scaffolds

Update on Pest Management and Crop Development

FRUIT JOURNAL

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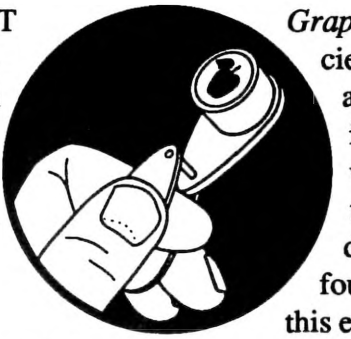
INSECTS

WORMS AWEIGH!

MANAGEMENT OF INTERNAL LEPIDOPTERA IN NY APPLE ORCHARDS

(Harvey Reissig, Entomology, Geneva)



❖❖ Apple growers in New York State 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 of internal Lepidoptera. 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 organophosphate insecticides. 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 lepidopterous pests of apple 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 commonly be found 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 apple orchards in New York State.

continued...

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PEST FOCUS

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UPCOMING PEST EVENTS

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 NY, 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 western U.S. production regions 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 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 NY 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 NY apple orchards. It might even be possible to deploy pheromone blends that would disrupt mating of both CM and the obliquebanded leafroller.

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

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organophosphate or other broad spectrum insecticides for control of the plum curculio and apple maggot.

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. This procedure was covered in the last (5/17) issue of Scaffolds. The results of a recent test in a heavily infested research orchard at the NYSAES are shown in the table at the end of this discussion. This study shows that a 4-spray program of an IPM-compatible insecticide such as Rimon, which is a chitinase inhibitor, applied according to predictions from the CM developmental model, can provide control comparable to Guthion applied on the same schedule.

Insecticide trials conducted in NY 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 reduced 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.❖❖

	AVERAGE % FRUIT DAMAGED BY Internal Lepidoptera			
Treatment and oz AI/100 gal	gen 1	harvest	stings	Plum curculio
Rimon 10 EC 0.64	2.7b	7.6a	2.3a	-.-
Rimon 10 EC 0.96	1.7ab	4.3a	1.0a	-.-
Rimon 10 EC 1.2	2.0b	5.2a	2.3a	-.-
Confirm 2 SC 1.5	3.0b	22.7c	3.7a	-.-
Guthion 50 W 4.0	0.7a	14.0b	4.7a	33.3a
Check	14.3c	85.3d	2.3a	48.7b

Means within a column followed by the same letter are significantly different (Fisher's Protected LSD Test), $P<0.05$). Data transformed arcsin [Sqrt (x)] for analysis.

NEWS AT ELEVEN

INSECT BITES
(Art Agnello, Entomology, Geneva)

San Jose Scale

❖❖ The San Jose scale (SJS) is a pest of tree fruit that attacks not only apple, but also pear, peach, plum, and sweet cherry. The minute SJS adult males emerge in the spring from beneath scale covers on the trees, usually during Bloom, and mate. The first of this year's adults started showing up on May 17 in our traps at Geneva. The females produce live crawlers within 4–6 weeks of mating; these are bright yellow, very tiny insects resembling larval spider mites. About 24 hours after birth, the crawlers have walked or drifted to new sites and settled in by inserting their mouthparts into the tree and secreting a white waxy covering that eventually darkens to black.

SJS infestations on the bark contribute to an overall decline in tree vigor, growth, and productivity. Fruit feeding causes distinct red-purple spots that decrease the cosmetic appeal of the fruit. Control measures for SJS are recommended when the scale or their feeding blemishes have been found on fruit at harvest during the previous season. Insecticidal sprays are most effective when directed against the first generation crawlers, specifically timed for the first and peak crawler activity, which are usually 7–10 days apart.

The most reliable method of determining first appearance of the crawlers in your specific area is by putting sticky-tape traps on the tree limb near encrusted areas and checking them at least twice a week, starting about the second week of June. Alternatively, a degree-day accumulation of 310 (50°F base) from the date of first adult catch has also been shown to be reliable if the degree-days are known with some accuracy. In the Geneva area, first crawler emergence has tended to occur sometime around mid-June.

Effective materials for SJS control include Lorsban 50WP, Guthion, Imidan and Penncap-M. These sprays may also help in the control of OBLR, apple maggot, and codling moth. Coverage and control are generally better if the pesticide is applied dilute and in every row. SJS is frequently more of a problem in larger, poorly pruned standard size trees that do not receive adequate spray coverage. Dormant or delayed-dormant sprays of oil, or Half-Inch Green applications of Lorsban 4EC or Supracide will have helped prevent populations from getting established. Early season pruning is important for removing infested branches and suckers, as well as for opening up the canopy to allow better coverage in the tree tops where SJS are often concentrated.

