scaffolds

Update on Pest Management and Crop Development

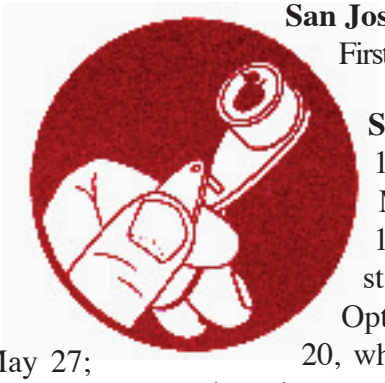
F R U I T J O U R N A L

May 4, 2009 VOLUME 18, No. 7 Geneva, NY

INSECTS

FLIGHT PLAN

ORCHARD RADAR DIGEST (Art Agnello, Entomology, Geneva)



❖❖ Geneva Predictions:

Roundheaded Appletree Borer
RAB adult emergence begins: May 27; Peak emergence: June 11.
RAB egglaying begins: June 6. Peak egglaying period roughly: June 27 to July 11.

Codling Moth
1st generation 3% CM egg hatch: June 8 (= target date for first spray where multiple sprays needed to control 1st generation CM).
1st generation 20% CM egg hatch: June 15 (= target date where one spray needed to control 1st generation codling moth).

Lesser Appleworm
1st LAW flight, 1st trap catch: May 7.

Mullein Plant Bug
Expected 50% egg hatch date: May 14, 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 19.

Obliquebanded Leafroller
1st generation OBLR flight, first trap catch expected: June 8.

Oriental Fruit Moth
1st OFM generation 2nd treatment date, if needed: May 29.

San Jose Scale
First adult SJS caught on trap: May 15.

Spotted Tentiform Leafminer
1st STLM flight, peak trap catch: May 5.
1st generation sapfeeding mines start showing: May 19.
Optimum sample date is around May 20, when a larger portion of the mines have become detectable.

White Apple Leafhopper
1st generation WALH found on apple foliage: May 10.

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IN THIS ISSUE...

CM MOTHS?

GUEST EXPERTS CORNER, Part I - COMMENTS ON CODLING MOTH MANAGEMENT

(Larry Gut & Peter McGhee, Michigan State Univ, E. Lansing)

❖❖ The codling moth is native to Asia minor, but was introduced into North America by European colonists early in the nineteenth century. It quickly spread across the continent and by 1880 had been detected in California and Washington. The codling moth thrived as the U.S. apple industry grew and by the beginning of the 20th century had established itself as the most injurious pest of apple wherever the crop was commercially grown. Although apple is the preferred host, it also feeds upon pear, quince, crab apple, hawthorn, English walnut and infrequently attacks various stone fruits.

Damage

In the absence of control measures, crop losses caused by larval feeding typically are in excess of 20% and may be as high as 95%. Fruit injury is of two types. A deep entry is where the larva enters the fruit, tunnels into the center, and feeds on seeds. Brown frass, the feces produced by the larva, can often be seen extruding from the entry hole. A sting is a shallow entry where the larva does some feeding but does not actually tunnel into the fruit. Fruit with either type of damage are unmarketable.

Management strategies and control measures

Cultural control. Codling moth densities can be reduced through good sanitation practices and the physical removal of cocooning larvae. Neglected orchards are a prime source of codling moth inoculum and should be removed. Picking bins are another important codling moth reservoir and should not be stored in proximity to commercial orchards. Alternatively, the bins can be treated in a hot water bath or some other manner that kills overwintering codling moth larvae. Removing cull apples before larvae exit the fruit can help reduce codling moth abundance. Another approach is to place cardboard bands around tree trunks and major scaffolds to intercept larvae as they move to cocooning sites. The bands are placed just prior to larvae exiting the fruit, removed after 3–4 weeks, and subsequently destroyed.

