping structures. This beetle has short antennae, large conspicuous eyes, and the forelegs possess a noticeable tooth. The upper surface of the body is dark metallic brown, with slightly patterned wing covers, and underneath (as seen in flight) the body is a bright metallic blue. The undersurface of the adult is coppery bronze. This species is diurnal in habit, at its most active in the heat of the day, and is often seen basking in the sun on fallen trees or logs. The flatheaded appletree borer is a very active insect that runs rapidly and flies readily when disturbed. Beetles appear after mid-May in N.Y., feeding at the bases of twigs on partially defoliated young trees, and lay eggs in crevices or under bark scales through the summer months. Development of this insect takes one year.

The two species of Prionus borers are similar in appearance and biology. The adults are robust, broad, somewhat flattened and blackish to reddish-brown beetles, with antennae roughly half the length of their body. Adults of the broad necked root borer are as much as 1 3/4 inch long with 12 antennal segments, and those of the tilehorned prionus nearly 1 1/2 inch long with 16-20 antennal segments. They emerge from the soil in early to midsummer, probably mostly in July in N.Y., remaining hidden beneath loose bark or debris at the base of the tree, except during dusk and at night. The females live for only 1-2 weeks, but are capable of producing hundreds of eggs during that time, mostly in the soil near the base of host trees. Beetles fly at night, and may be attracted to lights; female broad necked root borers have not been observed to fly.

Larvae

The roundheaded appletree borer larva, a fleshy, cream-colored, legless grub, is about 1/8 inch long upon hatching and 1 inch when fully grown; it actually reaches nearly twice this length during its development, but a considerable shortening occurs just prior to pupation. It has a dark brown head and blackish mandibles. The first thoracic segment is broader than the rest of the body, with a patch of brownish tubercles on the dorsal (top) surface. The body segments are separated by deep constrictions, and most have large oval spiracles on either side. This species passes through six instars during the course of its larval development, moving upward or downward in the trunk depending on the year and stage of growth, feeding on the inner bark (or cambium) layer, and widening its tunnels as it feeds. Some of the frass produced fills the tunnels, and some is pushed through openings to the outside, where it accumulates in small piles and has the appearance of sawdust at the base of the tree. By the

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end of its third season of feeding, the larva has bored several inches straight up in the trunk and constructed a pupal chamber just beneath the bark surface, within which it passes its final winter.

The larva of the flatheaded appletree borer shows a characteristic enlargement of the thoracic segments (just behind the head), particularly the second segment, which gives this insect its common name. This grub is light yellow, and when full grown is nearly twice the length of the adult. It is commonly found curved like a horseshoe, sluggish and inactive except in very warm weather. Upon hatching, the borer usually enters the bark directly and, if the wood is in favorable condition (that is, weakened, diseased or dying), burrows at once into the inner bark, where it feeds on the sapwood and develops rapidly. However, if the tree is vigorous with a heavy sap flow, the borer is often unable to thrive in the growing tissue and either dies or survives rather poorly for an extended period. The flatheaded appletree borer lives for the most part just beneath the bark, where it excavates broad, flat, and irregular channels filled with powderlike frass, until late in the summer as it approaches maturity, when it abruptly burrows more deeply into the solid heartwood and constructs a pupal chamber.

Larvae of the Prionus root borers are among the largest of insects that attack apple trees. These large grubs are fleshy, elongate, and creamy white to yellowish, with three pairs of small legs and small heads armed with strong black mandibles. Mature larvae reach lengths of 3 1/2 inches or more and weigh up to 1/2 oz. After hatching out, the young borers dig down to the roots and begin feeding on the bark. They move through the soil from one root to another, feeding on the surfaces of small roots and eventually enter the wood of larger roots, which they hollow, girdle or sever. In the summer, the larvae feed on the roots in the upper 6-18 inches of the soil, but in winter are often located at nearly twice these depths. The feeding and development period last 3-5 years for the tilehorned prionus and 3-4 years for the broad necked root borer. In early spring, mature larvae rise to within 3-6 inches of the surface to pupate.

