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Update on Pest Management and Crop Development

FRUIT JOURNAL

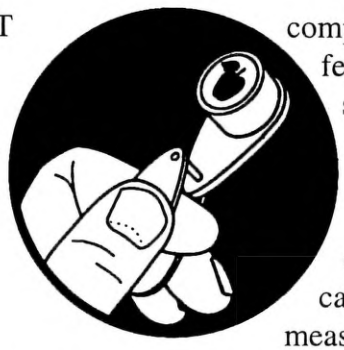
May 22, 2000 | VOLUME 9, No. 10 | Geneva, NY

INSECTS

CAN OF WORMS

MANAGEMENT OF INTERNAL LEPIDOPTERA IN NY APPLE ORCHARDS

(Harvey Reissig, Entomology, Geneva)



❖❖ Apple growers in N.Y. have not traditionally applied insecticide sprays specifically targeted against internal Lepidoptera. Early season control sprays directed against the plum curculio have provided adequate control of the first generation of internal Lepidoptera, and later sprays applied during July and August to control apple maggot have controlled later season generations. Most growers have used broad-spectrum organophosphate insecticides to control all of these pests that directly injure fruit and have usually obtained almost perfect control at a reasonable cost. However, in the future, it appears that changing pesticide regulations may affect the availability and use patterns of organophosphates. Also, as growers attempt to implement more sophisticated IPM programs using more selective "reduced risk" insecticides, which usually have a narrower activity range, for control of plum curculio and apple maggot, it may become necessary to apply specific treatments to control internal Lepidoptera throughout the growing season.

Biology

Three species of lepidopterous larvae can infest apple fruit in New York State: the codling moth (CM) *Cydia pomonella* (Linnaeus); the oriental fruit moth (OFM) *Grapholita molesta* (Busck), and the lesser appleworm (LAW) *Grapholita prunivora* (Walsh). This species complex of apple pests is commonly referred to as internal Lepidoptera. Seasonal development differs slightly for all three species. However, since codling moth is the most common pest found in fruit in commercial orchards, this entire complex of pests can be managed by directing control measures on a schedule designed to control CM. Since these pests can be found commonly infesting apples in unsprayed orchards and wild apple trees, natural enemies, predators and parasites will not provide adequate control in commercial apple orchards. Therefore, for the foreseeable future, it is likely that specific control tactics will have to be used in order to obtain acceptable control of CM in commercial N.Y. apple orchards.

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The seasonal life cycle of CM is discussed in detail in Cornell's Tree Fruit IPM Insect Identification Sheet No. 2. The spring flight of CM begins about the time that 'Delicious' apples bloom in N.Y., and a second peak of adult activity, which may include a second and partial third generation of the pest, begins in July and continues throughout the remainder of August. The second generation of CM usually causes more damage to fruit than the first generation of this pest. Even though CM biology and behavior is somewhat similar in the eastern and western apple growing regions, it is much more difficult to control CM in the western part of the United States. The reasons for this differential severity of CM in different apple production regions is unknown, but as a general rule, CM control is more difficult and fruit damage is usually more severe in apple production regions with hot, dry summer weather.

Mating Disruption

Studies conducted in Europe and the western U.S. have shown that it is possible to control CM by deploying large amounts of pheromones in commercial apple orchards to disrupt mating. Several types of pheromone-dispensing systems — including "twist ties", sprayable microencapsulated formulations that can be applied with normal airblast sprayers, paraffinic emulsions, and automated microsprayers — have been used to successfully dispense pheromones for disruption of CM mating in apple orchards. Pheromone disruption has generally provided adequate protection of fruit when large areas of orchards are treated to mitigate the effects of immigration of gravid females from unsprayed areas of outside infestation sources, and indigenous populations of CM in treated orchards are reduced to very low levels.

Usually, pheromone-disrupted orchards or areas under pheromone treatment are carefully monitored, using pheromone traps baited with high rates of pheromone to act as "super lures" to monitor CM males, and fruit samples to estimate damage from different CM generations. If pheromone trap catches or fruit monitoring indicate that CM populations and/or fruit infestation is reaching potentially damaging levels in pheromone-disrupted orchards, insecticide sprays are applied to supplement the pheromones. It is not uncommon to apply an average of at least one general insecticide spray in orchards under pheromone disruption treatments in the western U.S.

