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Update on Pest Management and Crop Development

FRUIT JOURNAL

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INSECTS

FOR SIGHT

ORCHARD RADAR DIGEST

Geneva Predictions:

Roundheaded Appletree Borer
RAB adult peak emergence: June 15.
RAB egglaying begins: June 7. Peak egglaying period roughly: June 27 to July 12.

Codling Moth
Codling moth development as of June 13: 1st generation adult emergence at 59% and 1st generation egg hatch at 6%.
1st generation 3% CM egg hatch: June 9 (= target date for first spray where multiple sprays needed to control 1st generation CM).
1st generation 20% CM egg hatch: June 18 (= target date where one spray needed to control 1st generation codling moth).

Obliquebanded Leafroller
1st generation OBLR flight, first trap catch expected: June 12.

San Jose Scale
1st generation SJS crawlers appear: June 20.

Spotted Tentiform Leafminer
2nd generation flight begins around: June 18.

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MODEL BUILDING

BY THE NUMBERS

Insect model degree day accumulations:

DD50 since 1st **Codling Moth** (1st generation OP application @ 250–360):
GENEVA: 355

DD50 since petal fall (End of **Plum Curculio** oviposition @ 308):
GENEVA: 242
HIGHLAND: 326

DD50 since March 1 = (**San Jose Scale** 1st generation crawlers emerge @ 500.)
GENEVA: 492
HIGHLAND: 561

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IN THIS ISSUE...

APPLE CORPS

MOTHING OFF

(Art Agnello and Harvey Reissig, Entomology, Geneva)

❖❖ Apple growers will soon be confronting the issue of potential problems from internal worms in some blocks, and while some have resorted to preventive calendar sprays with or without mating disruption applied over the top, we continue to look at strategies that attempt to strike a balance between reasonable cost and acceptable risk in terms of which potential tactics to use.

In 2005, oriental fruit moth (OFM) management programs were tested in five "moderate-risk" commercial orchards, using three different pheromone dispensing technologies, as well as a modified fruit sampling procedure to assess the need and timing for special pesticide sprays directed against the 2nd and subsequent generation of this species. The pheromone treatments used were:

1) Isomate-M plastic ties, at 100/A

2) MSTRS OFM high-yield, low-density plastic pheromone packets, at 5–8/A

3) Hercon Disrupt Micro-Flake OFM, a sprayable plastic laminate

Treatments 1 and 2 were applied between 17–21 June; Treatment 3 between 7–8 July. In five additional "moderate-risk" commercial orchards, growers applied their conventional pest management programs (including one orchard where pheromones were used), and an on-tree fruit sampling procedure was used to determine the need for specific additional internal worm treatments based on the occurrence of new fruit feeding. In all cases, growers managed the first generation of OFM with their conventional pesticide applications that were directed primarily against plum curculio and *obliquebanded* leafroller occurring at and immediately following petal fall.

Pheromone treatment efficacy in depressing adult male trap catch was monitored using Pherocon IIB traps that were checked weekly from 9 May to 29 August. The fruit sampling protocol consisted of 8 weekly on-tree fruit inspections conducted from mid-July through August, comprising 300 fruits per plot during the first week and 100 fruits per plot on subsequent weeks, for each of the 2nd and 3rd generations, to detect the initial occurrence of any OFM larval fruit damage in time to curtail further infestation. Whenever an inspection session resulted in detection of at least one damaged fruit, the grower was notified so that he could determine whether a special spray of a selective pesticide was needed for control of internal Lepidoptera.

Trap catches of OFM were generally suppressed to low levels in all pheromone treatment plots during the mid- and late summer, although some breakthrough captures did occur, so trap shutdown was not absolute in all cases. Two plots at one Niagara Co. farm with notable OFM catches were located near a non-disrupted organic apple planting with a high OFM population, so it is possible that immigration from that block was too severe to be completely disrupted by the pheromone

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treatments in our plots. This site also recorded a relatively high CM catch during the first flight in June. Trap catches in the insecticide-treated plots differed among the sites, with some farms at or near zero for both species all season, and others catching relatively large moth numbers. Interestingly, if the proposed trap catch thresholds of 10 OFM and 5 CM/trap/week had been used as a basis for making control sprays, our management recommendations would have been much more conservative than they were using the evidence of fruit-feeding damage.

