

NATURAL BORN KILLERS

LOCAL WORK- FORCE

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❖❖ There are many insects present in apple orchards that provide a benefit to growers by feeding on pest species. It is important that growers and orchard managers be able to recognize these natural enemies, so that they are not mistaken for pests. The best way to conserve beneficial insects is to spray only when necessary, and to use materials that are less toxic to them (see Tables 6.1.2 & 7.1.2, pp. 58 and 67 of the Recommends). This brief review, taken from IPM Tree-Fruit Fact Sheet No. 18 (available online at:

<http://hdl.handle.net/1813/43074>), covers the major beneficial insects that are likely to be seen in N.Y. orchards, concentrating on the most commonly seen life stages. Factsheet No. 23, "Predatory Mites" (online:

<http://hdl.handle.net/1813/43122>), reviews mites that are important predators of leaf-feeding mites. Photos and biological information on these and other beneficial species can also be found using the online (hosted by MSU) search engine version of the "Tree Fruit Field Guide to Insect, Mite, and Disease Pests and Natural Enemies of Eastern North America": <http://www.ipm.msu.edu/search>. A hard copy of the Tree Fruit Field Guide (formerly NRAES-169) can be purchased from PALS Publishing in Ithaca; a link to their site can be found at: http://pals-publishing.cals.cornell.edu/nra_order.taf?function=detail&pr_id=158

CECIDOMYIID LARVAE (*Aphidoletes aphidimyza*)

These gall midge flies (Family Cecidomyiidae) are aphid predators, and overwinter as larvae or pupae in a cocoon. Adults emerge from this cocoon, mate, and females lay eggs among aphid colonies. The adults are delicate, resembling mosquitoes, and are not likely to be seen. The eggs are very small (about 0.3 mm [1/85 in] long) and orange. They hatch into small, brightly colored, orange larvae that can be found eating aphids on the leaf surface (**Fig. 1**). These predacious larvae are



Fig. 1. Cecidomyiid larvae attacking aphids.

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present from mid-June throughout the summer. There are 3–6 generations per year. In addition to aphids, they also feed on soft-bodied scales and mealybugs.

SYRPHID FLY LARVAE (Family Syrphidae)

The Family Syrphidae contains the "hover flies", so named because of the adults' flying behavior. They are brightly colored with yellow and black stripes, resembling bees. Syrphids overwinter as pupae in the soil. In the spring, the adults emerge, mate, and lay single, long whitish eggs on foliage or bark, from early spring through midsummer, usually among aphid colonies. One female lays several eggs. After hatching, the larvae feed on aphids by piercing their bodies and sucking the fluids (**Fig. 2**), leaving shriveled,



Fig. 2. Syrphid larva feeding on an aphid.

blackened aphid cadavers. These predacious larvae are shaped cylindrically and taper toward the head. There are 5–7 generations per year. Syrphid larvae feed on aphids, and may also feed on scales and caterpillars.

LADYBIRD BEETLES (Family Coccinellidae)

- *Stethorus punctum*: This ladybird beetle is an important predator of European red mite in parts of the northeast, particularly in Pennsylvania, and has been observed intermittently in the Hudson Valley of N.Y., and occasionally in western N.Y. *Stethorus* overwinters as an adult in the "litter" and ground cover under trees, or in nearby protected places. The adults are rounded, oval, uniformly shiny black, and are about 1.3–1.5

mm (1/16 in) long. Eggs are laid mostly on the undersides of the leaves, near the primary veins, at a density of 1–10 per leaf. They are small and pale white, and about 0.3–0.4 mm (1/85 in) long. Eggs turn black just prior to hatching. The larva is gray to blackish with numerous hairs, but becomes reddish as it matures, starting on the edges and completing the change just prior to pupation. There are 3 generations per year in south-central Pennsylvania, with peak periods of larval activity in mid-May, mid-June and mid-August. The pupa is uniformly black, small and flattened, and is attached to the leaf.