Stone Fruit Aphids

Although green peach aphids are not always a serious pest every year, colonies of these greenish, smooth-looking aphids can start showing up in peach blocks around this time if they are going to be a problem. They cause curled leaves that may turn yellow or red in severe cases. The young aphids begin to hatch about the time of peach bloom and remain on the trees for 2–3 generations, until early summer, when they seek other hosts (mainly vegetable truck crops). Green peach aphids suck the sap from the new fruits and twigs, and are also found on plum, apricot, cherry, and many ornamental shrubs. These insects are difficult to control; Lannate or Thiodan are recommended postbloom, before excessive leaf curling occurs, in order to maximize the spray's effectiveness. Also, keep an eye out for black cherry aphid in your cherry trees after shuck fall. If colonies are building up on the foliage, recommended materials include Sevin, Imidan (tart cherries only), and Penncap-M.

Pear Psylla

The pear psylla is a "flush feeder", meaning that the nymphs feed and develop primarily on the newer, more tender growth. By midway through the growing season, the majority of leaves are hardened off and psylla development may then be limited prima-

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rily to the water sprouts. Once the nymph begins to feed, a honeydew drop forms over the insect; the psylla develops within this drop for the first few instars. Honeydew injury occurs when excess honeydew drips onto and congregates on lower leaves and fruit. The honeydew is a good medium for sooty mold growth. When it occurs on the fruit, it russets the skin and makes the fruit unsaleable.

Ladybird beetles, lacewings, syrphids, snakeflies (Raphidiidae), and predatory bugs have been recorded feeding on the psylla. There are also two chalcid parasites of pear psylla in the U.S. However, to obtain commercially acceptable fruit in New York, pear psylla generally must be controlled with insecticides.

For psylla control, we have historically recommended an application of an effective insecticide when nymphs start to build to the level of 1–2 per leaf after Petal Fall. More than one application of some material is often necessary. In the most recent past, the pyrethroids and Mitac have been the most widely used psylla products in our area. During the past 6 years, we have additionally been able to use Agri-Mek under Section 18 exemptions, as a Special Local Need use, and under its current status as a full federal and state label. This chemical is absorbed into the leaf tissue and kills the psylla when it feeds; its mode of action is also different from the other contact toxicants. In field trials, it has provided 4–6 weeks or more of protection under normal growing conditions.

Current guidelines call for it to be applied within the first 1–2 weeks after Petal Fall, which means that the effectiveness of a single application may not carry through the entire season, depending on how late the spray is made and how absorptive the tissue is at the time of application. Our spate of warm, dry temperatures so far this season has probably aged the pear foliage relatively quickly, similar to what occurs more often on the west coast, so the succulent tissue required for adequate absorption of the material may not last long. The Agri-Mek label allows for the option of a second spray, but considering the cost, late summer leaf condition, and resistance factors (and the fact that this is not a good contact material), a better approach would be to keep a watchful eye on the trees in mid- to late July, and switch to something different if needed, such as Provado, Pyramite or Mitac.❖❖

HUDSON VALLEY DISEASES

HUDSON VALLEY DISEASE UPDATE
(Dave Rosenberger, Plant Pathology, Highland)

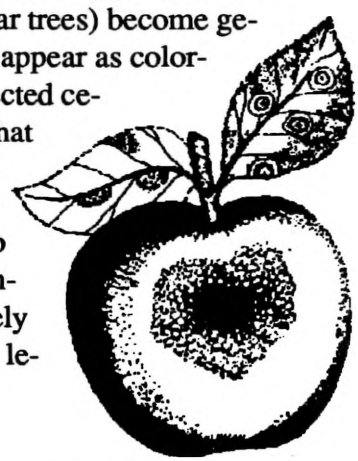
FIELD NOTES

Apple Scab

❖❖ As a result of several extended wetting periods during the last week, the supply of apple scab ascospores in the Hudson Valley has been depleted and the primary scab season is over. However, secondary scab could still cause serious problems in orchards where primary scab was not completely controlled. Fruit and foliage are still very susceptible to infection. In our unsprayed check plots, scab symptoms from infections that occurred May 8–9 became apparent toward the end of last week.

