scaffolds

Update on Pest Management and Crop Development

FRUIT JOURNAL

May 7, 2007 | VOLUME 16, No. 8 | Geneva, NY

INSECTS

## BOGIES ON YOUR SIX

ORCHARD RADAR DIGEST

Geneva Predictions:

**Roundheaded Appletree Borer**
RAB adult emergence begins: May
Peak emergence: June 15.
RAB egglaying begins: June 10. Peak egglaying period roughly: June 30 to July 14.

**Codling Moth**
1st generation 3% CM egg hatch: June 12 (= target date for first spray where multiple sprays needed to control 1st generation CM).
1st generation 20% CM egg hatch: June 19 (= target date where one spray needed to control 1st generation codling moth).

**Lesser Appleworm**
1st LAW flight, 1st trap catch: May 13.

**Mullein Plant Bug**
Expected 50% egg hatch date: May 19, which is 6 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 23.

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

**Oriental Fruit Moth**
1st OFM flight begins approximately: May 8.
Optimum 1st generation first treatment date, if needed: May 8.

**Redbanded Leafroller**
Peak trap catch and approximate start of egg hatch: May 8.

**San Jose Scale**
First adult SJS caught on trap: May 20.

**Spotted Tentiform Leafminer**
1st STLM flight, peak trap catch: May 15.
1st generation sapfeeding mines start showing: May 24.
Optimum sample date is around May 25, when a larger portion of the mines have become detectable.

**White Apple Leafhopper**
1st generation WALH found on apple foliage: May 16.
❖❖

## IN THIS ISSUE...

LI'L' ANGELS

PINK AND BLUE
(Art Agnello, Entomology, Geneva)

❖❖ This week's predicted stretch of sunny weather and blue skies would seem to be ideal conditions for orchard work, as we rarely have such accomodating spring conditions for an extended period in NY. We're still a little behind that notorious normal schedule that never really seems to occur, but I think this should be taken as a good opportunity to get prepared for the crush of pink bud pest management duties that always seems to coincide during too short a period. A brief assessment of where we stand with insect pests might be useful at this point.

The potential pests of most concern just now are probably rosy apple aphid (RAA), oriental fruit moth (OFM), and tarnished plant bug (TPB), with European apple sawfly and plum curculio lurking in the wings. Unlike the past few years, OFM still has time to make its appearance in most orchards well before bloom this season, very likely this week with the 70-degree highs predicted over the next few days. In blocks with a history of internal worm infestations, you might put up 1 or 2 traps and check them fairly regularly until pink bud to be sure there's no great flush of moths that might indicate a particularly high-risk population this year. Then, of course, comes the question of how to respond when the numbers start building.

To quote the philosopher Yogi Berra, 'You can observe a lot just by watching'. However, I might venture a guess that, even though we may get quite a few moths flying during pink and bloom, the overall temperature ranges we're expecting will result in very little egg hatch until petal fall, when the newly emerged 1st brood larvae will be best handled. Most growers will be using an OP like Guthion or Imidan at petal fall, possibly tank-mixed with a Bt, Intrepid or Proclaim for OBLR, and all of these will have some effect on most OFM populations. In particularly high-risk situations (that is, where you had a hard time managing internal leps last year, and can predict that they'll be back this year), you might want to substitute a more lep-active material like Avaunt or Calypso for one of your petal fall or (including Assail in the list of options) first cover sprays. This way you might get an extra jump on the OFM/CM complex during their first generation, while covering the need to protect against other petal fall regulars like plum curculio and European apple sawfly.

