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Update on Pest Management and Crop Development
FRUIT JOURNAL

May 10, 1999 VOLUME 8, No.8 Geneva, NY

INSECTS

THAT IS THE ???

OVERWINTERING OBLIQUEBANDED LEAFROLLER: TO TREAT OR NOT TO TREAT?

(Harvey Reissig, Entomology, Geneva)

❖❖ During Bloom, there are several species of caterpillars that can be found in commercial apple orchards in NY: the redbanded leafroller (*Argyrotaenia velutinana*), various species of green fruitworms, and obliquebanded leafroller (*Choristoneura rosaceana*). Although all of these species occur as larvae during Bloom, the overwintering stages of these species and early season biology prior to Bloom may be quite different.

The redbanded leafroller (RBLR) overwinters as a pupa within a folded leaf in the ground cover. Adults from the spring generation begin to emerge when apple trees are in green tip and lay eggs on the trunk and scaffold limbs of apple trees. Most eggs are laid around the Pink bud stage but oviposition continues during Bloom. Eggs begin to hatch during the later part of the *Bloom period.* Therefore, small, early instar larvae may be present during Bloom. The RBLR in the late 1950's was a serious problem in commercial apple orchards in New York State because larvae had become resistant to older insecticides such as DDT and lead arsenate. When organophosphate insecticides such as Guthion and Imidan were introduced into apple orchards in the 1960's, this pest became very rare in commercial apple orchards throughout the state. Since we catch adults of this pest in pheromone traps placed in areas near commercial orchards and even inside commercial orchards, we know that RBLR are still thriving in wild, unsprayed habitats. In former times, almost all apple growers throughout NY applied at least one spray of organophosphates at Pink, which probably killed adults. Currently, many growers are not applying broad spectrum insecticides before Bloom, so it is most likely that RBLR larvae in commercial apple orchards are now controlled primarily by Petal Fall sprays for plum curculio. This pest could become serious again in NY apple orchards if larvae or adults were to become resistant to various types of commonly used pesticides.

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Ten species of green fruitworms occur in New York, but only three of these are commonly found in apple orchards: the speckled green fruitworm (*Orthosia hibisci*), the humpbacked green fruitworm (*Amphipyra pyramidoides*), and the wide-striped green fruitworm (*Lithophane antennata*). Since the majority of green fruitworms found in NY orchards (60%) are the speckled green fruitworm, the other two are not considered to be problems. The speckled green fruitworm (GFW) overwinters as pupae and adults begin to fly about the time apple trees break dormancy. Eggs are laid during the Half-Inch Green bud stage of apple development, and the first larvae begin to appear around the tight cluster bud stage. Larvae are usually in the early to mid stages of their development by Bloom.

The obliquebanded leafroller (OBLR) overwinters as a second or third instar larva in sites on twigs covered by brown webbing called hibernacula, which are almost impossible to see in the field. The first larvae are usually visible around the Half-Inch Green stage of bud development and most larvae will have emerged from overwintering quarters by the middle of apple blossom. Many people are confused when they initially sample trees for OBLR larvae because the color of their head capsules is quite variable. All newly hatched OBLR larvae have black head capsules, but the color of head capsules of older larvae may be black, brown, or even have an olive-greenish cast. Newly hatched OBLR larvae can be easily confused with GFW larvae because both species have black head capsules. However, after 1 or 2 molts, GFW larvae have light green head capsules, and, of course, develop the characteristic white speckles scattered over their bodies. In contrast, OBLR larvae remain pale green without any white marks on their bodies.

Sampling Larvae at Bloom

For most practical purposes, sampling for lepidopterous larvae at Bloom is really an exercise in sampling for only one species, OBLR, in most NY orchards. RBLR are extremely rare and have not been found in sufficient numbers to warrant control measures in any commercial orchards in New York State within the last 15–20 years. GFW are also usually quite rare, and the only severe areas of infestation that have been observed during recent years were in a few commercial orchards in the Champlain Valley apple production region.