Damage

The roundheaded appletree borer is considered to be the species of boring beetle most destructive to fruit trees in N.Y.. Toward the end of the 1800's it was deemed second in importance only to the codling moth as an apple pest, and there was some speculation that it might cause the demise of N.Y.'s apple industry. However, because of the adult's susceptibility to pesticides applied against other pests in most commercial orchards, it is found today mainly in abandoned, wild or unsprayed plantings. Trees of all sizes are attacked, but those from 3-10 years old suffer the most. Frequently, several larvae may be found in a single tree, which is enough to completely girdle a young tree. Infested trees have a sickly appearance, producing sparse, pale-colored foliage. Continued yearly attacks can kill the tree or weaken so that it is broken off by the wind. Young trees that have been girdled will often bloom profusely and set a heavy crop of fruit, and then die in the process of bringing it to maturity.

Unlike the roundheaded appletree borer, the flatheaded borer preferentially attacks diseased or dying trees, inhabiting all parts of the tree from the base of the trunk to the limbs; its injuries are practically confined to newly transplanted nursery stock and to trees that have been weakened from causes such as inappropriate pruning, drought, or inadequate soil or nutrient conditions. Trees suffering from sun scald are regarded as being particularly subject to attack. Points of larval activity are difficult to locate, as scarcely any castings are thrown out, although white, frothy sap may be seen oozing from cracks in the bark. Injured spots can usually be detected by the darker color and slight depression of the bark, which may split over time; these sites may be enlarged year after year by succeeding generations that attack the borders of the wound in the dead wood around the injury. Like many borers, the flatheaded appletree borer will often girdle a small tree, with a single larva sometimes capable of killing the tree.

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The broad necked root borer and tilehorned prionus are exclusively root feeders; the only aboveground symptoms of infestation are a gradual thinning and yellowing of foliage and limb-by-limb mortality. Young trees are sometimes chewed off just below the surface and their root systems devoured. Established trees may have one or two roots left near the surface that keep them alive until blown over by the wind. Whole-tree excavation is usually the only method of verifying their presence, and often reveals root and crown areas with extensive honeycombing. Some of the galleries in large roots are filled with wood chips and frass, which eventually turns dark from the action of decay organisms. It is not unusual to find several to 20 or more borers in one tree.

Management

No single management method has been proven fully effective, and the most successful efforts involve a combination of preventive and remedial techniques.

• Cultural Practices: New trees should not be started in areas in proximity to the borers' wild host plants, especially flowering crabs, thorns, hawthorns or *Amelanchier* spp; destruction of any such plants within 300 yards of the orchard will greatly improve this tactic. Keeping the base of the trees free from rank growth of weeds, grasses, briars and shrubs not only makes it easier to detect and remove borers, but also exposes them to natural enemies such as golden and downy woodpeckers, ants, and a (small) number of parasitic wasps and flies. Heavily infested trees that are beyond recovery should be removed and burned before the following spring to prevent developing borers inside from completing their life cycle. Keeping trees in a healthy, vigorous condition is one of the best preventive measures against attack by flatheaded appletree borer, especially for newly transplanted trees. This is also a (somewhat less effective) measure for Prionus root borer infestations; disease, drought, mechanical injury, and poor soil conditions increase tree susceptibility.

• Foliar and Trunk Sprays: The adult population of the roundheaded and flatheaded appletree borers can be reduced by application of the pesticides commonly used to control plum curculio and codling moth in N.Y., particularly those applied at the beginning and end of June. Sprays of broad-spectrum insecticides against Prionus borer adults are only partially effective. However, with the supplemental label for the use of Lorsban 4E in directed trunk applications against apple-boring beetles, homeowners and commercial growers alike have a relatively effective option available for managing the most damaging life stages of these insects. Moreover, the middle two weeks of July would be an optimal window for this spray application.

• Oviposition Barriers: In early May, protective coverings of various materials can be wrapped around the bottom 12-24" of trunks (higher, up to the level of the branches, for flatheaded appletree borer) to exclude the female beetles from their preferred oviposition sites. Mosquito netting, fine mesh hardware cloth, tree wrap, tarpaper, cotton batting, or even layers of newspaper should be wrapped loosely around the trunk, tied at the top with twine and covered at the bottom with soil. Barriers should be removed in September, after all egg-laying activity is finished. An alternative method is to paint the lower surface of the trunk using white latex paint; this approach tends to work better on the smooth trunk surfaces of younger trees, and should be repeated each year, as the paint layer tends to crack with normal tree growth.