Cedar apple rust

The rains of last week and this week are providing ideal conditions for cedar apple rust infections on terminal leaves of susceptible apple varieties. Teliohorns on cedar apple galls (the fruiting structures on cedar trees) become gelatinous during rains and appear as colorful orange masses on infected cedar trees. Basidiospores that are produced on these fruiting structures are blown from cedar trees to apple leaves where they infect the leaves and ultimately cause yellow-orange rust lesions.



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Where cedar trees are present to provide inoculum, apple trees will remain at risk for cedar rust infection until about June 10. Apple fruit become resistant to infection at or soon after Petal Fall, but newly unfolding apple leaves remain susceptible. By mid-June, the cedar apple galls will have exhausted their spore-producing capabilities for the season and the rust season will be over. Cedar apple rust does not have any secondary infection cycle. Infections that may appear on terminal leaves of apple do not pose any threat for further spread of the disease in apples.

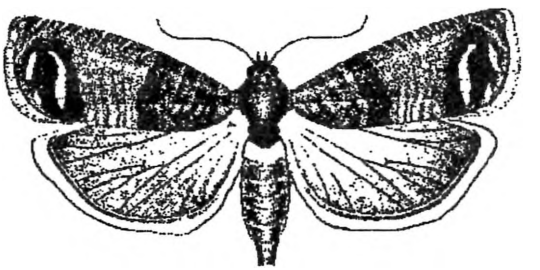
The importance of spraying to control rust after the first cover spray is debatable because fruit will not become infected. Failure to protect susceptible varieties, however, will result in severe infection of two or three terminal leaves during each infection period in locations where inoculum is abundant. The bright yellow-orange lesions can make a tree look rather sick during early July when symptoms are most apparent, and severely affected leaves will probably drop from the tree prematurely. Susceptible cultivars such as Rome Beauty and Golden Delicious that are left unprotected after first cover may lose so many terminal leaves that fruit size could be affected. Where inoculum is less abundant, trees left unprotected after first cover will only develop an occasional rust lesion on terminal leaves. Light rust infection on terminal leaves may be unsightly (except to plant pathologists!), but occasional lesions are unlikely to affect fruit size or quality.

Captan will suppress rust (about 50% control), but only Polyram, mancozeb, or SI fungicides (including Bayleton) will provide complete control. If heavy rains remove protectant fungicides and trees are left unprotected during a subsequent infection period, then the SI fungicides or Bayleton will provide excellent eradicant activity when applied within 96 hours of the start of the infection period.❖❖

PEST FOCUS

Geneva:
1st catch of **codling moth** = 5/13. DD(base 50°F) accumulated since then = 125.

Hudson: **San Jose scale** trap catch increasing. **American plum borer** and **lesser peachtree borer** numbers increasing in peach and cherry. 1st **peachtree borer** caught.



PHENOLOGIES

Geneva:
Apple (McIntosh): King fruit @ 1/2"
Apple(Red Delicious): King fruit @ fruit set
Pear (Bartlett): King fruit = 1/2"
Tart Cherry: Shucks off
Sweet cherry (Windsor): Shucks off
Peach: Shucks off

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	5/13	5/17	5/24
Spotted tentiform leafminer	399	157	53.7
Redbanded leafroller	0.8	3.4	2.5
Oriental fruit moth	55	44	40.7
Lesser appleworm	32.0	39.8	6.4
San Jose scale	0	0.4*	0.1
Codling moth	0.3*	23.3	16.4
American plum borer	0.2	0.4	1.5
Lesser peachtree borer	0	1.0*	1.5

Highland, NY

	5/10	5/15
Spotted tentiform leafminer	16.3	5.4
Redbanded leafroller	14.9	7.6
Oriental fruit moth	5.6	1.2
Codling moth	0.1	0.1
Lesser appleworm	0.2	0.9
European red mite(#/leaf)	18.0	11.0
San Jose scale	0	0
European red mite eggs/leaf	0	45.2*

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/24):	592	320
(Geneva 1998 1/1–5/24):	783	456
(Geneva "Normal" 1/1–5/24):	552	292
Hudson (3/17–5/24):	612	312

Coming Events:	**Ranges:**	
Spotted tentiform leafminer 1st flight peak	180-544	65-275
Spotted tentiform leafminer sap-feeders present	295–628	130–325
Oriental fruit moth 1st flight peak	259–606	96–298
Lesser appleworm 1st flight peak	372–851	181–483
Mullein bug hatch complete	532–720	252–390
White apple leafhopper nymphs present	236–708	123–404
Plum curculio oviposition scars present	448–670	232–348
American plum borer 1st flight peak	360–962	134–601
San Jose scale 1st flight peak	581–761	308–449

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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