It is somewhat controversial about whether or not it is necessary to sample for OBLR at Bloom to determine whether or not chemical applications are needed. Unlike many other orchard arthropod pests such as mites, leafhoppers, rosy apple aphids, and tarnished plant bugs, chronic OBLR problems usually occur from year to year in the same orchards in localized areas regardless of the intensity of control measures applied during any particular season. Therefore, past history of the block with respect to previous severity of OBLR infestations may be as good a guide as sampling or monitoring techniques. However, it may be a good idea to sample blocks with no previous history of OBLR infestation, particularly if an orchard is nearby areas where chronic infestations of OBLR have been observed. The procedure for sampling

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scaffolds
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
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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/scafolds/

overwintering OBLR larvae at Bloom to determine whether or not chemical treatments are necessary are described in the Pest Management Recommendations for Commercial Tree-Fruit Production and in the Apple IPM Sampling and Management Manual.

Factors Influencing Decisions for Control of Overwintering OBLR

There are two primary reasons to control the overwintering generation of OBLR: (1) To reduce early season fruit damage; (2) To reduce population levels of the subsequent, more damaging summer generation.

Reduction of Fruit Damage In most years, almost all of the apples damaged by early season feeding from overwintering larvae drop prematurely from the tree. Assuming that the crop load of infested trees is normal, OBLR larvae usually simply act as biological fruit thinners and cause very little damage. However, during the last several years, growers have commonly observed increasing levels of fruit damage from the overwintering generation of OBLR. Traditionally, early season fruit damage has usually been less than 5% and probably averaged 2–3%. More recently, some growers have reported overwintering damage levels exceeding 10%, particularly during the 1997 growing season. A probable explanation for these elevated damage levels is that since efficacy of almost all insecticides against OBLR is declining, higher population levels of overwintering larvae are infesting orchards than in previous years, resulting in increasing numbers of damaged fruit observed on the trees at harvest.

Another factor to consider when deciding to treat for overwintering OBLR, is the effectiveness of currently available compounds in actually preventing early season fruit injury. Usually, it is impossible to completely eliminate fruit injury from overwintering larvae with insecticide treatments, even when multiple sprays are applied. Normally, the most effective chemical treatments only reduce this early season fruit damage by 40–60%. One of the reasons for this relative lack of insecticide efficacy may be that it is very difficult to get OBLR larvae exposed to pesticides early in the season because they are usually tightly webbed inside fruit clusters or blossoms and not readily exposed to direct contact of insecticides or even feeding on external surfaces that were treated. Also, some young fruit may be damaged during late Bloom, when spray residues from prebloom sprays have degraded and additional sprays of most conventional insecticides cannot be applied because of their toxicity to honeybees.

Reduction of Population Levels of the Subsequent Summer Generation of OBLR – Previously, we have always said that the benefits of controlling the overwintering brood to reduce damage from the summer generation were not always apparent. Clearly, most growers in chronically infested areas continue to suffer severe summer damage (10–20%) even after applying extensive early season control schedules against the overwintering brood of OBLR. There have been very few studies set up to actually estimate the effects treating different generations of OBLR on fruit damage. One of the best recent studies was conducted in Canada during the 1998 growing season. The results of this study are shown in the following table:

Effects of Treating Different Generations of OBLR on Fruit Injury. Ontario, CA. 1998

Overwintering	First Summer	% Total Injury
Dipel	SpinTor	2.6a
SpinTor	Dipel	3.6a
Dipel	Dipel	3.8a
-.-	SpinTor	6.3b
-.-	Dipel	6.0b
Dipel	-.-	7.5b
SpinTor	-.-	7.3b
-.-	-.-	14.7c

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These results, which are a summary of trials conducted in six commercial apple orchards in Ontario, Canada, show that treating only one generation alone reduced damage compared to that in the check plot by about one-half, and there was no significant difference in fruit injury between those orchards treated for either the overwintering or summer generation alone. The most effective control was obtained in those plots in which both generations were treated. However, the damage in these more intensively treated plots was only about 3% less than those in which only one generation was treated. Therefore, we will be doing additional work this season to determine if these results are representative of what growers can normally expect from treating different generations of OBLR in commercial orchards and to calculate economic returns to growers based on fruit value and costs of the different intensities of insecticide schedules.

Also, in the future, the effects of using IPM-compatible insecticides such as the soon to be available material Confirm, which is a Molting Accelerating Compound, and Comply, which is an insect growth regulator, against the overwintering generation to control the summer generations should be evaluated. Studies conducted against other leafroller species in Europe have shown that applications of these types of compounds against larvae, in contrast to conventional insecticides, can have sublethal effects on surviving adults of the following generation. Therefore, treating large plots of overwintering larvae with these types of materials may have more of an effect in controlling subsequent generations of leafrollers than insecticides with more conventional modes of action.

