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Update on Pest Management and Crop Development

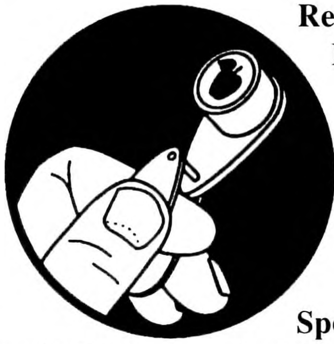
F R U I T J O U R N A L

May 12, 2003 VOLUME 12, No. 9 Geneva, NY

INSECTS

LOOKING AHEAD

ORCHARD RADAR DIGEST



Geneva Predictions:

Roundheaded Appletree Borer
RAB adult emergence begins: June 3; Peak emergence: June 16.
RAB egglaying begins: June 12. Peak egglaying period roughly: July 1 to July 15.

Codling Moth
Codling moth development as of May 12: 1st generation adult emergence at 0% and 1st generation egg hatch at 0%.

Lesser Appleworm
1st LAW flight, first trap catch expected: May 12; Peak trap catch: May 26.

Mullein Plant Bug
Expected 50% egg hatch date: May 20, which is 7 days before rough estimate of Red Delicious petal fall date.
The most accurate time for limb tapping counts, but possibly after MPB damage has occurred, is when 90% of eggs have hatched.
90% egg hatch date: May 28.

Obliquebanded Leafroller
1st generation OBLR flight, first trap catch expected: June 13.

Oriental Fruit Moth
Optimum 1st generation first treatment date, if needed: May 24.
Optimum second treatment date, if needed: June 5.

Redbanded Leafroller
Peak trap catch and approximate start of egg hatch: May 6.

San Jose Scale
First adult SJS caught on trap: May 21.

Spotted Tentiform Leafminer
1st STLM flight, peak trap catch: May 14
1st generation sapfeeding mines start showing: May 24.
Optimum sample date is around May 26, when a larger portion of the mines have become detectable.

White Apple Leafhopper
1st generation WAL found on apple foliage: May 18.

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IN THIS ISSUE...

INSIDE INFO

THE PERFECT WORM
(Art Agnello and Harvey Reissig, Entomology, Geneva)

❖❖ Cool weather forecast for the coming week is sure to slow the transition into bloom and postbloom pest development patterns, so now might be a timely occasion to reflect on what we do and don't know about the prospects for internal lepidopteran larval infestations in apple orchards for the current season. Last year, of course, we saw an increase in the recent occurrence of this problem in a number of western N.Y. orchards, including many where internal worms had never before been a concern.

Our informal year-end survey of problem blocks revealed that the infestations in over 70% of these cases were caused by either oriental fruit moth (OFM) or lesser appleworm (LAW), while codling moth (CM) was either the primary or contributing species in about 20% of the blocks. It's probably safe to assume that in the majority of cases, although OFM may be the most common offender, infestations are from a complex of these Lepidoptera species. Even though we are currently just initiating field research trials to determine what might be the underlying cause of this increasingly serious problem, the most likely candidates include: an increase in tolerance or resistance of local populations to the commonly used broad-spectrum insecticides, like OP's, that had previously given good control; subtle changes in the biology or development of these species that have resulted in alterations in the timing, duration, or even number of their seasonal generations; and the suitability of current summer spray programs in effectively controlling these species.

An examination of spray records from some of the more seriously affected orchards typically showed an absence of any lep materials in the early summer period between early June and late July, except for OBLR sprays, which consisted of products having little activity on internal worms. This is not surprising, as there should be — and always was — no real reason for internal lep materials to be used between the post-petal fall applications against plum curculio and the start of the apple maggot flight period more than a month later. Obviously, the situation is somehow different now, and it may be time for an amendment to some of these summer programs, as this period coincides with the egg hatch and early larval development of the OFM's second brood in NY. Spray histories from the past year suggest that fruit damage at harvest from the second and third brood larvae tended to show up in many of these high-pressure blocks where treatments against this generation either were not applied, or else appeared not to be effective, possibly because of resistance.