- Other Ladybird Beetles: Ladybird beetles are very efficient predators of aphids, scales and mites. Adults are generally hemisphere-shaped, and brightly colored or black, ranging in size from 0.8 to over 8 mm (0.03–0.3 in). They overwinter in sheltered places and become active in the spring. Eggs are laid on the undersides of leaves, usually near aphid colonies, and are typically yellow, spindle-shaped, and stand on end. Females may lay hundreds of eggs. The larvae have well-developed legs and resemble miniature alligators, and are brightly colored, usually black with yellow.

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scaffolds

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The pupal case can often be seen attached to a leaf or branch. There are usually 1–2 generations per year. One notable species that is evident now is *Coccinella septempunctata*, the seven-spotted lady beetle, often referred to as C-7. This insect, which is large and reddish-orange with seven distinct black spots, was intentionally released into N.Y. state beginning in 1977, and has become established as an efficient predator in most parts of the state.

LACEWINGS (Family Chrysopidae)

Adult lacewings are green or brown insects with net-like, delicate wings, long antennae, and prominent eyes. The larvae are narrowly oval with two sickle-shaped mouthparts, which are used to pierce the prey and extract fluids (**Fig. 3**).



Fig. 3. Lacewing larva feeding on a caterpillar.

Often the larvae are covered with "trash", which is actually the bodies of their prey and other debris. Lacewings overwinter as larvae in cocoons, inside bark cracks or in leaves on the ground. In the spring, adults become active and lay eggs on the trunks and branches. These whitish eggs are laid singly and can be seen connected to the leaf by a long, threadlike "stalk". Lacewings feed on aphids, leafhoppers, scales, mites, and eggs of Lepidoptera (butterflies and moths).

TRUE BUGS (Order Hemiptera)

There are many species of "true bugs" (Order Hemiptera) such as tarnished plant bug and mullin plant bug, that feed on plants, but a number of them are also predators of pest species. The ones

most likely to be seen are "assassin bugs" or reduviids (Family Reduviidae), and "damsel bugs" or nabids (Family Nabidae). These types of predators typically have front legs that are efficient at grasping and holding their prey.

PARASITOIDS

Parasitoids are insects that feed on or in the tissue of other insects, consuming all or most of their host and eventually killing it. They are typically small wasps (Order Hymenoptera; e.g., families Ichneumonidae, Braconidae, Chalcididae), or flies (Order Diptera; e.g., family Tachinidae). Although the adult flies or wasps may be seen occasionally in an orchard, it is much more common to observe the eggs, larvae, or pupae in or on the parasitized pest insect. Eggs may be laid directly on a host such as the obliquebanded leafroller, or near the host, such as in the mine of a spotted tentiform leafminer. After the parasitoid consumes the pest, it is not unusual to find the parasitized larvae or eggs of a moth host, or aphids that have been parasitized ("mummies"). Exit holes can be seen where the parasitoid adult has emerged from the aphid mummy.

GENERALIST PREDATORS

There is a diversity of other beneficial species to be found in apple orchards, most of which are rarely noticed, but whose feeding habits make them valuable additions to any crop system. The use of more selective pesticides helps to maintain their numbers and contributes to the level of natural control attainable in commercial fruit plantings. Among these beneficials are:

- Spiders (Order Araneida): All spiders are predaceous and feed mainly on insects. The prey is usually killed by the poison injected into it by the spider's bite. Different spiders capture their prey in different ways; crab spiders (Thomisidae and Philodromidae) and jumping spiders (Salticidae) forage for and pounce on their prey — the crab spiders lie in wait for their prey on flowers — and web-building spiders (e.g., Araneidae, Theridiidae, and Dictynidae) capture their prey in nets or webs.

- **Ants (Family Formicidae):** The feeding habits of ants are rather varied. Some are carnivorous, feeding on other animals or insects (living or dead), some feed on plants, some on fungi, and many feed on sap, nectar, honeydew, and similar substances. Research done in Washington has shown certain species (*Formica* spp.) of ants to be effective predators of pear psylla.

- **Earwigs (Family Forficulidae):** Although these insects may sometimes attack fruit and vegetable crops, those found in apple orchards are probably more likely to be scavengers that feed on a variety of small insects.

