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Update on Pest Management and Crop Development

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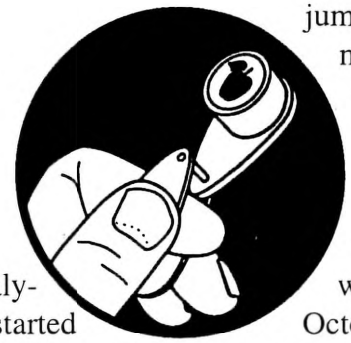
INSECTS

PART OF THE PROCESS

CREEPY CRAWLERS (Art Agnello, Entomology, Geneva)



❖❖ The first Comstock mealybug adult males of the season started showing up just before the start of the July 4th weekend in our Wayne Co. pheromone traps, so it shouldn't be long before we start seeing some adult females in pear foliage, followed by their invasive crawler offspring. For those with a history of infestations of this pest in their pears, the crawlers are the most susceptible stage for chemical control, which we normally expect sometime during the 3rd week of July in the Hudson Valley, and shortly thereafter in western N.Y. The following information is taken from the Comstock Mealybug IPM Fact Sheet, No. 22:

There are two generations of Comstock mealybug in New York, each taking 60 to 90 days to complete, depending on seasonal temperatures. The egg is generally thought to be the primary overwintering stage, but some nymphs and adult females from the second (summer) generation may also overwinter, with eggs being laid in the spring rather than the previous fall. Adult females and males emerge at the same time, from late June to mid-July for the first (overwintering) generation, and late August to mid-September for the second (summer) generation. Adult females are present for a total of 4–6 weeks, and oviposit for about one week after mating. Males survive for only a few days after emerging.

The elongate, orange-yellow eggs are laid in jumbled masses along with waxy filamentous secretions in protected places such as under bark crevices, near pruning cuts, and occasionally in the calyx of fruit. The summer-generation eggs are laid from mid-June through late July, and the overwintering eggs from mid-August into October. The early larval instars of the CMB are similar to adult females (wingless and elongate-oval in shape, with a many-segmented body) except that they are smaller, more oval-shaped, lack the long body filaments, and are orange-yellowish because they have less wax covering. Later instars are similar in appearance, but become progressively browner and redder.

The overwintered eggs hatch from mid-April through May and the nymphs (crawlers) migrate from the oviposition sites to their feeding sites on terminal growth and leaf undersides of trees and shrubs. This hatch is completed by the petal fall stage of pears. Nymphs that hatch from these

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overwintered eggs are active from roughly early May to early July. As the nymphs approach the adult stage, they tend to congregate on older branches at a pruning scar, a node, or at a branch base, as well as inside the calyx of pears. Second- (summer) generation nymphs are present from about mid-July to mid-September.

The Comstock mealybug poses two major concerns for the pear processing industry of New York: First, the emergence of crawlers and adult females from the calyx of pears at the packinghouse creates a nuisance to workers. Second, pears to be made into puree typically are not peeled or cored by processors who buy New York fruit, so infestations can potentially result in unacceptable contamination of the product.

Another problem, of concern to apple growers in the 1930s and 1940s, and again in the Hudson and Champlain Valleys in the early 1980s, is that the honeydew secreted by the crawlers is a substrate for sooty molds growing on the fruit surface. This problem also occurs on peaches in Ontario, Canada. These molds result in a downgrading of the fruit, and are therefore an additional cause of economic loss.

To date, the Comstock mealybug has been a problem to growers of processing pears because of the contamination and aesthetic reasons noted. An infestation generally requires one or more insecticide sprays during the growing season, directed against the migrating crawlers. Examine the terminal growth for crawler activity periodically throughout the summer. Crawler and adult female activity can be monitored best by wrapping white, double-sided carpet tape around low scaffold branches and inspecting for crawlers that have been caught on the tape. They can be recognized with a hand lens or, with some experience, by the unaided eye.