Very little work has been done to test the effectiveness of pheromone disruption against CM in N.Y. because of the effectiveness of insecticide control sprays for the plum curculio and apple maggot against this pest. However, if programs are developed to control these pests using more selective insecticides or some other control tactic, pheromone disruption would appear to be a potential, IPM-compatible control tactic for CM in N.Y. apple orchards. It might even be possible to deploy pheromone blends that would disrupt mating of both CM and the obliquebanded leafroller. We are conducting field trials this season to test the efficacy of combined pheromone disruption of CM, OFM, and OBLR using automated microsprayers in an organic apple planting in Niagara Co. for just this purpose.

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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
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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/scaffolds/

Chemical Control

It should not be necessary to apply additional special sprays for CM control in apple orchards that continue to be treated with even minimal schedules (2–3 sprays during the season) of organophosphate or other broad spectrum insecticides for control of the plum curculio and apple maggot. During the past few years, however, with the advent of trapping-based spray decisions for apple maggot, and a resulting decrease in cover sprays in some cases, there have been more opportunities for an unwelcome return of low-level CM infestations. In such cases, if it becomes necessary to apply special sprays for CM control in orchards that are not being treated with standard insecticides, timing control sprays by using CM developmental models based on heat unit accumulation is a very effective management strategy.

The Michigan model for predicting CM development gives fairly accurate predictions of codling moth activity in N.Y. As many as two insecticide applications may be made for each of the two generations per year, depending on the severity of pressure. Degree days are accumulated from the date of first sustained moth catch, and the first spray is applied at 250 DD (base 50°F), which corresponds with predicted 3% egg hatch. A second spray may be applied 10–14 days later. If pressure is not too severe, one spray will suffice, applied instead at 360 DD after the biofix date. To control the second generation, the timing is 1260 DD after this same biofix date.

We will again publicize suggested codling moth treatment windows this season, for those growers who don't necessarily spray certain blocks for maggot each year, and who have evidence (or suspicion) that codling moth is starting to pose a significant threat. We're calling the biofix May 19 in Geneva, May 16 in Appleton (Niagara Co.) and May 8 in Highland; we will be providing regular updates to identify imminent spray dates.

Insecticide trials conducted in N.Y. over a number of years in research orchards heavily infested with CM and other species of internal Lepidoptera have shown that most currently available IPM-compatible, "reduced risk" insecticides (Comply, Dipel, Confirm, and SpinTor) are slightly less effective in preventing fruit injury than are standard organophosphate insecticides, such as Guthion and Imidan. However, it is likely that these selective materials applied on a schedule of 2–3 sprays/generation of CM, based on predictions from a CM developmental model, will provide adequate control in normal commercial apple orchards that are not located adjacent to abandoned orchards or extensive acreages of feral, unsprayed apple trees. However, since some of these materials have limited contact activity against young CM larvae, and are only effective when ingested, they may be more effective if they are applied 5–7 days earlier than the estimated first hatching date predicted by the developmental model for each generation of CM. This type of scheduling ensures that eggs are deposited on residues of the material so that hatching larvae are more likely to ingest a lethal dosage of the compounds before entering the fruit.

Some of the newer selective contact insecticides being developed show promise as potential replacements or rotational complements to the standard OP programs currently used for internal lep management. The results of a two recent tests in heavily infested research orchards at the NYSAES are shown in the table on Page 4. In Trial 1, Actara (a neonicotine material somewhat related to Provado) was continued only through the second cover to evaluate its effectiveness against plum curculio, which was quite high; it did not control the other pests. Both programs using Avaunt (a new carbamate) gave good internal lep and curculio control. The Confirm (an insect growth regulator) program significantly reduced damage from internal leps, but was not as effective as the Guthion standard. Trial 2 looked at programs using the synthetic pyrethroids Baythroid and Danitol, the neonicotine Calypso, and the IGR Esteem. All treatments significantly reduced damage from internal Lepidoptera compared with the untreated Checks.❖❖