Mating disruption. Pheromone-based mating disruption is a novel codling moth control that entails dispensing synthetic codling moth sex attractant into a crop so as to interfere with mate-finding. Control is thereby achieved by curtailing the reproductive phase of the pest's life cycle. At present, mating disruption of codling moth is largely achieved through the manual application of reservoir-type release devices. Pheromone is released from synthetic polymers that are hand-applied at a rate of 200–400 sources per acre. Substantial efforts have been invested in other formulations to make the technology more cost effective. Plastic flakes, chopped fibers and microencapsulated formulations have been developed that allow the pheromone to be sprayed on the crop either by ground or air. An intriguing pheromone-based approach entails the formulation and release of

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insect sex attractants via aerosol-emitting devices that are deployed at densities of only 1–2 per acre. Regardless of the formulation used, mating disruption works best if initial pest density is low. Thus, the management approach is to use disruption in concert with supplemental insecticide sprays as needed. Often the use of mating disruption enables growers to apply fewer sprays than they otherwise would. This environmentally friendly approach also provides increased opportunities for natural enemies to reduce codling moth densities.

Natural enemies and biological control. In the absence of broadly toxic control measures, the codling moth is attacked by many kinds of natural enemies. Unfortunately, these are insufficient to suppress populations to levels that do not produce commercially unacceptable levels of damage. Codling moth natural enemies include egg, larval and pupal parasitoids, and predators. *Trichogramma minutum* and *Ascogaster quadridentata* are two parasitoids that can be easily reared, and thus are commercially available. *T. minutum* is indigenous to North America and parasitizes codling moth eggs, while *A. quadridentata* is an egg-larval parasitoid that was introduced from Europe. Several carabid beetles prey on the mature larvae that have dropped or crawled to the ground in search of cocooning sites. Earwigs are recognized as important egg predators.

Another biological agent available for control of codling moth is a naturally occurring virus that goes by the scientific name of *Cydia pomonella granulovirus* (CpGV). It is commonly referred to as the codling moth granulosis virus. CpGV is highly specific to the codling moth. It may infect the larvae of a few very closely related species, but it is noninfectious toward beneficial insects, fish, wildlife, livestock, or humans. The virus must be ingested by the larva to be effective, but it only takes a very low dose to cause death. Optimal use of the virus is against young larvae before they penetrate the fruit. If the virus is intended as a primary codling moth control, the first application should be made at the start of egg hatch. At least four applications will be required to cover the egg hatch period. Weekly applications at a low rate are a better approach than high dose sprays applied at wider intervals.

Chemical control. Insecticides have for at least 100 years been the principal means of controlling codling moth. From the early 1900s to the mid 1940s, inorganic chemicals, particularly lead arsenate, were the standard control measures for this pest. The availability of DDT in 1946 ushered in the era of synthetic organic insecticides for codling moth control. DDT was very effective, but its use was discontinued in 1960, primarily due to concerns over the build-up of toxic metabolites in the soil and the food chain. A suite of organic insecticides, but principally organophosphorous compounds (OP), replaced DDT as the principal codling moth control materials. These provided excellent control for 25–30 years; however, resistance to many of them was first detected in the late 1980s and has since been reported from most pome fruit producing regions. Growers have gradually come to rely on compounds with new modes of action. These include several types of insect growth regulators that operate by interfering with the insect's development, and neuroactive insecticides that target unique receptor sites, such as the chloronicotinyls.

Modern insecticides are more selective than the older insecticide chemistries, often targeting a single lifestage. Thus, they require more precise timing to maximize their effect. A growing degree-day (GDD) model is often used as a basis for codling moth management decisions. The model calculates GDDs based on a minimum developmental threshold of 50°F and maximum threshold of 88°F. The model predicts life history events, such as the start of egg hatch, that can be used to precisely time insecticide applications. Among the newer insecticides for codling moth control registered over the past few years are some insect growth regulators that act by suppressing development within the egg, as well as larvae that consume it. Hatching

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of eggs laid by treated adults will also be inhibited. Eggs are particularly susceptible to these products when laid on top of sprayed residue, thus sprays are timed earlier than most other control materials. Suggested timing for the first application is 100–150 GDD after the start of sustained moth capture or biofix.

The vast majority of insecticides used for codling moth control are aimed at killing larvae. This is not an easy task, as young larvae feed on and enter the fruit within a few hours of hatching. Options for controlling larvae include conventional contact poisons, like the OP compounds, that kill larvae that crawl across or consume the lethal residues. Newer insecticides require that the larva consume the toxin. In both cases, the primary target is the newly emerging larva at egg hatch, and thus they are typically applied beginning at 250 GDD post biofix. Timing of additional sprays largely depends on the product used and weather conditions. Some insecticides provide 21 days of residual control, while others may only provide 10 days. Rainfall in excess of 1/2 inch will substantially reduce the residual of most materials. The egg hatch period lasts 30–45 days, so several treatments may be required for control of each generation. ❖❖