According to your personal philosophy, RAA and TPB can be either perennial challenges, puzzling but non-fatal occurrences, or else a complete flip of the coin. Do you have them, do you need to treat for them, are you able to control them if you do, and does it matter if you don't? These pests also have been slow to tip their hand this season, although we have already seen a few founding colonies in some area orchards. It's possible to scout for rosies at pink, but this is often not practical, given all the other hectic activity at this time. TPB is not a good candidate for scouting, and if the bloom period is prolonged by cool, wet weather, a

continued...

scaffolds
is published weekly from March to September by Cornell University—NYS Agricultural Experiment Station (Geneva) and Ithaca—with the assistance of Cornell Cooperative Extension. New York field reports welcomed. Send submissions by 3 pm Monday to:

scaffolds FRUIT JOURNAL
Dept. of Entomology
NYSAES, Barton Laboratory
P.O. Box 462
Geneva, NY 14456-0462
Phone: 315-787-2341 FAX: 315-787-2326
E-mail: ama4@cornell.edu

Editors: A. Agnello, D. Kain

This newsletter is available on the World Wide Web at: http://www.nysaes.cornell.edu/ent/scaffolds/

pink spray is of little use. You'll have to decide for yourself whether this bug is of sufficient concern to you to justify treating. We have seen few orchards in western NY where TPB control is warranted (and only slightly more in the Hudson Valley), simply because the most effective treatment to use is still a pyrethroid, which a) kills predator mites, and b) still rarely lowers TPB damage enough to be economically justified. If you elect a spray of Ambush, Asana, Baythroid, Danitol, Pounce or Warrior at pink for plant bug, you'll take care of rosy apple aphid (and STLM) at the same time. If RAA is your main concern, you could elect a pink spray (non-pyrethroid options include Actara, Assail, Calypso, Esteem, Lannate, Lorsban, or Vydate) if you have the luxury of a suitable application window. Once again, be sure to consider potential impacts on non-target species such as beneficials, and be aware of your bee supplier's concerns about effects on pollinating bees.

What else is happening at pink? STLM is laying eggs, but most orchards don't seem to suffer too greatly from 1st brood leafminer these days, and a sequential sampling plan can be used to classify STLM egg density at pink or of sap-feeding mines immediately after petal fall (see p. 71 in the Recommends). Treatment is recommended if eggs average 2 or more per leaf on the young fruit cluster leaves at pink, or if sap-feeding mines average 1 or more per leaf on these leaves at petal fall. Sampling can be completed in approximately 10 minutes.

Leafrollers are also out there, but only part of the population is active at this time, so while you might get good control of any larvae you spray now, don't neglect the fact that the rest of the population won't be out (and susceptible to sprays) until bloom or petal fall, so it's probably better to wait until then to address this pest.

Finally, if mites normally need attention in a given block, and you haven't elected (or been able to achieve) a delayed-dormant oil application as a part of your early season mite management program, you'll be needing to rely on either: one of the ovicidal acaricides (Apollo, Savey, Zeal) available for use, whether before or after bloom; a rescue-type product (Nexter, Acramite, Kanemite, Kelthane, Carzol, Zeal) that can reduce motile numbers later on if they should begin to lap at the threshold; or Agri-Mek, which falls somewhere between these two strategies. Like the true ovicides, Agri-Mek should also be considered a preventive spray, since it needs to be applied early (before there are very many motiles) to be most effective, generally within the first 2 weeks after petal fall. Also, as a reminder, Carzol is restricted to no later than petal fall, so it may be of limited use in most programs. For any of the rescue products, the operational threshold in June is an average of 2.5 motiles per leaf (see the chart on p. 72 of the Recommends).❖❖

DISEASES

## BLOOM 'N' HOT

### CONTROLLING THE BLOSSOM BLIGHT PHASE OF FIRE BLIGHT

(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Fire blight remains the most fearsome disease for apple and pear growers because of its sporadic nature and the tree deaths that it can cause. The key for controlling fire blight is prevention of blossom blight. Blossom blight occurs when the bacterial pathogen, *Erwinia amylovora*, colonizes stigmas in open flowers and then invades flower nectaries at the base of the flower pistil. The antibiotic streptomycin has been used for more than 50 years to prevent *E. amylovora* from reaching the flower nectaries, and strep sprays are still the preferred control for blossom blight in most regions of northeastern United States.

continued...