Initial levels of insecticide resistance are usually low (3–5X) when unacceptable fruit damage begins to show up. Adequate control can be obtained with existing materials by using maximum rates, optimizing timing, and increasing coverage. However, this strategy does not

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is published weekly from March to September by Cornell University—NYS Agricultural Experiment Station (Geneva) and Ithaca—with the assistance of Cornell Cooperative Extension. New York field reports welcomed. Send submissions by 3 pm Monday to:

scaffolds FRUIT JOURNAL
Dept. of Entomology
NYSAES, Barton Laboratory
P.O. Box 462
Geneva, NY 14456-0462
Phone: 315-787-2341 FAX 315-787-2326
E-mail: ama4@cornell.edu

Editors: A. Agnello, D. Kain

This newsletter available on CENET at: news://newsstand.cce.cornell.edu/cce.ag.tree-fruit
and on the World Wide Web at:
http://www.nysaes.cornell.edu/ent/scaffolds/

inhibit resistance development, and may last for only a short time. To reduce selection pressure for insecticide resistance, apply insecticides only as necessary, use correct dosages, obtain adequate coverage, and optimize timing. Treat different generations with different chemical classes of materials, and consider the possible use of nonchemical control tactics (e.g., mating disruption). Good solutions to the internal worm problem may take some time to formulate with any degree of confidence, simply because of the complexity and variability of the potential causes. However, for the time being, our best advice falls into the basic categories of monitoring, filling in possible gaps, and rotating, depending on the current status of your apple infestations.

• For orchards with no previous history of internal worm damage:

1 - Continue to maintain normal spray schedules using the programs that have been providing adequate control up to now.

2 - We would recommend setting up pheromone traps just to monitor for the presence and perhaps population levels of the key species - CM, OFM, and possibly LAW. The OFM traps should probably be out by now, since the first flight was recorded last week in several advanced sites, and the rest of the counties will likely follow by this week. The CM and OFM traps need to be out by the middle of this week at the latest to ensure catching the first moth, although this event could certainly be delayed in many spots because of the low temperatures (also, we'll be publicizing the first catches for many of the representative areas).

3 - To ensure continued effectiveness of your current spray program, inspect fruit at harvest for evidence of internal worm damage.

• For orchards currently experiencing only trace amounts of internal lep damage (1–2% of fruit):

1 - Apply two sprays of a normal OP insecticide against both the first and second generation of OFM, as determined using trap catches or degree day (DD) model predictions. The details: At about 1400 DD (base 45°F) after the biofix, which should turn out to be early July sometime, assess trap catches; spray if you're catching 15–20 moths per week. Two weeks later, check fruits for injury (20 fruits/tree on 30 trees). If trap numbers remain high, continue spray program (10–14 day schedule); if trap numbers remain high AND damage is starting to occur, rotate to another material (e.g., Asana, Danitol, Avaunt, or, if the NYS labels come through, Warrior or Intrepid).

2 - Apply additional sprays in August and early September to protect fruit until picking, according to the pre-harvest interval (phosmet might be preferable because of its 7-day PHI).

• For orchards with more serious internal lep infestations (>5% fruit damage):

Chemical control strategies for problem blocks:

1 - Non-OP materials that may be effective against CM, OFM, and LAW: pyrethroids, Avaunt, Intrepid.

2 - Optimize timing for each brood (2 sprays timed according to trap catches or DD models) and protect fruit in late season until harvest.

3 - Use each chemical class against only one generation.

Integrated control programs for management of resistant internal leps:

Option 1 - Apply standard chemicals or selective materials for control of first generation. Use pheromone ties for second and later generations. Apply selective chemicals for control of summer generations timed according to pheromone trap catches or DD models.