The fruit sampling procedure was convenient to implement, requiring 10–15 min per plot, and seemed to effectively allow detection of low-level infestations at a very early stage, so that the growers could be notified of any extra needed control measures in a timely fashion. Incidence of fruit injury was extremely low except for one (organic) site, which was the only pheromone plot location where more than 1 damaged fruit was detected per sampling bout. No damaged fruits were found during the 8 weekly samples in any of the Isomate plots; damage was detected 3 times each in any MSTRS and Hercon flake plots plots. In the insecticide-treated plots, damaged fruit was found during only one of these sessions, near the end of August. The high incidence of in-season fruit damage seen at the organic site was a result of high endemic pressure, of mostly OFM, plus the organic management regimen, which consisted of kaolin clay and B.t. for the 1st generation, and Cyd-X (codling moth granulosis virus) applied 4 times against the summer generations (20 July, at 5 oz/A; and 4, 20, 31 Aug, at 3 oz/A).

Our grower notifications of fruit damage during the season did not always result in a decision to apply an extra spray for internal worm control. Fruit damage caused by internal-feeding Lepidoptera at harvest was very low in all treatments at 3 of the 5 pheromone disruption sites. At the Niagara Co. site, the Isomate plot sustained approximately 10% fruit damage, although its proximity to a non-disrupted organic planting with a high population could have been a contributing factor. Additionally, the 1st generation CM we detected was not being disrupted, and damage from this species was likely included in the harvest evaluation, as no effort was made to distinguish between OFM and CM damage. The organic site had previously suffered relatively high fruit damage the previous season. Damage in all the treatments here ranged from 7–17% damage, which the grower indicated was acceptable for the organic processing market, and a measurable improvement over the previous season. No appreciable internal Lepidoptera feeding damage occurred in any of the 5 insecticide-treated plots.

Although the pheromone treatments tested were generally a useful component of the OFM management programs in these orchards, some factors can be identified as potentially contributing to less than perfect fruit quality:

- Plot size was not large enough to overcome the possibility of immigration by mated females;
- OFM population pressure was sometimes too high to be effectively disrupted by the pheromone treatments;
- the pheromones were applied only against 2nd and subsequent generations, leaving the potential for the 1st generation to contribute to fruit damage.

This research is being repeated and expanded this season, to continue to test the effectiveness of these application dispensers and the reliability of the fruit damage inspections. Nevertheless, it may be difficult to convince growers that any level of internal Lep damage before deciding to apply a treatment is acceptable in their orchards. (For full details and graphics on this report, there's a pdf in the "Links" section, under Research Reports at: http://www.nysaes.cornell.edu/ent/faculty/agnello/) ❖❖

CHEM NEWS

POME GRANTED

CHEM NEWS – BAYTHROID XL/ BAYTHROID 2 LABELED

(Art Agnello, Entomology, Geneva)

❖❖ The NYS DEC has granted Baythroid XL (Bayer CropScience, EPA Reg. No. 264-840) a registration for use on all pome and stone fruits in New York State. The a.i. is beta-cyfluthrin, a synthetic pyrethroid with activity on a broad range of the major insect pest species in these fruit crops, including leafhoppers, internal leps, leafrollers, plum curculio, apple maggot, sawflies, true bugs, San Jose scale crawlers, American plum borer, black cherry aphid, and cherry fruit fly. Per-acre use rates vary from 1.4–2.8 ounces, depending on the pest. This product has an REI of 12 hours and a PHI of 7 days (check label for details).

