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THE OHIO STATE UNIVERSITY Newsletter Extension

Fruit ICM News

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In This Issue:

Timing Retain® Sprays

Source: Dr. Jim Schupp-FREC, Penn State Dept. of Horticulture, Fruit Times, July 27, 2004

ReTain (AVG) is a plant growth regulator that blocks production of ethylene. When ReTain is applied to apple, several ripening processes are slowed, including preharvest drop, fruit flesh softening, starch disappearance, and red color formation. In order for ReTain to be effective, it must be applied well in advance of the climacteric rise in ethylene production that signals the onset of fruit maturity. If applied too early, the effects may wear off prematurely. If applied too late, a significant portion of the crop may not be responsive to AVG, having already begun to produce autocatalytic ethylene. A second reason for avoiding late applications of ReTain is the 21 day preharvest interval (PHI), which, combined with a late spray date, could result in an undesirable delay in harvest.

The label recommends applying ReTain four weeks before anticipated harvest (WBH). This has sometimes caused confusion, as the grower is timing the spray relative to some future, unknown date. A more scientific basis for timing would be to state that ReTain should be applied four weeks before the natural climacteric rise in fruit ethylene, but this is still a future event with an element of uncertainty. The good news is that there is a fairly wide window when ReTain can be applied with optimal results, and a fairly easy way to determine when to apply it.

The best application window for ReTain is about 10 days wide and centered on the four WBH date. For early season varieties, such as Gala and McIntosh, start by estimating when you would normally expect to begin harvesting the variety if no ReTain or ethephon (Ethrel, Ethephon II) were used. Now take into consideration the season. For example, the 2004 bloom date, the ripening pattern of cherries, peaches, and summer apple varieties all suggest that this season is about 10 days earlier than normal in PA. Adjust the anticipated harvest date according to how early or late you estimate the season is, then count back four weeks on the calendar. Now mark the calendar from that date through the next seven days. This is your application window for that early season variety.

Watch for good spray conditions with at least six hours drying time within that week and apply the material at the first opportunity. Congratulations! Your ReTain is on at the right time. Now mark your calendar for 21 weeks after the spray was applied. This is the PHI, as required by the label. You can't legally harvest before this date.

Repeat the same thought process for later varieties, but keep in mind that later varieties are usually less affected by seasonal variation in maturity than stone fruits or early apple varieties. It is usually unnecessary to account for seasonal variation in fruit maturity for Empire and later varieties. See the August issue of Pennsylvania Fruit News for a more in-depth paper on using NAA and ReTain as stop-drops.

Summer Salvos - The Apple Maggot

Source: Harvey Reissig and Art Agnello, Entomology, Geneva, Scaffolds Fruit Journal, July 26, 2004

We're in the traditional 'peak activity' window for apple maggot right now, and there have been a few adults trickling into some grower demo sites we have around the state, so this primer on maggot control strategies bears repeating at this time:

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 keep this pest at acceptable levels in commercial apple plantings for the foreseeable future.

Biology:

The AM overwinters as a pupa in soil beneath apple trees. Adults emerge from the ground in late June or early July (first 2003 catch in selected locations: Highland, 6/30; Geneva, 7/14; Lafayette, 7/17; Sodus 7/23) 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 September 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 NY. 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 meters 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 to early July in NY, this protective program will usually require about four 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.

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 Publication No. 207, *Apple*

IPM: A guide for sampling and managing major apple pests in New York State; also available at: http://www.nysipm.cornell.edu/publications/apple.man/mid.html 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:

- 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.
- 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.
- Many growers simply apply sprays whenever any flies are captured and ignore the recommended threshold level of 5 flies per 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 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 re-entry or pre-harvest intervals, 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, Actara, Assail, 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. Ongoing work is being conducted on 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 Calypso and Spintor, plus sugar-baited spheres.

Kaolin clay (Surround) has also shown good potential for use against AM, although application frequency and rate are key factors in its efficacy for this purpose.

Degree Day Accumulations for Ohio Sites July 28, 2004

Location	Degree Day Accumulations Base 50F	
	Normal	Actual
Akron-Canton	1584	1595
Cincinnati	2094	2114
Cleveland	1650	1567
Columbus	2028	1832
Dayton	1928	1963
Kingsville	1475	1429
Mansfield	1596	1578
Norwalk	1713	1555
Piketon	2089	1991
Toledo	1700	1579

Wooster	1712	1496
Youngstown	1496	1450

Brown Rot Control Materials for Peaches

Brown Rot Control Materials for Peaches				
Material	Rate/100 gallons	Rate/acre	Restricted-entry Interval	Pre-harvest Interval
Benlate 50 WP **OR** Topsin-M 70 WSP *plus* Captan 50 WP Captan 80 WDG	4 to 8 oz 8 oz 1.3 lb 0.8 lb	0.75 to 1.5 lb 1.5 lb 4 lb 2.5 lb	24 hours 12 hours 4 days for 50 WP, 1 day for 80 WDG	3 days 1 day 0 days 0 days
OR Captan 50 WP	2.6 lb	8 lb	see above	0 days
OR Ziram 76 DF	1.5 to 2.7 lb	4.5 to 8 lb	48 hours	14 days
OR Wettable sulfur 95%	6 lb	18 lb	24 hours	0 days
OR Orbit 41.8 L	-	4 fl oz	24 hours	0 days
OR Indar 75 WSP	-	2 oz	12 hours	0 days
OR Elite 45 DF	2 oz	6 oz	12 hours	0 days
OR Pristine 38 WG	3.5 oz to 4.8 oz	10.5 to 14.5 oz	12 hours	0 days