Treatment	Spray timing	AVERAGE % FRUIT DAMAGED BY Internal Lepidoptera gen 1	harvest	OBLR	Plum curculio
Trial 1					
Actara 25WG	PF thru 2C	11.0 b	68.7 c	7.7 b	7.0 a
Avaunt 30WG	PF thru 6C	2.3 a	7.7 ab	4.0 ab	9.7 a
Avaunt 30WG + Vydate 2L	PF thru 6C PF	0.0 a	2.0 a	1.0 a	5.7 a
Confirm 2F	PF thru 6C	1.3 a	21.0 b	3.3 ab	34.7 b
Guthion 50WP	PF thru 6C	0.0 a	3.3 ab	2.0 a	8.3 a
Check	—	15.3 b	61.7 c	1.0 a	41.3 b
Trial 2					
Baythroid 2EC	Pink thru 6C	0.3 a	0.0 a	2.3 ab	14.7 bc
Calypso 70WG	Pink thru 6C	1.0 ab	2.0 ab	10.3 b	4.7 a
Esteem 0.86EC + Guthion 50WP + Danitol 2.4EC	Tight Cluster PF thru 2C 3C thru 6C	0.0 a	0.0 a	3.3 ab	3.0 a
Imidan 70WP	PF thru 6C	0.3 a	1.0 ab	3.3 ab	10.7 ab
Check	—	5.3 c	18.7 d	24.0 c	63.0 d

Means within a column followed by the same letter are significantly different (Fisher's Protected LSD Test), $P<0.05$).

KEEP 'EM COVERED

THE IMPORTANCE OF BEING PC

(Art Agnello, Entomology, Geneva)

❖❖ Just a reminder that plum curculio egg-laying, which is a very temperature-dependent activity, has been significantly curtailed during the recent period of cold and wet weather we have been experiencing. Whatever protective residues of insecticides that were applied at petal fall will almost certainly have dissipated in effectiveness and probably actual amount by the time conditions start to moderate again, and it's a sure bet that the curcs haven't finished their cutting or laying. Therefore, most growers will want to be prudent and follow up in most blocks with a second application of a suitable material such as an OP by 10–14 days after their petal fall spray, to protect the fruits during this year's prolonged curc season.❖❖

DISEASES

REPAIR EFFORTS

DISEASE MANAGEMENT IN HAIL-DAMAGED ORCHARDS

(Dave Rosenberger, Plant Pathology, Highland)

❖❖ A severe hail storm moved through the lower Hudson Valley on the evening of May 18, leaving varying levels of damage in its wake. In orchards at the center of the storm path, hail damage to tree fruits was so severe that some growers will abandon the crop. Orchards on the edges of the storm path sustained varying degrees of damage. In general, late-blooming apple varieties such as Delicious, Golden Delicious, and Rome sustained less damage than earlier varieties such as Mac and Empire. Late blooming cultivars apparently escaped some damage because they had not yet sized enough to provide a substantial target. The longer fruit stems on the later cultivars may also have allowed the fruitlets to deflect the hail impacts more than cultivars such as Empire that often have short, stiff stems.

Pear blocks and high-risk apple blocks that were hit with hail should have been sprayed with streptomycin as soon as possible after the hail storm. Because of continuing rain and wind, most streptomycin applications were made 36–48 hours after the hail storm rather than within 24 hours as is usually recommended. Most growers with apple orchards that were free of fire blight for at least two years opted not to apply streptomycin because they assumed that these orchards would be free of blight inoculum (a decision with which I concurred). Whether or not this was the correct decision should become evident within several weeks.

The risks of hail-induced trauma blight are presumably higher this year than they would be in most years because bloom time weather was very favorable for fire blight. According to the MaryBlyt model, fire blight infections in the lower Hudson Valley could have occurred on May 6, 7, and 10, with "high risk" indicated for May 8, 9, 11, and 14. (There was only a bit of rat-tail bloom left by the 14th). The model indicated that the first symptoms of blossom blight and canker margin symptoms should have been present about two days before the hail storm. No one has reported visible fire blight symptoms at this time. However, the prediction that early symptoms may have been present at the time of the hail storm means that secondary inoculum for blight could have been present in orchards where blossom infections occurred. Growers should monitor orchards carefully for blight symptoms during the next two weeks.

In hailed blocks where this year's crop will be abandoned, no more fungicide sprays should be necessary to protect foliage. The supply of apple scab ascospores has been depleted (1229 DD base 32 °F.), and risks of further spread of apple scab are relatively small in orchards where trees were fully

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protected from primary scab up to this point. Where the crop will be harvested, continued fungicide protection is warranted to ensure protection against flyspeck, black rot, and the risk (albeit a small risk) of secondary apple scab infections.❖❖

SPOT TREATMENT

CONTROLLING FABRAEA LEAF SPOT ON PEAR AND QUINCE

(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Fabraea leaf spot is a perennial threat to quince and Bosc pears. Other pear varieties can also get Fabraea, but Bosc is the most susceptible of the commonly grown varieties in New York. Epidemics of Fabraea leaf spot are usually initiated between petal fall and July 1. This disease is one of the most "explosive" diseases of tree fruits. It often seems to appear almost overnight during late June or early July, but epidemics are actually initiated much earlier than that.