**Avoiding streptomycin resistance**

Strep-resistant strains of *E. amylovora* are now prevalent in some areas of Michigan, Missouri, Washington, and California, but strep resistance is uncommon or absent in New York, New England, and the Mid-Atlantic States. Why has strep resistance developed in some geographic regions whereas streptomycin is still effective in other regions? Various explanations can be provided, but probably none of them can be proven. However, strep resistance appears to have emerged primarily in areas where growers applied streptomycin repeatedly after bloom to control the shoot blight phase of fire blight. To understand why post-bloom strep sprays trigger resistance, one must understand the ecology of bacteria.

Only small populations of the many species of non-pathogenic bacteria that live on plant surfaces and in orchard soils are present in spring when apples and pears are in bloom. However, these populations increase rapidly with warmer summer weather. The current hypothesis for development of strep resistance in *E. amylovora* is that summer applications of streptomycin rapidly select for strep resistance in the huge non-target bacteria populations that are exposed to summer strep sprays. The DNA that encodes for strep resistance in other bacterial species is then passed to *E. amylovora*, thereby making the fire blight pathogen strep resistant. (Yes, bacteria have had nifty mechanisms for inter-specific "genetic engineering" before scientists even dreamed of that term!) The probability of triggering strep resistance via blossom blight sprays is relatively low due to the small size of the non-target bacterial populations that are exposed to these sprays, but the probability of triggering resistance increases with increase population sizes during summer.

Unfortunately, some streptomycin alternatives are being inappropriately promoted as "resistance management tools" that will control blossom blight while prolonging the usefulness of streptomycin. There is absolutely no evidence to support the contention that strep alternatives are beneficial except where strep resistance is already present. The fact that streptomycin has been used for blossom blight sprays in New York for more than 50 years without engendering resistance suggests that development of strep resistance is unlikely so long as applications are limited to blossom sprays.

The main reason for using only streptomycin for blossom blight control is that none of the alternatives are as consistently effective as streptomycin. A review of recent publications showed that in more than 15 separate trials, biocontrols such as Serenade have never out-performed streptomycin for blossom blight control. In many cases the biocontrols were significantly less effective. Furthermore, the optimum timing for biocontrols remains uncertain and may be significantly different than for streptomycin. The existing blossom blight models were designed with the assumption that a fast-acting antibiotic could be applied ahead of predicted infection periods, so the models may prove less useful for timing sprays of biocontrols.

Thus, where strep resistance is not an issue, streptomycin is still the best and most reliable control for blossom blight. Needlessly integrating other blight control products into blossom sprays will increase costs, may result in control failures, and does not provide any known benefits for resistance management. The key to resistance management for streptomycin is to avoid strep sprays after bloom. A single post-bloom strep spray is still recommended within 24 hours after a hail storm (if allowed by the PHI restrictions on the label), but that is the only scenario where postbloom applications of streptomycin should be used to control fire blight.

**Timing blossom blight sprays**

Numerous models have been developed to help scientists and growers predict when weather conditions will favor blossom infections and therefore when antibiotic sprays are needed. MaryBlyte and Cougar Blight are the two models that have proved most useful in eastern United States. MaryBlyte is

continued...

a software program that provides excellent predictions based on real-time, user-entered observations of tree growth stage, daily max-min temperatures, and wetting due to rain or dew. Cougar Blight uses similar inputs to generate predictions that can be derived from look-up tables. Information on using Cougar Blight is readily available on-line (http://www.ncw.wsu.edu/treefruit/fireblight/2000f.htm), whereas accessing the copyrighted MaryBlyte software has been difficult in recent years. Details of how to use these models are available elsewhere and will not be discussed here.

The primary value of predictive models is that they help to pinpoint optimum timing for application of antibiotics used to control blossom blight. With fire blight, a spray applied either one day too soon or one day too late can be almost worthless. When antibiotics are applied to far in advance of an infection event, the antibiotic may fail to protect the flowers that will open after the spray was applied and before the infection event. Streptomycin does not redistribute after it dries. If antibiotic sprays are applied after bacteria have already entered plant tissue, some of the infections will escape control.

