scaffolds

Update on Pest Management and Crop Development

FRUIT JOURNAL

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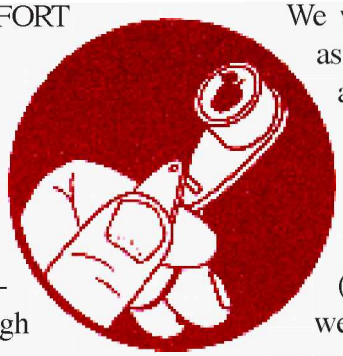
GENERAL INFO

THE BIG EASING

COLD COMFORT (Art Agnello, Entomology, Geneva)



❖❖ I think it's fair to say that winter has made its point, and even though we weren't subjected to notable snow accumulations or particularly harsh freezing temperatures during the past few months, we've gotten our ration of cold weather and most people are ready for things to start warming up again. I say 'most' only because fruit growers are probably among the minority in not wishing for an early spring, a sentiment that the general population could be forgiven for regarding as a little perverse. Then again, last year at this time we had already had a week of temperatures in the 70s, everyone was in shorts, and apples were at tight cluster, something non-growers don't associate with the sequence of disastrous freezes in April that decimated most of the northeastern US crop. So...time to attend to your final arrangements, preparations, and calibrations; trees are reported to be in good health and ready to confront the growing season, which should get under way in about another week.

Systems Check

One of the things that is actually not being impacted by the sequester, Scaffolds will continue to be offered via email and online this year. We encourage subscribers to inform us of any address changes, so that there are no interruptions in delivery of this newsletter, barring the normal bounce-back messages that result from enhanced spam filters, malware, firewalls and pop-up blockers (remember back when the term "software" sounded hi-tech?).

We will again be sending Scaffolds out as a pdf file via email each Monday afternoon. For those desiring a more screen-friendly format than the double column we currently use, I can send an unformatted plain text version to anyone who requests it, in addition to (or in place of) the pdf. There is also a web version available, which should be up and ready for viewing at the same time as the emailed pdf is sent. *Scaffolds* can be found online at: **http://www.scaffolds.entomology.cornell.edu/index.html**. Please make a note of this address in any bookmarks you may maintain that point to *Scaffolds*.

Also, we will continue to post a version of Scaffolds online that is formatted to be more easily read on smartphones and other mobile devices. Look for "ScaffoldsMD for Mobile Devices" under the current link to the PDF version.

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IN THIS ISSUE…

As always, we are happy to consider contributions (particularly from N.Y. sources) in the form of articles on topics in any of the fruit crop protection or crop production areas, as well as N.Y. field observations, trap data, etc. Our preferred deadline for such dispatches is 2 p.m. on Monday.
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INSECTS

AND SO IT BEGINS

FIRST FLIGHT: CONSIDERATIONS FOR EARLY "WORM" MANAGEMENT IN NY APPLES

(Peter Jentsch, Entomology, Highland; pjj5@cornell.edu)

❖❖ The early "worm" complex found in commercial apples during the pre-bloom period begins with the emergence of the green fruitworm (GFW). In Highland, we traditionally have our first flight of GFW in early March, with our first capture of this insect on the 11th of March this season. This insect group comprises at least three different lepidopteran species whose larvae feed on the foliage, flowering parts and developing fruit of pear and apple. An in-depth look at this insect complex can be found in a PDF of the 1974 NYSAES Food & Life Sciences Bulletin No. 50, "Green Fruitworms", by P.J. Chapman and S.E. Lienk. [http://fls.cals.cornell.edu/OCRPDF/50a.pdf]

In the Hudson Valley, it's a fairly predictable event to catch GFW adults flying during the warmest days of early March, yet the damage to fruit can be sporadic from year to year. This group, comprising many species, includes the speckled green fruitworm (*Orthosia hibisci*), the widestriped green fruitworm (*Lithophane antennata*), and the humped green fruitworm (*Amphipyra pyramidoides*), among others that are aptly named according to predominant physical features the larvae exhibit. Many other lepidopterans follow the GFW