When we detect crawlers in some problem blocks we are monitoring, we'll advise an application of a material such as Provado, Diazinon, Lannate, or (on apples only) Lorsban to control this insect.❖❖

APPLE MAGGOT

SACRIFICE FLIES
(Harvey Reissig, Entomology, Geneva)

❖❖ The apple maggot (AM), Rhagoletis pomonella (Walsh), is a native insect that originally infested hawthorn trees throughout the northeastern United States and Canada. The AM has been a major pest of apples since they were introduced into North America. In unsprayed habitats, it is not uncommon for nearly 100% of apple and hawthorn fruit to be infested by AM, because natural enemies do not reduce population levels of this pest in natural settings. Therefore, some type of control program will continue to be necessary to control this pest at acceptable levels in commercial apple plantings in the foreseeable future.

Biology

The AM overwinters as pupae in soil beneath apple trees. Adults emerge from the ground in late June or early July and begin to lay eggs in the fruit after a 7–10 day pre-oviposition period. Adults remain active during July and August, and a few adults remain active throughout Sep-

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tember and even in October in seasons when the weather is mild. AM females lay eggs underneath the skin of apples. These eggs hatch in about a week and larvae begin to tunnel throughout the fruit. Usually, particularly in cultivars with very hard fruit, larvae grow very slowly while the apple remains on the tree. Larvae usually complete their development after apples have dropped from the tree in the fall. Then they leave the fruit and tunnel into the soil to pupate, where they spend the winter.

General Management Principles

Organophosphate insecticides are very effective in controlling AM adults, and it is very rare to find detectable levels of AM injury in fruit sampled in commercial apple orchards in New York State. Therefore, management programs for AM are based on the assumption that there are no indigenous populations of this pest inside orchards and are designed to prevent flies from immigrating into orchards from outside habitats. Unfortunately, in NY there are usually numerous hosts (abandoned or uncultivated apple and hawthorn trees) that are chronically heavily infested with AM and relatively close to commercial orchards. Apple maggot flies are capable of moving at least several hundred yards to infest other hosts and at least a few flies will always move longer distances of up to one mile.

Extensive research has been done to compare the biology and host preferences of AM reared from apple fruit and various species of hawthorn fruit. Populations living in these two different hosts are considered to be somewhat distinct and are called "host races". There is considerable disagreement among various authorities about whether or not flies infesting hawthorns will immigrate into commercial apple orchards and oviposit in apples. For all practical purposes, heavily infested hawthorn trees near apple orchards should be considered just as much a potential threat as heavily infested wild apple trees.

Elimination of Wild Hosts and Cultivar Differences

Since wild hosts (apples and hawthorns) in close proximity to commercial orchards are considered to be the only sources of potential infestations of AM flies, it is a sensible strategy to eliminate as many of these pest sources as possible. Obviously, it is desirable to create as large a "host-free" area around orchards as possible, but most authorities recommend removing alternate hosts for a distance of at least 100 m from the borders of commercial orchards. It is best to survey wooded areas surrounding apple orchards in the early spring when apples are in bloom because they are easier to detect at this time.

AM prefer to oviposit in certain cultivars of apples, and larvae survive better in some varieties of fruit than others. Early ripening, soft cultivars such as 'Wealthy', 'Cortland' and 'Early McIntosh' are generally more favored for AM oviposition and larval survival than harder, later-ripening cultivars such as 'Rome', 'Delicious', and 'Idared'. 'Northern Spy', which is a cultivar with hard, late-ripening fruit, appears to be one exception to this general rule because it is reported to be a favorite cultivar for AM infestation. Although no commercially produced cultivars are immune to AM infestation, management strategies can be relaxed somewhat in less preferred, harder varieties.

Conventional Protective Control of Apple Maggot Flies

This program does not require monitoring of specific orchard blocks. Whenever it is determined that AM flies have first emerged in an unsprayed habitat (preferably in close proximity to the targeted orchard) the entire orchard should be sprayed initially with an organophosphate insecticide 7–10 days (their pre-oviposition period) later. Additional sprays should be applied at 10–14-day intervals until about the middle of August. Since flies emerge in late June-early July in New York State, this protective program will usually require about 4 sprays annually. Usually, this type of program is only necessary in blocks in which detectable levels of AM-infested fruit have been found, or in orchards located adjacent to extensive numbers of heavily infested wild hosts.