Older literature suggests that streptomycin may be more effective when applied at night rather than during the day. This observation probably derives from the fact that more streptomycin is absorbed into plant tissue under slow drying than under fast drying conditions. However, any given rate of streptomycin also provides better control when applied at temperatures above 65° F. as compared with applications made at 50° F or below. Thus, the slow-drying benefit of nighttime applications may be negated by cooler night temperatures if there is a significant differential between daytime and nighttime temperatures.

When strep is applied under fast-drying conditions, a minimum of 8 oz of streptomycin per 100 gal of dilute spray (or a minimum of 24 oz/A for medium sized trees) should be applied, even though rates as low as 4 oz/100 gal have been suggested if streptomycin is applied with Regulaid. Including Regulaid with the 8 oz/100 gal rate of streptomycin should further enhance activity. However, using the higher rate of streptomycin plus Regulaid in repeated sprays during a single season is likely to result in marginal leaf yellowing. Marginal yellowing of leaves (Figs. 1 & 2) is not uncommon if

Fig 1.

Fig 2.

continued...

trees receive repeated applications of streptomycin under conditions that allow good absorption. The marginal leaf yellowing has never been associated with adverse effects on the trees or on fruit set.

Finally, a personal observation that does not qualify as "science": Growers too busy to deal with fire blight models might benefit from a crude warning system that we might call the Personal Discomfort Blight Alert (PDBA). Working in the Hudson Valley, I have noted that severe blossom blight infection periods often occur on days when moderate physical activity causes me to break into a noticeably uncomfortable sweat. The discomfort comes from a combination of high temperature, high humidity, and lack of acclimation to summer temperatures. If I sense PDBA conditions when trees are in bloom, then I know that a blossom blight spray is needed immediately (unless an antibiotic spray was recently applied) because the combination of temperature and humidity required to trigger a PDBA is often indicative of impending shower activity. PDBAs are useful warnings for severe blight infection periods, but they won't predict infections that may occur under more marginal conditions and/or in very high inoculum situations. Also, PDBAs will prove unreliable for individuals running a fever, experiencing hot flashes, or eschewing all physical activity! ❖❖

## STROBY LIGHTS

### CONTROLLING POWDERY MILDEW ON APPLES

(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Mildew has rarely been a problem for apple growers using SI fungicides (Nova, Rubigan, Procure) for scab control because the SIs are very effective against mildew. However, mildew can be a significant problem where SIs are no longer used for scab control and/or where mildew populations have become resistant to low rates of SI fungicides. Milder winters may also be allowing survival of more mildew-infected buds, thereby increasing both the reservoir of primary inoculum and problems with mildew control.

Mancozeb fungicides (Polyram, Captan, Vangard, and Scala) are effective fungicides for apple scab, but none of them will control mildew. Sulfur is an effective mildewcide, but its short residual activity makes it less effective than SI and strobilurin fungicides (Sovran and Flint), especially during the period of peak mildew pressure between bloom and first cover when leaf area is increasing rapidly. Sovran and Flint are very effective as protectant fungicides for controlling mildew, but they lack the rapid "knock-down" or post-infection activity that was characteristic of the SI fungicides. Topsin M may still control mildew in some blocks, but it is unreliable because of widespread resistance to benzimidazole fungicides. Even in new orchards where Topsin M was never used, resistant strains may have blown into the orchard from surrounding orchards or have been imported with the nursery stock.

Mildew infections that arise from buds infected last summer usually become evident and begin to release spores around tight cluster (Fig 1). Thus, secondary infections can occur as early as tight cluster, with extensive infections possible during

Fig 1.

continued...

the pink and bloom stages. With SI fungicides, these prebloom and bloom-time infections could be suppressed by applications at petal fall and first cover even when no mildewcides were applied prior to petal fall. However, where Sovran or Flint will be used as the primary defense against mildew, at least one application is needed prior to petal fall (e.g., at tight cluster, pink, or bloom) because these stroby fungicides lack the post-infection and eradicant activity that the SIs provided.

My preferred program for controlling powdery mildew on bearing apple trees involves one or two sprays of a strobilurin fungicide applied between tight cluster and petal fall, followed by two sprays of an SI fungicide applied between petal fall and second cover, with additional sprays of sulfur at 3–5 lb/A (combined with captan) to protect emerging terminal leaves until late June. Where SI sprays are still effective against scab, the SI sprays could be used before petal fall and the strobilurin sprays could be used at petal fall and first cover. Nonbearing trees may need protection later into the summer because continued mildew infections are possible so long as terminals are still elongating.