SPOTTED WING DROSOPHILA UPDATE IN TART CHERRIES

(Julie Carroll, NYS IPM Program, Geneva; jec3@cornell.edu)

❖❖ Three of the seven sites had SWD in traps last week. All three of these sites are near Lake Ontario. Inland sites have yet to catch SWD. All sites we're monitoring have two traps in the block, one on the edge of the block (out trap) and one in the interior of the block (in trap). Here are the numbers for each of the three sites:

In trap: 1 male; Out trap: 1 female

In trap: 1 female; Out trap: zero SWD

In trap: 4 females; Out trap: 2 females

The majority caught were female SWD, which is a somewhat typical pattern wherein females show up in traps first.

Management of SWD in Michigan tart cherries relies on traps to determine when SWD is in the orchard. Once it is found, it is time to initiate a spray program to protect fruit, if you haven't already. For best results, sprays should be applied at 7 day intervals. If it rains, apply an insecticide as soon as possible after the rain. The insecticide quick guide for tree fruit can be found on the Spotted Wing Drosophila Management page: <http://fruit.cornell.edu/spottedwing/management/>.

A recap of efficacy (days-to-harvest):

Excellent – Exirel (3 days), Minecto Pro (21 days), Danitol (3 days), Mustang Max (14 days), Imidan (7 days)

Good to Excellent – Entrust 80WP 2ee (7 days), Entrust 2SC 2ee (7 days), Asana XL 2ee (14 days), Lambda-Cy EC 2ee (14 days)

Moderate – Delegate WG (7 days)

Fair to Poor – Grandevo (zero days) This biological may prove useful in close rotation (3 days) with excellent materials, such as Entrust to bring you up to harvest. This is how it is being used in commercial blueberry production in NJ.

Other tactics: Mowing row middles every other week was found to significantly reduce SWD infestation over no mowing in Michigan. Trees were unsprayed and 3 gallons of fruit sampled at harvest for SWD larvae showed, on average, 100 larvae in unmowed orchard setting versus 25 in the mowed orchard; a 75% reduction.

Test fruit pressure? In plums, if fruit was greater than 3.5 lbs pressure it wasn't susceptible. If less than 3.5 lbs pressure, it was susceptible to SWD. I'm not sure if it's feasible to test pressure on tart cherry fruit.

Harvest dates are still one to three weeks out, so plan accordingly. We will continue trapping through harvest. ❖❖

BMSB MANAGEMENT SURVEY FOR COMMERCIAL PRODUCERS

A nation-wide survey is currently under way to gather information from farmers and growers on the economic impact of the brown marmorated stink bug (BMSB) on agriculture. The objective of the survey is to better provide you with the help you need in managing this pest. We'd like to find out when BMSB became a problem for you, where you currently get information on how to control them, how much damage you have suffered, your use of and interest in various management practices, and your feelings about biological control methods and their potential for you

operation. The results of the survey will be used by Extension programs across the United States to fine tune management advice for the BMSB and help prioritize research and outreach activities.

If you'd like to participate, the survey should take you about 20-25 minutes to complete. Your individual survey responses will be confidential and the data collected will only be reported in summaries. Your participation is voluntary and you can decide not to answer a given question if you choose.

The link to the on-line survey along with more information about the survey can be found on the StopBMSB.org website (<http://stopbmsb.org/go/BfxA>). If you have any questions about the Brown Marmorated Stink Bug Management Survey for Commercial Producers, please contact Jayson Harper by e-mail at jkh4@psu.edu or call 814-863-8638. ❖❖

NUT PRODUCTION SURVEY

Farmers of NYS, do you think growing tree nuts (chestnuts, hazelnuts, walnuts, etc.) is a nutty idea, or worth considering? Please take a few minutes to fill out this [brief survey](#) for a Cornell PhD project. Thanks!