Option 2 - Apply OP or alternative chemicals for control of the first generation. Apply selective chemicals (Avaunt or Intrepid, if available) for control of second generation. Apply low rates of sprayable pheromone to protect fruit from late June until harvest.❖❖

DISEASES

SEEING RED

RUST DISEASES
(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Between May 5 and 12, the lower Hudson Valley had least five wetting-drying cycles that provided 67 hr of leaf-wetting but only 0.55 inches of rainfall. These conditions are highly favorable for apple rust diseases because the intermittent wetting promotes production and dissemination of rust spores, light rains are less effective than heavy rains for washing spores out of the air, and long wetting periods allow time for spores to be blown into orchards from the alternate red cedar hosts. Furthermore, apples were passing from full bloom to the early stages of petal fall during the past week, and the period of peak susceptibility for rust infections on fruit occurs between pink and first cover.

The EBDC fungicides (mancozeb, Polyram) and the SI fungicides (Rubigan, Nova, Procure, Bayleton) are all effective for controlling rust diseases on apples. The SI fungicides provide at least 96 hr of post-infection activity against rust infections on leaves. The EBDC fungicides do not provide any post-infection activity, although they may arrest the infection process when applied during the first 12–18 hr after rains begin. Captan and Topsin M are ineffective against rust diseases.

The strobilurin fungicides (Sovran, Flint) have provided good control of rust diseases in some trials and moderate levels of control in other trials. The inconsistent performance of strobilurins against rust diseases may be attributable to differences in spray timing. Several tests at the Hudson Valley Lab have shown that strobilurins controlled rust diseases as well as 3 lb/A of mancozeb if the sprays were applied before the infection period. However, the strobilurins have much less post-infection activity than the SI fungicides. In a 2001 trial where control plots had 69% of Jerseymac fruit with quince rust, Nova provided 98% control of quince rust when it was applied at either 3 days or 7 days after the infection period, whereas Flint provided only 23% control at 3 days post-infection and no control after 7 days.

Three different rust diseases caused by *Gymnosporangium* species occur on apples in the Hudson Valley. Cedar apple rust (CAR), caused by *G. juniperi-virginianae*, infects both leaves and fruit of susceptible cultivars, but leaf infections are far more common than fruit infections. Hawthorn rust caused by *G. globosum* only infects leaves and is generally less abundant than CAR. Quince rust (*G. clavipes*) infects fruit but does not cause leaf lesions. On infected leaves, the early symptoms of CAR and hawthorn rust are so similar that the two species cannot be easily differentiated. The size and coloration of rust lesions on leaves also differs among apple cultivars. By mid-August, hawthorn rust and CAR can be differentiated based on the appearance of the fungal fruiting structures (aecia) that form on the bottom sides of infected leaves.

Nearly all apple cultivars are susceptible to quince rust, although the degree of susceptibility varies. Many apple cultivars are resistant to either cedar apple rust or hawthorn rust, but very few are resistant to both CAR and hawthorn rust. Even when cultivars are resistant to rust, rust spores can cause leaf spot lesions on leaves that are not protected with fungicides. Rust-induced leaf spots develop when rust spores germinate and kill a few leaf cells before fungal growth is interrupted by the incompatible host reaction on a resistant cultivar. The killed leaf cells are then invaded by other secondary pathogens such as *Alternaria*, *Botryosphaeria*, or *Phomopsis*.

All three of the apple rust diseases require red cedar trees as an alternate host. For both CAR and hawthorn rust, the spores that infect apples are produced on the orange, jelly-like teliohorns that are

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generated by cedar galls during wet spring weather. Quince rust does produce a gall on cedars. Instead, quince rust appears as a canker on cedar twigs. The cankers can be easily located only when they are wet and are producing orange-red teliohorns during spring. Unlike CAR and hawthorn rust, where individual galls produce spores for only one season, quince rust infections can survive and produce spores on cedars for many years.