Options for Control of the Overwintering Generation of OBLR

Numerous studies conducted in NY over many years to compare the effectiveness of different insecticides and control schedules on overwintering OBLR have produced results that illustrate two general principles: (1) Usually, control programs do not eliminate damage from overwintering OBLR, particularly in large trees that are difficult to spray, but commonly reduce fruit damage by 40–60%. Also, although there are some differences among specific insecticides, a single spray at Petal Fall is as effective in protecting fruit as a 2-spray program at Pink and Petal Fall. The most effective insecticides currently available for controlling the overwintering generation of OBLR are: Lorsban, Asana, Dipel, Confirm, SpinTor, and Lannate. Dipel and Confirm (when it becomes labelled) are the only materials that can be applied during Bloom.

Insecticide resistance

Insecticide resistance is another important factor to consider when considering control options for control of the overwintering generation of OBLR. All studies monitoring susceptibility to various insecticides during the last several years have shown that OBLR populations are gradually becoming more resistant to all available conventional insecticides and may already have become cross resistant to new materials such as Confirm, which has not yet been widely used in NY apple orchards. Most discussions of the theories of management of insecticide resistance suggest that the proliferation of resistance is enhanced when more than one generation of insects is treated annually with the same insecticide or different insecticides from the same class of chemicals. Therefore, treating the overwintering brood extensively with insecticides is probably not a good strategy for preventing the proliferation of development of insecticide resistance of OBLR. Whenever possible, if a decision is made to control the overwintering brood, it is probably best to use a different class of insecticide for control of the subsequent summer generation to attempt to reduce resistance selection pressure for any particular chemical class of insecticide during one growing season.❖❖

FRUIT SALAD

INSECT BITES
(Art Agnello, Entomology, Geneva)

Assault on a Miner

❖❖ This season is already unwinding to be a notable one, and it looks like one of the first insect pests to make its presence known will be spotted tentiform leafminer. Eggs laid by the first generation moths have been more numerous this year than in recent memory. Because most varieties are well into Bloom by now, we're past the point of using Pink control strategies; however, it would be prudent to check the fruit cluster leaves for sapfeeding mines at Petal Fall, to see whether any chemical intervention might be called for. Recall that this brood doesn't do too much direct damage to the trees or the crop, but that problem populations can be effectively whittled down now, before the more devastating second or third generations make a showing. An average count of more than one sapfeeding mine per leaf might prompt the inclusion of some Provado or Agri-Mek in the Petal Fall application. Check the Recommends for sampling guidelines.

American Plum Borer

Eggs of this moth are deposited on cherry and peach trees in cracks under loose bark and hatch in a few days. Larval tunnels are shallow with frequent openings to the outer bark, where red frass accumulates. The larvae can't bore into the cambium unless a wound of some sort is present. Because most of the tart cherries in New York are mechanically harvested, APB has become the major borer pest in some orchards in the Lake Ontario fruit growing region. These susceptible trees are not only damaged by APB, but likely serve as reservoirs from which other susceptible crops (such as peaches infected with canker diseases) may be infested.

Directed trunk sprays are recommended in cherries at Petal Fall, when first generation adults are emerging. Adults begin to emerge during Bloom and the flight peaks around Petal Fall or shortly thereafter. Lorsban 4E used for lesser peachtree borers at Petal Fall will provide control against any APB that may be present. Field trials indicate that if APB number just a few per tree on average, this single application at Petal Fall will probably be adequate, given the economic constraints of tart cherry production. Under more severe pressure, a second application around the beginning of August would be warranted against the second generation larvae. This would also correspond with the timing for the last of the season's peachtree borer sprays.