• Surface Deterrents: Additional protection from ovipositing females is gained by applying a deterrent wash on uninfested trunk surfaces using a paintbrush; an alkaline mixture of insecticidal soap plus caustic potash (lye) mixed to the consistency of thick paint is recommended. This should be applied every 2-4 weeks, depending on rainfall, from late May through July to deter egg-laying of the roundheaded appletree borer.

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• Trap Logs: A large number of flatheaded appletree borer adults can be trapped out by placing posts or felled logs of almost any kind in the orchard, either pounded in upright or simply lying on the ground and exposed to the sun. These can be coated with tanglefoot to catch the beetles, or else left uncoated until the egg-laying period is past, and then removed to another site and burned.

• Worming: Destruction of the roundheaded appletree borer by hand is more labor-intensive, but this can be the most effective measure, depending on the magnitude of the infestation. During bloom and again in September, inspect the bark surface for small pinholes with sawdust exuding from them, checking the lower 24" of the trunk to just below the soil surface. Using a sturdy knife, cut through the bark at any such points until the burrow is reached; use caution not to further damage the tree. Insert a stiff wire that is slightly hooked at the end, to reach and impale the borer if possible. Soil insecticides and fumigants have shown some promise against larvae of the Prionus borers, but none that are commercially available are fully effective. Coarse trunk sprays of Lorsban applied for control of other borers will provide some efficacy against these species as well.❖❖

PEST FOCUS

Geneva:
Oriental fruit moth and **redbanded leafroller** 2nd flights began 7/3. 1st **peachtree borer** trap catch 7/3. 1st **dogwood borer** moths caught in Geneva and N. Huron 7/7. **Spotted tentiform leafminer** 2nd flight began 6/23. The first sample of sap-feeding mines should be taken at 690 degree days (base 43°F) following this event. DD43°F since then = 414. **Obliquebanded leafroller** flight began 6/17. Sampling should take place at approx. 600 degree days (base 43°F) following this event. DD43°F since then = 528.

Highland:
1st **apple maggot** caught on red sphere traps. **Green apple aphid** and **potato leafhopper** nymphs increasing. **Spotted tentiform leafminer** 2nd flight began 6/16. Degree days (base 43°F) since then = 603. **Obliquebanded leafroller** flight began 6/10 in Milton. Degree days (base 43°F) since then = 757.

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	6/30	7/3	7/7
Redbanded leafroller	0.0	0.5*	1.5
Spotted tentiform leafminer	274	455	375
Oriental fruit moth	1.1	4.7*	5.4
Lesser appleworm	0.4	0.2	0.0
San Jose scale	0.3	0.3	0.0
Codling moth	0.8	0.8	0.9
Obliquebanded leafroller	0.3	0.3	0.6
Pandemis leafroller	0.0	0.0	0.1
American plum borer	0.4	0.0	0.3
Lesser peachtree borer	0.5	1.3	0.8
Peachtree borer	0.0	0.2*	0.0
Dogwood borer (N. Huron)	0.0	0.0	0.1*
Apple maggot	–	–	0.0

Highland, NY

	6/30	7/7
Redbanded leafroller	0.1	1.1
Spotted tentiform leafminer	205	198
Oriental fruit moth	1.1	1.0
Lesser appleworm	2.4	1.6
Codling moth	6.5	1.0
Obliquebanded leafroller	5.4	6.0
Apple maggot	0.1*	0.0
Fruittree leafroller	1.4*	0.8
Sarganothis fruitworm	1.6*	1.3
Tufted apple budmoth	1.1*	0.9
Variegated leafroller	1.1*	1.7
Dogwood borer	0.0	0.4

* first catch

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UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–7/7):	1424	864
(Geneva 1/1-7/7/2002):	1595	1037
(Geneva "Normal"):	1547	1028
(Geneva 7/14 Predicted):	1630	1020
(Highland 7/7):	1751	1132

Coming Events:	**Ranges:**	
Apple maggot 1st catch	1045–2057	629–1297
Pear psylla 2nd brood hatching	992–1200	609–763
Comstock mealybug 1st adult catch	1270–1673	756–1105
Obliquebanded leafroller summer larvae hatch	1076–1513	630–980
American plum borer 2nd flight begins	906–1897	967–1337
Codling moth 1st flight subsides	1112–2124	673–1412
Lesser appleworm 2nd flight begins	1152–2302	778–1531
Pandemis leafroller flight subsides	1372–1665	878–1076
Spotted tentiform leafminer 2nd flight peak	1219–2005	701–1355

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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