[Actually, note that Baythroid 2 (EPA Reg. No. 264-745), which had already been registered in NYS, but not on tree fruits, ALSO was recently granted a new label that now allows its use on these crops. This formulation's a.i. is 'regular' cyfluthrin, which is only half as effective as the 'beta' isomer. Growers can therefore use the 'old' Baythroid 2 on tree fruits, IF they get the new label from their distributor that shows the changes.] ❖❖

DISEASES

TERMINAL ILLNESS?

CONTROLLING THE SHOOT BLIGHT PHASE OF FIRE BLIGHT IN APPLE ORCHARDS

(Dave Rosenberger, Plant Patholgy, Highland)

❖❖ The most severe losses from fire blight occur when epidemics are initiated during bloom. The blossom blight phase of fire blight has been studied extensively. Cougar Blight, MaryBlyt, and other models have been used for predicting outbreaks of blossom blight and/or for timing streptomycin sprays. When applied at proper timings, streptomycin is very effective for controlling blossom blight. However, a few infections may escape even when strep sprays are properly timed.

The spread of fire blight after bloom (shoot blight phase) is less studied and less well understood than the blossom blight phase. Shoot blight sometimes results in significant loss of tree canopy and extensive loss of trees due to subsequent infections of susceptible rootstocks, even in orchards that had relatively little blossom blight. Even when shoot blight causes only minor direct damage, shoots that become infected during summer can result in cankers that carry inoculum to the next season, thereby creating increased potential for severe blossom blight the following year. Applications of streptomycin during summer are specifically NOT recommended except immediately following hail storms, because regions that utilized summer sprays of streptomycin to control shoot blight have, without exception, developed strains of the fire blight bacterium, *Erwinia amylovora* (EA), that are resistant to streptomycin. Removal of infected shoots by pruning has advantages, disadvantages, and practical limitations that have been discussed in prior years (Scaffolds Fruit Journal 13(10):3–5; 6(12):1–3).

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What contributes to the rapid spread of fire blight during summer? So far, no one has been able to predict when and why these outbreaks occur. Better control of shoot blight is a component of fire blight that requires more research. However, both the literature and field observations provide some interesting "clues" about factors that may contribute to summer spread of fire blight and possible options for reducing secondary spread.

Sucking insects have long been suspected of vectoring EA (i.e., carrying EA from tree to tree) or facilitating infection (i.e., generating feeding injuries that might allow wind and rain-dispersed EA to enter leaf tissue). McManus and Jones (1994) showed that shoot blight infections can be correlated with wind events that may cause leaf injury via wind whipping, but presence of insects that puncture epidermal tissue might facilitate infection in the absence of wind events.

The predominant sucking insects present on terminals in early summer in apple orchards are aphids and leafhoppers. The role of aphids has been evaluated in two studies, and both reported that aphids were incapable of vectoring or facilitating spread of fire blight (Plurad et al., 1967, Clarke et al., 1992). Pfeiffer et al. (1999), using caged insects, showed white apple leafhoppers caused no increase in fire blight incidence or severity.

Potato leafhoppers (*Empoasca fabae*, formerly *E. mali*), were implicated in some of the earliest studies of potential insect vectors/facilitators of fire blight (Brooks, 1926; Burrill, 1915; Gossard and Walton, 1922; Miller, 1929; Stewart and Leonard, 1916). Unlike aphids and white apple leafhoppers, potato leafhoppers (PLH) feed primarily in the phloem and their feeding injury causes physiological changes in the host. In their recent study with caged insects, Pfeiffer et al. (1999) reported that PLH caused a highly significant increase in fire blight in two out of the three years they conducted trials. They postulated that PLH facilitated bacterial entry through feeding wounds. Dissemination of bacteria by leafhoppers moving from tree to tree was not examined.