In orchards with SI-resistant apple scab, growers should avoid using Nova, Rubigan, and Procure prior to petal fall or first cover because these fungicides may actually stimulate scab problems if any scab infections become established in trees. If primary scab control is less than 100% effective in SI-resistant orchards, then applying SI fungicides sometimes seems to increase the severity of secondary scab infections. The SI fungicides cannot promote scab growth so long as no scab is established in the trees, so using SI fungicides for mildew control in orchards with SI-resistant scab poses no problems so long as primary scab is completely controlled. Nevertheless, Flint, Sovran, or triadimefon may be better choices for mildew control in orchards where SI-resistant scab is known to exist.

Triadimefon (sold as Bayleton, Triadimefon or T-50) is an SI fungicide, but it has no activity against apple scab and therefore should not cause any stimulation of secondary scab in SI-resistant orchards. When it was first introduced, Bayleton was effective at rates of 1.5 to 2 oz/A. However, the mildew population in many NY apple orchards has apparently shifted toward resistance because private consultants now tell me that triadimefon must now be applied at rates of 4–5 oz/A to control mildew in many Hudson Valley orchards.

Some growers in western NY have reported that Nova is also losing effectiveness against mildew when applied at low label rates. Mildew with decreased sensitivity to Nova can be expected to show reduced sensitivity to other SI fungicides as well. Thus, orchards where mildew can be controlled only with higher rates of Nova will probably also require higher rates of triadimefon, Rubigan, or Procure. Even though apple mildew has lost some sensitivity to SI fungicides, we have not yet heard of any control failures when SI fungicides (including triadimefon) were used at higher labeled rates.

Mildew control failures that have been attributed to decreased effectiveness of SI fungicides may actually have other causes. In some orchards, poorly calibrated sprayers that provide adequate scab control may contribute to mildew problems. Rains that create scab infections also redistribute fungicide residues, and that redistribution may partially compensate for poor spray coverage as it relates to scab control. However, mildew can infect leaves in the absence of rainfall or wetting periods, and it therefore can infect any leaves left unprotected due to poor spray coverage.

Dry bloom periods such as we are currently experiencing in the Hudson Valley also favor mildew development in other ways. First, the lack of rainfall means that no mildew spores are being washed away and inactivated by rain. Furthermore, spray intervals get stretched during dry springs because we know there is little reason to spray for scab when no rains are being predicted.

continued...

Increasing the interval between fungicide sprays during dry spring weather makes perfect sense. To maintain control of mildew, however, Sovran or Flint should be applied ahead of the stretched interval or else an SI fungicide (with triadimefon as a viable option) should be included when the spray program is resumed. In either case, a properly calibrated sprayer and good spray coverage are especially important for controlling mildew in years when extended dry periods allow spray intervals to be stretched. ❖❖

HORTICULTURE

HERE'S THE SKINNY

## BLOOM THINNING – APPLES

(Steve Hoying, Horticultural Sciences, Highland)

❖❖ Both eastern and Western New York look to have a full crop of apples this year and bloom is just around the corner. With this type of crop to thin, we think that a multi-step thinning approach can work reliably. Consider bloom thinning as the first opportunity during this growing season to thin.

Applications should be made at 50% bloom with caustic thinners such as Wilthin or ATS with Pomalin on appropriate varieties such as Fuji, Gala, and Delicious. The timing window is very narrow (1–2 days), since the goal is to allow the king bloom to be pollinated, and then apply the chemical to prevent further pollination of other flowers. Thinning response with the caustic blossom thinners is not weather dependent, and fruit injury can occur with high rates and slow drying conditions. The use of NAA at full bloom generally gives only a very moderate thinning response and is generally not recommended. As with any NAA spray, results will depend on weather conditions surrounding bloom. A frost before application greatly increases the amount of thinning obtained. Any

Figure 1. Bloom thinners should be applied after pollination of the King flower and before pollination of the side flowers. This is a very narrow window for application!

damage to fruitlets and leaves results in greater chemical uptake. The amount of sunlight 3–5 days before application also has an important effect on chemical thinners. Foliage is more succulent with cloudy weather and takes up more of the thinning chemicals. In addition, cloudy conditions result in reduced carbohydrate supply for fruit growth, which results in greater natural fruit drop.