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Reduced Protective Spray Schedule for AM Control

This program also does not require monitoring of specific orchard blocks and is very similar to the conventional program, except that the first spray is applied on a calendar basis on July 15. Then, two more sprays will be applied, on August 1 and August 15. The delay of the first spray for AM control is based on the principle that extensive monitoring studies conducted in NY have shown that flies usually do not begin to immigrate into commercial apple orchards from wild habitats until about the middle of July. This type of program usually is quite effective unless environmental conditions result in a shortage of fruit on wild hosts outside of orchards. Then, AM flies may alter their usual behavior of initially ovipositing in fruit on wild host trees close to their emergence site and may immediately begin to disperse to find suitable oviposition hosts in commercial apple orchards.

Conventional AM Monitoring Program

This program is described in detail in the Apple IPM Scouting Manual (IPM Pub. No. 207, Apple IPM: A guide for sampling and managing major apple pests in New York State) and is based on the idea that it is not necessary to spray an orchard unless a certain population level of flies (monitored by red sticky spheres) is detected immigrating into a monitored block. This technique has been used quite successfully by many growers in NY in "typical" orchards, and the average orchard monitored by this strategy will usually require 1–2 sprays annually for control of AM. Although many growers in NY use apple maggot traps hung along the edges of commercial orchards as a general indication of when to start spraying for AM, most do not adhere strictly to the formal recommendations described for the monitoring program. Some of the most common deviations from the protocol are: (1) Many growers use apple maggot traps only to determine when the first AM spray should be applied and then spray at 14-day intervals thereafter, regardless of subsequent trap catches. (2) Growers often monitor for apple maggots in one or two blocks and then spray the remainder of their orchards based on trap catches in the monitored blocks. (3) Many growers simply apply sprays whenever any flies are captured and ignore the recommended threshold level of 5 flies/trap.

Growers and consultants using an AM monitoring program often are concerned about late season catches of flies on traps during September and October in commercial apple orchards. Studies conducted in NY have not shown that there is any need to apply control sprays after the middle of August, even though flies can still be captured on traps after the estimated period of residual effectiveness of the last spray. Apparently, female AM active late in the season in apple orchards do not oviposit in fruit, even though most of them have completely developed eggs in their ovaries.

This monitoring program should not be used in "high risk" blocks that are adjacent to extensive sources of AM infestations from wild hosts. Using this program in such blocks will not only result in a potential risk of low levels of AM injury, but will also not result in any reduction of pesticide use because experience has shown that in such blocks the traps will simply indicate that a spray is needed every 10–14 days throughout the season after the traps are deployed.

Although there have never been any formal recommendations presented on exactly how many AM traps should be deployed to completely monitor a grower's entire acreage of apples, it should be noted that AM traps, in contrast to pheromone traps for moths, have a very short range of attraction (10–25 yards). Therefore, it is clearly unreasonable to expect that trap catches in any one particular block can be used to monitor fly immigration into another orchard 1–2 miles away! Also, there is some margin of safety built into the monitoring recommendations. The monitoring directions assume that the protective residue from an organophosphate spray will last 10–14 days before another spray is needed. Obviously, residues from organophosphate sprays gradually degrade and become less effective, so that

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the residual effectiveness in killing flies does not decline abruptly on the 14th day after a spray to become completely ineffective.

AM Monitoring, Border Spray Program

This strategy is similar to the standard recommended monitoring program, except that whenever trap catches indicate a need for an AM control spray, only the 3–4 border rows of the monitored block and the ends of rows are sprayed. This program is based on the principles that there are no indigenous populations of AM flies inside monitored orchards, and that AM flies immigrating into orchards from outside sources will be killed by residues on treated border rows trees before they can move into the interior of the orchard.

Although some growers and consultants have reported excellent success using border sprays for AM control, very little research has been done in NY to formally test the effectiveness of this type of program. Therefore, growers should be cautious in using this strategy. This program should probably be used only in "low risk" blocks that are not near sources of potential outside AM infestations and are planted to cultivars which are not favored for AM oviposition or larval survival.

New Insecticides and Tactics for AM Control

Organophosphate insecticides offer many advantages to growers for AM control. They are very effective, relatively inexpensive, generally not toxic to predaceous mites, provide good residual control, and there is no evidence to suggest that flies are becoming resistant to these compounds. However, changing pesticide regulations are resulting in either the loss of registration of some of these compounds or changes in the pre-harvest interval, which may adversely affect using these materials, particularly for late season control of AM.