Weeping Pear Blossoms

Some western NY pears this season are apparently being affected by another one of those old-time but sporadic pests — false tarnished plant bug. A close relative of the common tarnished plant bug, this species hatches out during pear Bloom, and the developing nymphs feed by piercing the tender pear stems and young fruits, sucking out the juices (thus producing an oozing, soggy looking blossom cluster), and causing the fruits to either drop or else become deformed, if they remain on the tree. The original feeding punctures turn into granular spots, which can run together to form patches and depressions, with hard and gritty flesh beneath. This pest has been known from Fairport to Lockport since the 1880's, and because it takes about a month for the insect to pass through all its five instars, the only real recourse is to spray them with something definitive. This can be a serious problem, so a pyrethroid at Petal Fall is the serious remedy we would advise if your trees are infested.❖❖

FIELD NOTES

HUDSON VALLEY DISEASES

APPLE SCAB
(Dave Rosenberger and Fritz Meyer, Plant Pathology, Highland)

Apple Scab Update

❖❖ The first primary scab lesions appeared on Friday, May 7, on unsprayed trees at the Hudson Valley Lab. These lesions resulted from the infection period of April 22–23. Additional scab infection periods occurred May 3–4 (12 hr, 53°F, 0.1 inch rain) and May 8–9 (33 hr, 59°F, 0.25 inch rain). Spotty showers occurred throughout the Hudson Valley last week. Some areas received more than an inch of rain, but drought conditions still prevail in much of the lower Hudson Valley. At the Hudson Valley Lab, total accumulated rainfall since April 1 is only 1.4 inches, and soil water reserves were relatively low at the beginning of April. The supply of apple scab ascospores is usually depleted by about Petal Fall, but some later discharges are likely this year because drought conditions have delayed both spore discharge and disintegration of the overwintering leaves on the orchard floor.❖❖

PHENOLOGIES

Geneva:
Apple (McIntosh): Full bloom
Apple(Red Delicious): King bloom
Pear (Bartlett): 25% Petal fall
Tart Cherry: 25% Petal fall
Sweet cherry (Windsor): Petal fall
Peach: Petal fall

Highland:
Apple (McIntosh): 30% Petal fall
Pear (Bartlett): Petal fall
Plum: Shuck split
Apricot: Fruit 1 cm diameter

DISEASES

THE ROTTIN' BUNCH

CALYX-END ROT OF APPLES
(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Calyx-end rot (also known as blossom-end rot) is a sporadic problem in New York apple orchards. Infections occur around Petal Fall. Black or dark brown lesions appear at the calyx-ends of affected fruit during early to mid-June. The disease can be caused by any one of three different fungi: *Sclerotinia sclerotiorum*, *Botrytis cinerea*, or *Botryosphaeria obtusa*. Symptoms caused by these three fungi are similar, and distinguishing among them can be difficult even for experts.

Calyx-end rot is most common in years when extended wetting periods (2–3 days duration) occur between late bloom and first cover. The 11 days of rain that occurred last year near Petal Fall provided ideal conditions for infection and contributed to an unusual number of complaints about this disease in 1998. Recurrence of calyx-end rot as a significant disease in 1999 is unlikely unless an extended wetting period develops during late Bloom, Petal Fall, or the immediate postbloom period. Losses to calyx-end rot can be reduced by including appropriate fungicides in the Petal Fall spray, but the economics of adding specific fungicides to control calyx-end rot are questionable because the disease occurs so infrequently.

Sclerotinia sclerotiorum, the most common cause of calyx-end rot in New York, grows on lower stems of infected weeds hosts (e.g., dandelion, wild clover) in the orchard ground cover. Ascospores are produced and released when the ground stays wet for 2–3 days. Apple fruit become infected when ascospores of *S. sclerotiorum* are blown from the infected plants in the groundcover to apple flower sepals or to

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the calyxes of small fruitlets. The infection usually spreads toward one side of the fruit, thereby creating an off-center lesion that is most evident when the fruit is viewed from the calyx end. The fruit surface at the edge of the lesion is sometimes bright red, especially if the lesion is still expanding. However, infections usually stop expanding and dry out by the time lesions reach 5 to 15 mm in diameter. Most affected fruit will ripen prematurely beginning in late July. Affected fruit usually drop from the tree before harvest. The incidence of infection rarely exceeds 5% of the total fruit load on a tree, and the disease will not spread from one infected fruit to another.