Temperature also influences the uptake of NAA. Ideal temperatures the day of application are 70–80 degrees. Application of NAA above 80 degrees results in substantially greater uptake and more thinning, lower than 70 degrees, poorer uptake and less thinning. The time of day application is made is not important, but be sure conditions (e.g. wind) are ideal for thorough coverage. Temperature and sunlight for the 3–5 day period after thinning also affects the amount of thinning obtained. Warmer temperatures increase thinning response, colder ones decrease response. Finally, night temperatures have been shown to be extremely important in thinning response. Night temperatures above 60 °F give greater thinning response. These conditions use up carbohydrates produced during the day at a fast rate, resulting in a deficit of resources for fruit growth, and causing the weakest fruit to drop. The greatest thinning can result if warm tempera-

continued...

tures are combined with intense cloudy and warm daytime weather. Under these conditions, the tree produces little reserves during the day and at night the fruits use up all the reserves produced during the day, making the fruitlets very susceptible to the stress caused by chemical thinners. In contrast, the least effective thinning is achieved when bright, warm daytime conditions are accompanied by low night temperatures. Low day AND night temperatures, regardless of light levels, cause little stress to the tree and fruit, and the thinning response is poor.

Growers should critically examine the weather forecast for the 3–5 day period following application of thinners and adjust rates up or down 50% based on forecast temperatures and sunlight levels.

The next step in this approach is an application of thinner at petal fall. Cameo, Delicious, Empire, Fuji, Gala, Golden Delicious, Jonamac, Liberty, Macoun, Rome, and Spartan will all benefit from this timing. Adjust rates according to each variety. Be sure to refer to the Cornell Pest Management Guidelines for Commercial Tree-fruit Production for complete details at www.nysaes.cornell.edu/ent/treefruit/. ❖❖

## PEST FOCUS

Geneva: **Spotted tentiform leafminer** and **oriental fruit moth** 1st catch.

Highland:
**European red mite** nymphs present in apple.

## PHENOLOGIES

Geneva:

| | 5/7 | 5/14 (Predicted) |
|---|---|---|
| Apple(McIntosh): | early pink | bloom |
| Apple(Red Delicious): | tight cluster | king bloom |
| Pear: | white bud | bloom |
| Sweet cherry: | 50–100% bloom | petal fall |
| Tart cherry: | early bloom | bloom–petal fall |
| Peach: | early bloom | petal fall |

Highland:
Apple (McIntosh, Ginger Gold): bloom
Apple (Empire): 50% bloom
Apple (Golden Delicious): king bloom
Apple (Red Delicious): 50% king bloom
Pear (Bartlett/Bosc): bloom
Peach (early, late): petal fall
Plum (Stanley, Italian): bloom

INSECTS

NEW *OP*TIONS

A PETAL FALL PREVEIW
(Peter Jentsch, Entomology, Highland)

**Living with the OP transition or transforming to a Non-OP Insect Pest Management Program from Petal Fall to First Cover**

❖❖ Since the mid-sixties, the organophosphate (OP) class of insecticides has played an important role in apple insect pest management. Their use as broad-spectrum insecticides, especially at the critical petal fall–2nd cover period has allowed for significant and consistent reductions in fruit damage caused by a diverse and persistent insect pest complex. IPM scouting techniques were developed during the OP era and the establishment of economic damage thresholds has been based on their use. But we have entered a time of transition in apple insect pest management in which the use of the organophosphate class of insecticides will continue to be a much smaller component in pest management strategies. For some producers, their use has already been eliminated altogether.