WE CM MOTHS, TOO

GUEST EXPERTS CORNER, Part II - CODLING MOTH MANAGEMENT FOR 2009

(Greg Krawczyk and Larry Hull, Penn State Univ., Biglerville)

❖❖ With the introduction of some new and highly effective insecticides during 2008 and the greater use of pheromone mating disruption by many growers last year, fruit injury from the codling moth decreased in many areas across the state. Does this mean we can drop our guard against this notorious pest? NO! We should be as vigilant as ever for this troublesome pest. It will take more than one year to really stem the tide against the codling moth.

Because of the very warm temperatures recently, tree development and codling moth development are ahead of schedule for a normal year. For growers planning to use mating disruption as part of their annual CM management program, you should have already purchased your products for this year. There are a number of products on the market that affect both codling moth and the oriental fruit moth simultaneously, in addition to a number of products that just affect just a single species. Briefly, if your target is both CM and OFM, there are a number of products that affect both pests – CheckMate CM/OFM Duel, CheckMate CM/OFM Puffer, and Isomate CM/OFM TT. Please follow the label for each product for dispenser density and placement within the tree (i.e., for CM, place the dispensers in the top 20 percent of the tree canopy). Even though OFM has already started to fly, the above products should be in place before CM biofix.

For those growers who have used a mating disruption product for CM in previous years, it is likely that you will need some supplemental insecticides, especially for the first generation (see below for a listing of product choices). In addition, it is very important that you place pheromone traps in trees to monitor the success of your mating disruption program. We have recently completed a number of studies with a new lure from Trece Inc. to monitor CM in mating disruption blocks. The lure is called a CM-DA Combo. It contains both the sex pheromone – that is released by the females to attract the males – and a kairomone (i.e., a plant-derived chemical volatile [i.e., pear ester]) that attracts both male and female moths. We recommend at least one trap per 5 acres with no less than one trap per 10 acres to determine the success of your mating disruption program. There are also powerful 10X lures available for monitoring CM male adults in mating disruption blocks. These products

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are available from either Suterra LLC, Trece Inc. or other distributors.

If your plan is to use just conventional insecticides for CM control this year, your choice of products is quite varied, depending on the stage of CM you wish to target. Products that possess ovicidal activity (i.e., affecting the eggs) should be applied as follows: Intrepid (16 fl oz/acre) – apply within 150–175 DD after biofix and repeat 14 days later. Insecticides that target the hatching larvae (i.e., 230–250 DD after biofix) are as follows: organophosphates, various neonicotinoids (e.g., Assail, Calypso), Avaunt, and Delegate. Please refer to the Tree Fruit Guidelines for rates on these products. It is important to implement good resistance management practices for all of the above products (i.e., use only one of the above active ingredients within the same generation of CM, do not use the same active ingredients across two consecutive generations).

Another option that growers can consider for CM control is a codling moth granulosis virus (CpGV) (i.e., Carpovirusine and Cyd-X). We have used these products very successfully over the past few years in combination with mating disruption to reduce the severity of this pest. CpGV products must be ingested by the hatching larvae. The larvae will continue to feed for a couple of days before the virus kills them. CpGV products are fairly short residual (i.e., 5–7 days); thus, they need to be reapplied more often than conventional insecticides. Growers will likely need 4–5 applications per generation depending the length of the egg hatch period, the severity of the populations, and weather conditions.

Even if you are just using insecticides or CpGV for CM control this year, don't forget to use pheromone traps to monitor adult populations in your orchards. Monitoring traps in insecticide-only treated orchards require the use of a 1X lure. The traps are very important for setting biofix, determining the seasonality of adult flight, and they can estimate the relative adult population density in the immediate area. We don't yet have any reliable moth capture thresholds for determining whether to spray or not spray in insecticide only treated orchards. ❖❖

FIELD NOTES

DOWN IN THE VALLEY

ORIENTAL FRUIT MOTH IN THE HUDSON VALLEY

(Peter Jenscth, Entomology, Highland)

❖❖ The oriental fruit moth is nearing treatment threshold based on pheromone trap catch numbers. The model prediction for application using the pheromone trap catch biofix of 200 degree days (base 45°F) will occur over the next few days in the lower to mid-Hudson Valley, later in the upper Valley.