Eliminating red cedars near orchards had long been recommended as one approach for reducing the incidence of rust diseases on apples. The number of spores reaching an orchard declines rapidly as the distance to the nearest cedar trees is increased. However, eliminating cedars rarely provides complete control of rust diseases in areas where cedar trees are common, because small numbers of spores can be blown to apples from distant cedars. Where all cedars are eliminated within several hundred yards of an orchard, outbreaks of apple rust diseases are likely only in years when light rains cause extended intermittent wetting periods. Under those conditions, the abundance of cedar trees in backyards, hedgerows, and unmanaged land will produce enough spores to "contaminate" the air throughout the Hudson Valley fruit growing region. Because those conditions are occurring this spring, all growers in the Hudson Valley are advised to apply an SI fungicide before or near petal fall to minimize potential losses to quince rust.❖❖

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/12):	377	195
(Geneva 1/1-5/12/2002):	449	236
(Geneva "Normal"):	411	205
(Geneva 5/19 Predicted):	443	222
(Highland 1/1–5/12):	514	275
Coming Events:	**Ranges:**	
Pear psylla first egg hatch	111–402	55–235
Codling moth 1st catch	273–805	141–491
Green fruitworm flight subsides	170–544	69–280
Mullein bug 1st hatch	322–481	156–246
Mullein bug 50% hatch	404–475	193–275
Oriental fruit moth 1st flight peak	259–606	96–298
Rose leafhopper nymphs on multiflora rose	188–402	68–208
Spotted tentiform leafminer sap-feeders present	295–628	130–325
San Jose scale 1st catch	189–704	69–385
McIntosh at petal fall	418–563	210–298
Red Delicious at bloom	384–586	185–252
Peach at petal fall	257–466	131–277
Pear at petal fall	343–544	144–275
Plum at fruit set	411–527	206–287
Sweet cherry at fruit set	381–518	171–287
Tart cherry at bloom	257–448	122–251

Please note that we now include a predicted degree day accumulation for the next week, based on temperature forecasts supplied by SkyBit, Inc.for Geneva, in our degree day table under UPCOMING PEST EVENTS. Using crop phenology and weather data that we have collected over the years, we have used this value to predict about where crops should be next week (in Geneva) in the PHENOLOGIES table.

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Dept. of Entomology
NYS Agricultural Exp. Sta.
Barton Laboratory
Geneva, NY 14456-0462

PEST FOCUS

Geneva:
Lesser appleworm and **American plum borer** 1st catch today, 5/12.

Highland:
Low numbers of **tarnished plant bug** caught in white sticky traps. Low levels of terminal damage caused by **obliquebanded leafroller** larvae observed.

PHENOLOGIES

Geneva:

	5/12	5/19 (Predicted)
Apple(McIntosh):	50% bloom	bloom–petal fall
Apple(Red Delicious):	late pink–king bloom	bloom
Pear:	bloom	petal fall
Sweet cherry:	petal fall	fruit set
Tart cherry	25% petal fall	petal fall
Plum:	petal fall	shuck split
Peach:	bloom	shuck split

Highland:
Apple (McIntosh/Ginger Gold): 50% petal fall
Apple (Red Delicious/Golden Delicious):full bloom
Pear (Bartlett/Bosc):80% petal fall
Peach: fruit set
Plum: fruit set
Apricot: fruit set

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	5/1	5/5	5/12
Green fruitworm	0.0	0.0	0.1
Redbanded leafroller	9.2	7.4	5.1
Spotted tentiform leafminer	589	606	387
Oriental fruit moth	0.5*	4.8	9.1
Lesser appleworm	0.0	0.0	0.5*
San Jose scale	0.0	0.0	0.0
American plum borer	–	0.0	0.1*

Highland, NY

	5/5	5/12
Green fruitworm	0.1	0.0
Redbanded leafroller	8.6	7.9
Spotted tentiform leafminer	34.3	32.9
Oriental fruit moth	1.3	5.1

* first catch

This material is based upon work supported by Smith Lever funds from the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.