Some farms will continue using the OPs, adapting to label changes that increase both reentry intervals (REI) and pre-harvest intervals (PHI), while decreasing the number of yearly applications and per acre rates. Guthion 50WP will see greater restrictions based on its use until its eventual phase-out in 2012. In apples and pears, a total of 8 lb of formulated product/A is allowed in 2007. In 2008-2009 the rate decreases to 6 lb of formulated product/A. In 2010 it decreases to 4 lb/A and 3 lb/A in 2011-2012. There is now a 60-ft buffer required from permanent bodies of water and occupied buildings, and a PHI in Pick-Your-Own operations scaled from 33 to 44 days, according to use rate.

Many growers may opt to use Imidan in place of Guthion during the petal fall period for its broad-spectrum activity. Imidan 70WP label changes do not affect PHIs (7d on apple), but REIs for tree fruit crops went from 24 hours to 3 days. The Imidan rate range is 2 1/8 to 5 1/3 lb/A. Research data comparisons between these two OPs conducted at the Hudson Valley Lab suggest using Imidan at the higher range achieves comparable control to Guthion, especially in high plum curculio (PC) pressure blocks. Lorsban 75WG is restricted to prebloom use in pears but may be used up to and including petal fall in apples and post-bloom as a trunk spray for borers. Its use as a petal fall application will allow for a more timely and very effective application against overwintering obliquebanded leafroller and can be used as a rotational material for insecticide resistance management in alternating years. It has good efficacy against PC, while data conducted at the Geneva experiment station suggest it offers better control of PC than the 50WP formulation (Reissig 1999).

For producers opting not to use the OPs this season and in the years to come, we should take some time to consider the ramifications of this transition into new classes of chemistries for insect control. The bright side of the story is that we presently have a number of materials that have demonstrated excellent control of the key insect pests of pome fruit. The downside of this transition is the importance we will need to place on the efficacy of these newer materials against what we would have considered to be secondary pests, such as codling moth, which had been "unconsciously" managed with the OPs in the past. To take this a step further, codling moth had been managed primarily at 1st cover by an OP directed at plum curculio and, for the 2nd generation, using an OP directed at apple maggot in July and August. If the products we use have little or no internal worm efficacy, you will need to consider monitoring internal leps with pheromone traps (codling moth, oriental fruit moth and lesser appleworm), degree day development of these insects, and fruit damage assessments throughout the season.

continued...

Considering the newer NYS-registered pyrethroids (IRAC class 3), they are very similar to each other with regard to activity against the pest complex, being broad-spectrum and generally detrimental to the predatory mites and insects. From studies conducted in vegetable crops on lepidopteran larvae, they appear to decrease in efficacy as temperatures increase, suggesting that they are most effective during the spring.

Warrior (lambda-cyhalothrin) and Proaxis (gamma-cyhalothrin) are encapsulated-suspension synthetic pyrethroid insecticides, both having a 2.56 to 5.12 fl oz/A rate range on pome fruit. They differ slightly in chemistry with regard to having a double or single isomer, respectively. This slight alteration appears to give gamma-cyhalothrin greater residual, when in comparative tests on vegetable crops, Proaxis demonstrated a longer delay of aphid re-infestation than other pyrethroids (Michigan State 2006). Baythroid (cyfluthrin) was registered in NYS on apple last year and is restricted to two applications per year and a total of 2.8 oz per season. Danitol (fenpropathrin) has been available for at least 7 years in NYS, but up until this season was used at less than the federally labeled rate in NY (10 2/3 fl oz/A); it is now allowed for use at 16 oz/A. This material has shown to have good control of the pest complex, with two notable attributes, compared with the other pyrethroids. Danitol has demonstrated strong miticidal activity at the reduced rate, and has been used extensively on the west coast for managing their stink bug complex at the higher rate. It has not been a proven management tool for the stink bug complex in NY at the reduced rate. Ramifications for the use or overuse of the pyrethroids include the significant reduction of the beneficial phytoseiid Typhlodromus pyri and possible development of resistance by both the internal lepidopteran larvae complex (codling moth, oriental fruit moth and lesser appleworm to name but a few) and of course, obliquebanded leafroller. As OP replacements, they should be employed judiciously.