None of the published studies have provided definitive evidence that PLH actually transmits EA from plant to plant, nor has anyone proposed a threshold level of PLH that may be required before these insects impact the incidence of shoot blight during summer. Nevertheless, given the tremendous losses that fire blight can cause if it spreads during summer, it may be prudent to apply insecticide treatments to control PLH in orchards that have active fire blight. Approaches for controlling PLH were outlined in last week's issue of Scaffolds.

Apart from controlling piercing-sucking insects with insecticides, few other options have been investigated as controls for shoot blight. Apogee is very effective for reducing the incidence of shoot blight, but it must be applied beginning during late bloom, and that is too early to know whether or not streptomycin sprays have provided complete control of fire blight.

Jim Eve, a private crop consultant, has suggested that regular applications of sulfur fungicide may suppress spread of fire blight during summer. After Jim shared his observations with me, I discovered that although sulfur has never been tested as a control for fire blight, it was widely used and recommended as a control for PLH on various crops in the first half of the 20th century (Delong, 1934; Menusan, 1938; Miller, 1942). Thus, any blight control observed with sulfur might derive from its effect on PLH rather than from direct toxicity to EA bacteria. Effectiveness of sulfur for suppressing PLH and/or EA in apples remains to be proven, but the possible interactions among PLH, EA, and sulfur sprays raises interesting researchable questions.

Conclusions: The literature contains sufficient data to implicate PLH in summer spread of fire blight, although details (PLH threshold levels, effectiveness of adults vs. nymphs, etc.) remain to be worked out. The proven approach for controlling

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PLH will involve traditional insecticides such as Provado (as outlined in last week's Scaffolds article). However, the possibility that sulfur applied to control powdery mildew might also assist in suppressing fire blight is a hypothesis worth testing in research trials. Pruning out fire blight strikes as they appear is still recommended whenever removal by pruning is feasible. ❖❖

Relevant Literature:

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PEST FOCUS

Geneva:
First **pandemis leafroller** trap catch 6/8. First **obliquebanded leafroller** trap catch today, 6/12.

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	6/5	6/8	6/12
Redbanded leafroller	0.4	0.0	0.0
Spotted tentiform leafminer	1.0	0.2	0.0
Lesser appleworm	0.5	2.0	0.0
Oriental fruit moth	0.0	0.0	0.0
Codling moth	0.1	0.0	0.0
San Jose scale	17.5	10.0	0.0
American plum borer	0.6	0.2	0.0
Lesser peachtree borer	0.5	0.8	0.0
Dogwood borer	0.1*	–	0.2
Pandemis leafroller	0.0	0.2*	0.3
Obliquebanded leafroller	0.0	0.0	0.1*

Highland, NY

	5/30	6/5
Spotted tentiform leafminer	7.4	3.3
Oriental fruit moth	2.1	0.8
Codling moth	0.3	0.2
Obliquebanded leafroller	0.0	0.1*
Fruit tree leafroller	0.1	0.0
Tufted apple budmoth	0.1	1.0
Variegated leafroller	0.0	0.8
Lesser peachtree borer	1.3	0.1
Dogwood borer	0.0	0.0
Lesser appleworm	0.6	4.2

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–6/12/06):	947	519
(Geneva 1/1–6/12/2005):	909	551
(Geneva "Normal"):	924	540
(Geneva 1/1–6/19 Predicted):	1114	640
(Highland 3/1–6/19/06):	983	561

Coming Events:	Ranges(Normal±StDev):	
Codling moth first flight peak	599–989	325–581
European red mite summer egg hatch	737–923	424–572
Pandemis leafroller flight peak	881–1041	516–606
Obliquebanded leafroller 1st flight peak	943–1313	565–827
Spotted tentiform leafminer 2nd flight begins	952–1184	560–740
Oriental fruit moth 1st flight subsides	836–1280	489–811
Peachtree borer 1st catch	770–1358	439–841
San Jose scale 1st flight subsides	853–1223	516–756
Lesser appleworm 1st flight subsides	950–1436	570–920
Pear psylla 2nd brood nymphs hatch	967–1185	584–750

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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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