A. Speckled green Fruitworm, *Othosia hibisci* (Guenee)

B. Humped green fruitworm (*Amphipyra pyramidoides*)

C. Widestriped green Fruitworm (*Lithophane antennata*)

D. Bailey green fruitworm (*Lithophane baileyi*) Grote

E. Fourlined green Fruitworm (*Himela interactata*) Morrison

Full-grown larvae of the green fruitworm complex (watercolor paintings by J.A. Keplinger). Adapted from Chapman P. J. And Lienk S. E. Green Fruitworms. New York's Food And Life Sciences Bulletin No. 50, Entomology (Geneva) #6. October 1974

scaffolds
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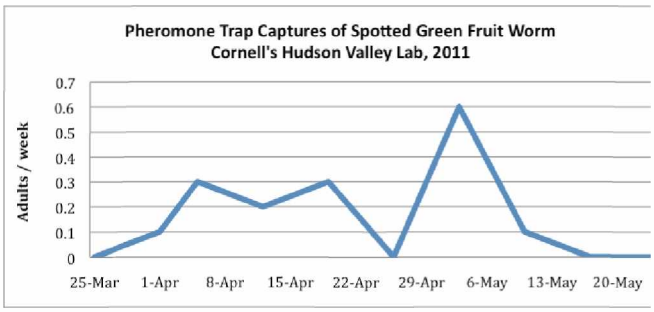
complex during the pre-bloom period and include redbanded leafroller, spotted tentiform leafminer, oriental fruit moth, lesser appleworm, codling moth, and emerging larval populations of overwintered obliquebanded leafroller (OBLR). The GFW and OBLR are of greatest concern to commercial fruit growers prior to and shortly after bloom, and many control measures used against these two insects are effective in managing the secondary lepidopteran pests.

The complex of green fruitworms are members of the noctuid family and fly at night. Flight begins during apple bud development, peaks at tight cluster, and is completed by the pink stage. GFW



adults have a wingspread of about 1.5 inches. The forewings are grayish pink; each is marked near the middle with 2 purplish gray spots, outlined by a thin pale border, with the hind wings lighter in color than the forewings. Females begin ovipositing on twigs and developing leaves when apples are in the half-inch green stage. GFW eggs are about 3/8" in diameter and 3/16" in length. GFW eggs are white with a grayish tinge and ridges radiating from the center. The egg takes on a mottled appearance shortly before hatch. A female will deposit only 1 or 2 at any given site, laying several hundred eggs from late March to mid-May in the Hudson Valley.

In the northern regions of the Champlain Valley and throughout the mid-Hudson Valley, GFW can be a severe pest on early developing apples. The GFW larvae pass through 6 instars, the early stages possessing a grayish green body, brown head and thoracic shield. Mature larvae, about 1.5" in length, have a light green body and head. A number of narrow white stripes run along the top of the body with a wider, more pronounced white line running along each side. The areas between the stripes are speckled white. Early stages of larvae feed on foliage and flower buds, and are found inside rolled leaves or clusters. Mature larvae will damage flower clusters during bloom, feeding on developing fruit and foliage 2 weeks after petal fall with peak populations during bloom. The fruit

remaining on the tree will have both shallow and deeply indented corky scars at harvest, which are indistinguishable from obliquebanded leafroller injury. Larvae then drop to the ground, burrow into

the soil to pupate and overwinter 2–4 inches in the soil to emerge the following spring as adults.

Control

In years of heavy infestation pressure from GFW, as much as 10% fruit injury can occur. Adult pheromone trap captures will provide growers with information on GFW presence and the onset of adult flight. Scouting for larvae to determine levels of pest pressure should begin shortly after tight

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cluster. Although NY has no established thresholds for this pest, a provisional threshold of 1 larva or feeding scar per tree has been used to begin applications in Massachusetts. A more conservative threshold should be applied in high-value apple varieties on dwarfing rootstocks in high-density planting systems. If GFW populations historically cause economic injury to fruit, management efforts should begin from tight cluster to pink to target the pre-bloom Lepidoptera complex. The GFW complex and OBLR have resistance or reduced susceptibility to most organophosphates, with the exception of chlorpyrifos (Lorsban, IRAC Class 1B). If Lorsban is used as a pre-bloom foliar application, it will also control San Jose scale. Asana, Ambush/Pounce, Baythroid, Danitol, Warrior, and pyrethroids in IRAC Class 3, tend to have the highest efficacy against larvae under cooler temperatures (<72°F). Generally, as temperature increases, larvae metabolize/detoxify pyrethroid chemistries more effectively, while OPs, carbamates and newer chemistries tend to be more stable and less susceptible to this phenomenon.