The newer OP replacement materials fall into diverse classes. The neonicotinoids (IRAC class 4) include Provado, Assail, Actara, and Calypso. They have strikingly different impacts on the insect pest complex. They have in common excellent control of the leafhopper complex, yet poor efficacy against obliquebanded leafroller. Assail stands out as an excellent internal lepidopteran larvae, apple maggot and aphid complex management tool, yet is weak on plum curculio. Actara and Calypso are excellent materials for plum curculio and European apple sawfly (EAS), but Calypso has demonstrated superior activity against the green aphid complex and internal lepidopteran larvae and will perform well at petal fall for these reasons. Calypso is allowed only 2 applications per season and its placement based on its pre-harvest interval of 30 days will limit its use near harvest on early varieties. Provado has been the industry standard for the past ten years in leafminer management, and its use at reduced rates for leafhopper and aphid management has made it significantly more cost-effective. Yet it has been shown to increase European red mite populations in trials at the Hudson Valley Lab, even at reduced rates.

Avaunt (indoxacarb), another newcomer to the field and in a class of chemistry all its own (oxadiazine; IRAC class 22), has been used widely as an OP replacement for managing PC, EAS, apple maggot, leafhoppers, codling moth and oriental fruit moth. With a 12-hour re-entry and 14 days to harvest, it can be used as a late-season material. Yet with 4 allowable applications, it can also be used during the petal fall timing as an OP replacement for PC and codling moth management at PF through 2nd cover. In field trials, it has been comparable to Imidan against PC, while in large blocks it has provided good commercial control of this pest. ❖❖

## INSECT TRAP CATCHES
## (Number/Trap/Day)

### Geneva, NY

| | 4/30 | 5/3 | 5/7 |
|---|---|---|---|
| Green fruitworm | 0.1 | 0.3 | 0.0 |
| Redbanded leafroller | 3.8 | 5.7 | 3.0 |
| Spotted tentiform leafminer | 0.0 | 0.0 | 1.1* |
| Oriental fruit moth | 0.0 | 0.0 | 0.1* |

### Highland, NY

| | 4/30 | 5/7 |
|---|---|---|
| Green fruitworm | 0.1 | 0.0 |
| Redbanded leafroller | 2.2 | – |
| Spotted tentiform leafminer | 0.4 | 28.6 |
| Oriental fruit moth | 0.4 | 6.2 |
| Codling moth | – | 0.0 |

* first catch

## UPCOMING PEST EVENTS

| | 43°F | 50°F |
|---|---|---|
| Current DD accumulations (Geneva 1/1–5/7/07): | 274 | 120 |
| (Geneva 1/1–5/7/2006): | 369 | 164 |
| (Geneva "Normal"): | 344 | 182 |
| (Geneva 1/1–5/14/2007, Predicted): | 393 | 196 |
| (Highland 3/1–5/7/07): | 231 | 111 |

| Coming Events: | Ranges(Normal±StDev): | |
|---|---|---|
| McIntosh at pink | 258–320 | 124–156 |
| Red Delicious at tight cluster | 203–248 | 97–143 |
| European red mite egg hatch | 157–358 | 100–168 |
| Green fruitworm flight subsides | 170–544 | 101–239 |
| American plum borer 1st catch | 194–567 | 141–279 |
| Comstock mealybug crawlers in pear buds | 220–425 | 80–254 |
| Spotted tentiform leafminer 1st catch | 73–433 | 40–114 |
| Spotted tentiform leafminer 1st oviposition | 141–319 | 58–130 |
| Spotted tentiform leafminer 1st flight peak | 180–544 | 114–208 |
| Oriental fruit moth first catch | 129–587 | 80–204 |
| Obliquebanded leafroller larvae active | 149–388 | 64–160 |
| Pear psylla first egg hatch | 111–402 | 60–166 |
| Redbanded leafroller 1st flight peak | 180–455 | 101–191 |
| Rose leafhopper nymphs on multiflora rose | 188–402 | 96–198 |


This material is based upon work supported by Smith Lever funds from the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.