The recommended trap thresholds for the first flight of oriental fruit moth differ for apple and peach. In peach, control of first brood is recommended if more than 15 moths/trap/week are captured. In apple, control is warranted if trap capture exceeds 30 moths/trap/week. After the first flight, thresholds for apple and peach are the same, at a value of 10 moths/trap/week. Spray timings for oriental fruit moth control in apple and peach differ through the season and are based on accumulated DD from separate biofix dates established for each crop at the beginning of each season. Timings are based on recommendations from The Penn State University, Fruit Research and Extension Center, Biglerville, PA.

For control of OFM on apple at emergence of the first brood: I would include the neonicotinoids Assail or Calypso, and the IGR Intrepid should be applied at the 250–275 DD timing.

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Esteem could also be used at this timing under moderate OFM pressure. Applications of organophosphates (azinphos-methyl or phosmet), carbamates (carbaryl), the pyrethroids, Delegate, or Avaunt could be made later, at 350–375 DD.

Options for managing OFM on apple at the emergence of the second brood would include the neonicotinoids Assail or Calypso, and the IGRs Intrepid and Esteem, which should be applied at the 1350–1400 DD timing. All other insecticides such as the organophosphates, carbamates, pyrethroids, Delegate, or Avaunt should be made at 1450–1500 DD. These timings target the middle of egg hatch of the second brood. ❖❖

PEST FOCUS

Geneva:
Spotted tentiform leafminer and redbanded leafroller 1st flights at peak.

Highland:
Lesser appleworm 1st trap catch. **Pear psylla** egg hatch increasing, nearing threshold. Moth (**green fruitworm**, **redbanded leafroller**, **obliquebanded leafroller**) larval feeding damage on apple foliage observed. **Rosy apple aphid** nymphs and adults present, causing damage. **Tarnished plant bug** fruit-feeding damage observed.

PHENOLOGIES

Geneva:

	5/4	5/11 (Predicted)
Apple(McIntosh):	king bloom	bloom
Apple(Red Delicious):	pink	king bloom – bloom
Apple(Empire):	king bloom	bloom
Pear (Bartlett):	25% petal fall	petal fall
Sweet cherry:	bloom – petal fall	petal fall – fruit set
Tart cherry (Montmorency):	bloom	petal fall
Plum (Castleton):	petal fall	petal fall
Peach (Red Haven):	bloom	petal fall
Apricot (Harrowblush):	fruit set, shucks on	

Highland:

Apple (Ginger Gold):	petal fall
Apple (McIntosh)	80% petal fall
Apple (Red Delicious):	10% petal fall
Apple (Golden Delicious):	bloom
Pear (Bartlett):	petal fall
Pear (Bosc):	80% petal fall
Peach (early):	petal fall
Peach (late):	bloom
Plum (Stanley):	petal fall
Plum (Italian):	bloom
Apricot:	petal fall
Sweet cherry:	bloom

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	4/27	4/30	5/4
Green fruitworm	0.0	0.0	0.1
Redbanded leafroller	19.1	29.7	23.9
Spotted tentiform leafminer	21.5	65.0	32.8
Oriental fruit moth	1.4*	8.2	10.0
Lesser appleworm	0.0	0.0	0.0

Highland, NY

	4/27	5/4
Redbanded leafroller	14.8	17.4
Spotted tentiform leafminer	115.7	66.2
Oriental fruit moth	8.6	13.3
Lesser appleworm	0.0	0.1*
Codling moth	0.0	0.0

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/4/09):	324	163
(Geneva 1/1–5/4/2008):	363	194
(Geneva "Normal"):	298	140
(Geneva 1/1–5/11 Predicted):	404	202
(Highland 3/1–5/4/09):	386	188

Coming Events:	Ranges (Normal ±StDev):	
Green fruitworm flight subsides	243–459	108–242
Spotted tentiform leafminer sap-feeders present	343–601	165–317
Comstock mealybug crawlers in pear buds	215–441	80–254
European red mite egg hatch	231–337	100–168
Lesser appleworm 1st catch	253–531	116–282
Rose leafhopper nymphs on multiflora rose	239–397	96–198
American plum borer 1st catch	389–489	190–264
Mirid bugs 1st hatch	331–443	163–229
Oriental fruit moth 1st flight peak	344–542	174–288
McIntosh at bloom	349–421	172–220

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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