Source: 2004 Commercial Tree Fruit Spray Guide & Microflo Captan 80DWG label

Pest Phenology

Coming Events	**Degree Day Accum. Base 50F**
Spotted tentiform leafminer 2nd flight subsides	1326 1680
Oriental fruit moth 2nd flight subsides	1379 1771
Apple maggot flight peak	1458 - 1770
San Jose scale 2nd flight peak	1459 - 1805

Thanks to Art Agnello, Cornell University

Fruit Observations & Trap Reports

Insect Key
AM: apple maggot
CM: codling moth
ESBM: eye-spotted budmoth
LAW: lesser apple worm
LPTB: lesser peachtree borer
OBLR: obliquebanded leafroller
OFM: oriental fruit moth
PTB: peachtree borer
RBLR: redbanded leafroller
SJS: San Jose scale
STLM: spotted tentiform leafminer
TABM: tufted apple budmoth
VLR: variegated leafroller

Site: Waterman Lab, Columbus
Dr. Celeste Welty, OSU Extension Entomologist

Apple 7/22 to 7/28/04	
Redbanded leafroller	9 down from 28
Spotted tentiform leafminer	1402 down from 2162
San Jose scale	NA down from 32
Codling moth	13.2 up from 12.0
Lesser appleworm	7 down from 15
Tufted apple budmoth	0 same as last wk
Variegated leafroller	3 down from 7
Obliquebanded leafroller	0 down from 1
Apple maggot (3 traps)	1 up from 0

Site: Holmes, Wayne, and Wayne Counties
Ron Becker, IPM Program Assistant

Apple: 7/21 to 7/28/04	
Redbanded leafroller	Holmes: 6 up from 2
	Wayne: 0.3 down from 1
	Medina: 0 down from .75

Spotted tentiform leafminer	Holmes: 240 up from 180
	Wayne: 980 up from 420
	Medina: 660 down from 675
Oriental fruit moth	Holmes: 0 same as last wk.
	Wayne: 1 up from 0
	Medina: 0 same as last wk.
Codling moth	Holmes: 2.0 up from 1.3
	Wayne: 12.1 up from 5.2
	Medina: 0.83 up from 0.5
Apple maggot (sum of 3 red ball traps, no lure)	Holmes: 0 same as last wk
	Wayne: 0 same as last wk
	Medina: 0 down from .25
Lesser appleworm	Wayne: 13 up from 5

Peach: 7/21 to 7/28/04	
Peachtree borer	Holmes: 5 up from 1
	Wayne: 4 up from 3
	Medina: 0 same as last wk.
Lesser peachtree borer	Holmes: 1 up from 0
	Wayne: 3 up from 1
	Medina: 0 same as last wk.

Ron's comments: Light aphid found in apples. Areas of brown rot found in peaches that had been sprayed with Captan and Indar. Grapes starting to show downy mildew.

Site: West District; Huron, Ottawa, Richland, and Sandusky Counties
Lowell Kreager, IPM Scout/Technician

Apple 7/20 to 7/27/04	
Apple maggot (3 trap sum)	0.0 same as last week
Codling moth	1.1 up from 0.8
Lesser appleworm	3.6 up from 2.4
Oriental fruit moth	2.0 up from 1.3
Redbanded leafroller	4.3 up from 1.4
San Jose scale	1.6 up from 0.0
Spotted tentiform leafminer	667 up from 277
Peach 7/20 to 7/27/04	
Lesser peachtree borer	2.2 down from 2.7
Oriental fruit moth	0.5 down from 1.7

Peachtree borer	0.7 up from 0.2
Redbanded leafroller	4.2 up from 2.2

Site: East District; Erie and Lorain Counties
Jim Mutchler, IPM Scout/Technician

Apple 7/20 to 7/27/04	
Apple maggot (3 trap sum)	0.2 down from 0.3
Codling moth	3.2 up from 0.6
Lesser appleworm	9.5 up from 6.0
Oriental fruit moth	4.4 down from 4.6
Redbanded leafroller	1.5 down from 2.6
San Jose scale	218 up from 115
Spotted tentiform leafminer	523 up from 350
Peach 7/20 to 7/27/04	
Lesser peachtree borer	3.0 down from 3.3
Oriental fruit moth	3.3 down from 4.8
Peachtree borer	6.0 same as last week
Redbanded leafroller	0.5 down from 3.0

Other pests included Japanese beetles, green apple aphids, and obliquebanded leafrollers.

Beneficials included lacewing eggs and adults and lady beetles

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veteran status.

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