Epidemics usually occur as a result of primary infections that become established during the 3–4 weeks after petal fall. These primary infections appear as nondescript, round leaf spots that usually escape notice. If fungicide protection is inadequate during June or early July, a few primary infections will provide the inoculum for a rapidly developing epidemic. Foliar symptoms can appear almost simultaneously on many leaves throughout much of the tree canopy during late June or early July.

Fabraea can build up more quickly than diseases like apple scab because scab is able to infect only *newly* formed leaves on growing terminals, whereas older leaves and fruit never become resistant to infection by *Fabraea*. Leaves and fruit on quince and pear trees remain susceptible to Fabraea leaf spot right up until harvest. Thus, when Fabraea leaf spot epidemics develop in early summer, all of the existing leaves can become infected in a short time if inoculum is present and trees are left unprotected.

To avoid Fabraea epidemics, quince and pear trees should be protected with fungicide from petal fall through July 4. These sprays will prevent the primary infections that subsequently produce the abundant conidia that cause the epidemics. If trees are protected with fungicides applied on a 14–21-day interval through July 4, then the chances for late-season development of Fabraea are minimized.

The mancozeb fungicides have been considered the most effective for controlling Fabraea, but their use is restricted by their 77-day preharvest interval. Until this year, ziram was the most commonly used fungicide for protecting pear orchards during summer. Now both Sovran and Flint are registered for use on all pome fruits, including pears and quince. Neither Sovran nor Flint have been evaluated for efficacy against Fabraea leaf spot and Fabraea therefore is not included on either label. However, both Sovran and Flint should control Fabraea if they are used during summer for other diseases for which they are labeled.

Pears and quince should be protected from Fabraea during June even in orchards where the crop has been lost to hail. Fabraea can cause premature defoliation, and trees that defoliate in early summer will fail to set fruit buds for next year. Furthermore, orchards that develop Fabraea this year will pose control challenges for next year because of high inoculum carry-over.❖❖

Fabraea leaf spot lesions on immature quince fruit.

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	5/15	5/18	5/22
Redbanded leafroller	1.0	0	0.1
Spotted tentiform leafminer	92.6	55.2	18.8
Oriental fruit moth	35.9	51.2	4.2
Lesser appleworm	27.1	75.7	4.2
Codling moth	–	0.7*	1.5
San Jose scale	0.6	2.3	0.5
Pandemis leafroller	–	0	0
American plum borer	0.4	0.3	0
Lesser peachtree borer	–	0	0
Peachtree borer	–	0	0

* first catch

Highland, NY

	5/15	5/22
Redbanded leafroller	1.3	0.6
Spotted tentiform leafminer	4.9	1.2
Oriental fruit moth	6.4	1.1
Codling moth	0.9	0.9
San Jose scale	0	0
Pear psylla (eggs/50 leaves)	0	5.0
Pear psylla (nymphs/50leaves)	2.5	0
Lesser peachtree borer	0.3*	0.1

PEST FOCUS

Geneva:
Codling moth flight began 5/18. **Obliquebanded leafroller** pupae present.

Highland: 2nd generation **pear psylla** adults laying eggs on Bartlett pear.

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/22):	616	328
(Geneva 1999 1/1–5/22):	546	287
(Geneva "Normal" 1/1–5/22):	539	282
(Highland 1/1–5/22):	767	422

Coming Events:	**Ranges:**	
Plum curculio oviposition scars present	448–670	232–348
Codling moth 1st flight peak	547–1326	307–824
San Jose scale 1st flight peak	457–761	229–449
American plum borer 1st flight peak	360–962	134–601
European red mite summer eggs hatch	773–938	442–582
Lesser peachtree borer 1st catch	224–946	110–553
Pear psylla hardshell present	463–651	259–377
Mirid bugs hatch complete	532–720	252–390
Pandemis leafroller 1st catch	749–829	423–488
Obliquebanded leafroller 1st catch	686–1104	392–681

Red Delicious at fruit set.

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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