Recent laboratory and field tests have shown that newer "reduced risk" compounds, such as SpinTor and Provado, have activity against the AM. When these materials were tested in NY, they provided comparable control to a standard treatment of Guthion, but weekly sprays were necessary for SpinTor because of its short residual effectiveness. These materials, particularly Provado, have very little contact activity and must be ingested by the flies to be effective. Laboratory trials have shown that the effectiveness of Provado against AM can be increased by adding sugar as a feeding stimulant, but these same effects have not been demonstrated in the field. Currently, cooperative work is being conducted with Dr. Dan Moreno, a USDA fruit fly specialist in Weslaco, TX, to develop an improved feeding stimulant bait that can be mixed with these types of new insecticides to increase their effectiveness. Additional trials of other new materials are being tested in the laboratory and field against AM, including: photoactive dyes, Calypso, Avaunt, and (outside of NY) poison baited spheres.❖❖

COMING SOON

FIELD DAY ANNOUNCEMENT

❖❖ It's not too early to mark your calendar for the annual N.Y. Fruit Pest Control Field Day, which will take place during Labor Day week on Sept. 6 and 7, as dictated by tradition. For those who keep track of such things, we're back to our traditional practice of holding the Hudson Valley installment on the first day, and then moving to Geneva for the western NY perspective on the second day. Activities will commence in Highland on Wednesday, the 6th, with registration, coffee, etc., at the Hudson Valley Laboratory, 8:30 am. The tour will proceed to the orchards to view plots and preliminary data from field trials involving new fungicides, miticides, and insecticides on apples. On Thursday, the 7th, Geneva participants will register starting at 8:30 in the lobby of Barton Lab, after which we will then view and discuss results from field trials on tree fruits and grapes. It is anticipated that the tour of field plots will be completed by noon. Save the dates.❖❖

GENERAL INFO

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PEST FOCUS

Geneva: **Spotted tentiform leafminer** 2nd flight began 6/15. Degree days (base 43°F) since then = 812. **Codling moth** flight began 5/19; DD50 since then = 815. **Oriental fruit moth** 2nd flight began this week.

Highland: **Codling moth** flight began 5/8; DD50 since then = 1383. **Spotted tentiform leafminer** 2nd flight began 6/12. DD43 since then = 919. **Japanese beetles present in apple trees.**

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–7/17):	1831	1141
(Geneva 1999 1/1–717):	1967	1323
(Geneva "Normal" 1/1–717):	1803	1251
(Highland 1/1–7/17):	2106	1375

Coming Events:	Ranges:	
American plum borer 2nd flight begins	906–1876	973–1337
Comstock mealybug 1st flight peak	1327–1782	824–1185
Apple maggot 1st catch	1045–1671	629–1078
Apple maggot 1st oviposition	1566–2200	1001–1575
Obliquebanded leafroller 1st flight subsides	1420–2452	899–1790
Oriental fruit moth 2nd flight peak	1000–2908	577–2066
San Jose scale 2nd flight begins	1449–1975	893–1407
Redbanded leafroller 2nd flight peak	1479–2443	952–1698

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	7/10	7/13	7/17
Redbanded leafroller	0.6	0.7	0.3
Spotted tentiform leafminer	364	456	449
Oriental fruit moth	1.0	16.5	13.1
Lesser appleworm	3.5	1.0	2.0
Codling moth	5.5	2.3	8.4
San Jose scale	0	0	0
American plum borer	0.1	0	0
Lesser peachtree borer	5.5	2.7	3.1
Peachtree borer	0.5	0.3	1.4
Obliquebanded leafroller	43.4	0.2	0.1
Apple maggot	0	0	0
Dogwood borer	0.6	0.3	0.3

Highland, NY

	7/10	7/17
Redbanded leafroller	0.6	0
Spotted tentiform leafminer	42.4	17.6
Oriental fruit moth	0.2	0
Codling moth	0.5	0.7
Sparganothis fruitworm	0.9*	0.6
Apple maggot	0	0
Lesser peachtree borer	0.9	1.7
Lesser appleworm	0.1	0.5
Dogwood borer	0.1	0
American plum borer	0.7	0.6
Obliquebanded leafroller	0.6	0
Tufted apple budmoth	0.1	0
Variegated leafroller	0.2*	0.1

* first catch

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.