Applying Benlate or Topsin M at Petal Fall should control calyx-end rot caused by *S. sclerotiorum*. No one has conducted trials to verify the effectiveness of these fungicides, but research on other crops has shown that Benlate or Topsin M are effective for controlling *S. sclerotiorum,* whereas the other fungicides registered for apples are not very effective. However, the value of including Benlate or Topsin M in Petal Fall sprays is debatable. These fungicides are no longer effective for controlling apple scab because fungicide-resistant strains are present in many orchards, and their effectiveness against powdery mildew is suspect for the same reason. Thus, the only reason to include Benlate or Topsin M in Petal Fall sprays is for protection from black rot or from calyx-end rot caused by *S. sclerotiorum*. The sporadic nature of calyx-end rot means that in most years a specific spray to control *S. sclerotiorum* will not pay for itself.

Botryosphaeria obtusa, the same fungus that causes frogeye leaf spot and black rot fruit decay, occasionally causes a calyx-end rot that appears in early summer. We do not know why sepal infections with *B. obtusa* occasionally cause calyx-end rot symptoms, whereas they usually remain quiescent and cause a fruit decay only after fruit begin to ripen. Lesions of calyx-end rot caused by *B. obtusa* are usually dark brown to black and may completely surround the calyx or they may be offset to one side of the calyx. In orchards where inoculum levels are high and fungicide protection is lacking, *B. obtusa* can infect flower sepals and/or fruit calyxes anytime from Green Tip through Petal Fall. All of the registered scab fungicides suppress *B. obtusa*, but the SI fungicides and low rates of mancozeb fungicides (1 lb/100 gal) are relatively weak. Captan, Topsin M, and Benlate provide the best protection against black rot infection and have been recommended at Petal Fall in orchards where black rot fruit decay has been a problem in previous years.

Botrytis cinerea, the third of the three fungi that can cause calyx-end rot, is the same fungus that causes gray mold decay of stored apples. (It also causes gray mold of strawberries and raspberries.) Apple fruit with calyx-end rot caused by *B. cinerea* usually have a light brown lesion that completely surrounds the fruit calyx. Sometimes infected fruit still have dried-out petals trapped in the calyx-end. The entrapped or retained petals probably provide a food source that enhances establishment of *B. cinerea* in the calyx. None of the scab fungicides have proven effective for controlling *B. cinerea* in apples, but incidence of calyx-end rot caused by *B. cinerea* remains low because green fruit are relatively resistant to this fungus.❖❖

PEST FOCUS

Geneva:
1st catch of **American plum borer.**

Hudson: **Spotted tentiform leafminer** and **Oriental fruit moth** numbers high. **American plum borer** 1st catch in peach and cherry.

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	5/3	5/6	5/10
Green fruitworm	0	0	0
Spotted tentiform leafminer	349	499	663
Redbanded leafroller	11.5	18.6	5.6
Oriental fruit moth	72	101	51
Lesser appleworm	14.6*	12.8	18.1
San Jose scale	0	0	0
Codling moth	-	0	0
American plum borer	-	-	0.4*
Lesser peachtree borer	-	-	0

Highland, NY

	5/3	5/10
Green fruitworm	0	0
Spotted tentiform leafminer	19.9	16.3
Redbanded leafroller	18.4	14.9
Oriental fruit moth	3.4	5.6
Codling moth	0.1*	0.1
Lesser appleworm	0.1*	0.2
European red mite(#/leaf)	10.0	18.0
San Jose scale	-	0
White apple leafhopper nymphs	-	0

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/10):	377	185
(Geneva 1998 1/1–5/10):	508	275
(Geneva "Normal" 1/1–5/10):	337	157
(Hudson 3/17–5/10):	410	193
Coming Events:	**Ranges:**	
Pear psylla 1st hatch	111-402	55-208
Spotted tentiform leafminer 1st flight peak	180-544	65-275
Spotted tentiform leafminer sap-feeders present	295–628	130–325
Tarnished plant bug adults active	71–536	34–299
Redbanded leafroller 1st flight peak	180–455	65–221
Codling moth 1st catch	273–805	141–491
Oriental fruit moth 1st flight peak	259–606	96–298
Plum curculio adults active	135–394	49–225
Rose leafhopper nymphs on multiflora rose	188–402	68–208
San Jose scale 1st catch	189–704	69–385
McIntosh at petal fall	418–563	210–317
Peach at shuck split	362–518	174–287
Pear at petal fall	343–544	144–275
Plum at petal fall	277–466	113–252
Sweet cherry at fruit set	381–518	171–287
Tart cherry at petal fall	385–563	185–289

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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