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MODEL BUILDING

Insect model predictions for Highland[H]/Geneva[G]

[Source: NEWA Apple Insect Models, <http://newa.cornell.edu/index.php?page=apple-insects>]

Obliquebanded Leafroller 3rd instar larvae occurrence @ 720 DD43; 90% egg hatch @ 810 DD43 (currently @ 871 [G] / 960 [H] / 678 [Wmson] / 690 [Sodus] / 720 [Wolcott]).

ORCHARD RADAR DIGEST

[H = Highland; G = Geneva]:

Roundheaded Appletree Borer

Peak RAB egg laying period roughly: June 26-July 9 (G).

Peak RAB egg hatch roughly: July 4-22 (H) / July 11-29.

Codling Moth

Codling moth development as of July 9:

2nd generation adult emergence at 6% (H)/99% (G) and 1st generation egg hatch at 100% (H)/82% (G).

Lesser Appleworm

2nd LAW flight begins around: July 13 (G).

Oriental Fruit Moth

second treatment date, if needed, July 9 (H) / July 19 (G).

Redbanded Leafroller

2nd gen RBLR peak catch and approximate start of egg hatch: July 13 (G).

PEST FOCUS

Highland: San Jose scale 2nd generation adults, first catch today, 7/9.

UPCOMING PEST EVENTS

	43°E	50°E
Current DD* accumulations (Geneva 1/1–7/9):	1636.0	1102.9
(Geneva 1/1–7/9/2017):	1617.4	1010.1
(Geneva "Normal"):	1665.6	1077.7
(Geneva 1/1-7/16, predicted):	1844.5	1262.4
(Highland 1/1–7/9):	1956.7	1332.9

<u>Coming Events:</u>	<u>Ranges (Normal ±StDev):</u>	
Apple maggot 1st oviposition punctures	1605-2157	1144-1544
American plum borer 2nd flight start	1560-2140	1028-1434
Codling moth 2nd flight start	1583-2230	1032-1494
Comstock mealybug 1st flight subsides	1818-2132	1216-1418
Dogwood borer peak catch	1434-1864	898-1233
Lesser appleworm 2nd flight start	1429-2108	924-1405
Obliquebanded leafroller 1st flight subsides	1630-2048	1060-1377
Oriental fruit moth 2nd flight peak	1454-1951	927-1307
Peachtree borer flight peak	1028-2004	619-1355
Redbanded leafroller 2nd flight peak	1529-1975	979-1322
San Jose scale 2nd flight start	1629-1979	1058-1336
Spotted tentiform leafminer 2nd generation tissue feeding mines	1378-2035	913-1182

*all DDs Baskerville-Emin, B.E.

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

Highland, NY

	<u>7/2</u>	<u>7/6</u>	<u>7/9</u>		<u>6/25</u>	<u>7/2</u>	<u>7/9</u>
Redbanded leafroller	7.5	10.5	6.5	Redbanded leafroller	18.5	31.0	60.5
Spotted tentiform leafminer	62.5	55.5	23.5	Spotted tentiform leafminer	56.0	89.0	65.5
Oriental fruit moth	18.0	74.5	63.5	Lesser appleworm	0.5	0.5	0.0
Codling moth	5.0	9.5	4.0	Oriental fruit moth	5.0	0.0	1.5
Lesser peachtree borer	15.0	3.5	2.0	Codling moth	49.0	13.5	7.5
Obliquebanded Leafroller	0.5	2.5	1.0	San Jose scale	0.0	0.0	7.0*
Dogwood borer	9.0	0.0	0.0	Obliquebanded leafroller	53.0	17.0	17.0
Peachtree borer	6.0	10.5	8.5	Dogwood borer	0.0	0.5	1.0
Apple maggot	0.0	0.0	0.0	Tufted apple budmoth	23.0*	12.0	4.5
				Sparganothis fruitworm	7.0*	11.0	7.5
				Apple maggot	-	1.8*	4.3

* first catch

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.

The **Cornell Pest Management Guidelines for Commercial Tree Fruit Production** (aka 'The Recommends') is available from the Cornell Store, both in a printed book format as well as online; visit <https://ipmguidelines.org/> for purchasing details.

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