The B.t. products such as Biobit, Dipel, Javelin, and MVP (IRAC Class 11A) also have a low impact on beneficial mites and are very effective against OBLR and the GFW complex. The B.t. products can be applied through bloom, as needed, and their use should be optimized by employing multiple applications at 5–7-day intervals at the lower labeled rates. Intrepid (methoxyfenozide, IRAC Class 18A), another reduced-risk insecticide that is very effective against the larvae, imitates the natural insect molting hormone and works by accelerating the molting process. Intrepid is quite safe to birds, fish, and most beneficial insects. Proclaim (emamectin benzoate, IRAC Class 6), a second-generation avermectin insecticide related to Agri-Mek, is also an excellent insecticide against the GFW complex, and has a low impact on beneficial mites. If European red mite (ERM) has emerged, Proclaim, used with a penetrating adjuvant, would reduce early ERM populations. Altacor (chlorantraniliprole), Belt (flubendiamide) (both IRAC Class 28), Delegate (spinetoram) and Entrust (spinosad) (both IRAC Class 5), have been used successfully against the surface feeding and internal Lep complex. However, placement of these materials has been predominantly at the onset of OBLR summer generation larval hatch, which has provided excellent results in NY State.

As we would be managing the overwintering OBLR larvae at the same time as GFW, we need to consider these applications in light of OBLR management throughout the remainder of the season. Since the development of insecticide resistance is dependent on the volume and frequency of applications of insecticides and the inherent characteristics of the insect species, we should limit use of an insecticide class to a single generation of pest for resistance management purposes. The present model for insecticide resistance management (IRM) practices is to use a single insecticide class for a single generation of insect pest. For example, an IRM program against one of the lepidopteran complex, specifically OBLR, would use effective insecticides listed above (X, Y, Z) in three different IRAC classes (A, B, C) throughout the season:

- Insecticide X (Class A): 1 application @ TC-Pink for GFW, or PF for OBLR, RBLR, LAW, OFM larvae
- Insecticide Y (Class B): 2 applications @ 14d interval; first emergence of 1st brood OBLR larva
- Insecticide Z (Class C): 1 application @ first emergence of 2nd brood OBLR larvae, if needed

Given the historic failures the apple industry has experienced in managing the leafroller and internal worm complex, we should consider designing programs to maintain the effectiveness of these excellent IPM tools beginning early in the season, before the heat of the battle begins. ❖❖

DISEASES

IT'S ELEMENTAL

CONSIDERATIONS FOR COPPER SPRAYS IN TREE FRUITS

(Dave Rosenberger, Plant Pathology, Highland; dar22@cornell.edu)

❖❖ Copper fungicide/bactericide sprays have proven useful for managing fire blight of apples and pears, peach leaf curl and bacterial spot on peaches and nectarines, and bacterial canker on cherries and apricots. When a fixed copper is applied to apples at green tip to suppress fire blight, the copper in that spray will also provide protection against apple scab equivalent to that provided by mancozeb applied at 3 lb/A. Several lines of evidence suggest that the annual use of copper at green tip may also help to suppress DMI-resistant apple scab. However, more work is needed to verify if, and determine why, a single copper spray in spring might impact resistance to DMI fungicides.

In studies completed in the 1930s, researchers found that copper-containing Bordeaux sprays applied with fish oil in spring sometimes suppressed development or release of apple scab ascospores from overwintering leaves. However, they concluded that the impact and consistency of copper was too erratic to be useful for apple scab sanitation and they focused on using urea instead. As a result, copper is no longer presumed to provide reliable suppression of scab ascospores even though copper sprays will protect green tissue from infection when applied before spores are released.

Many different copper products are registered for these uses, and it is difficult to know which product to select for any given application. Factors that impact activity of copper were discussed in an article published last year (Scaffolds Fruit Journal 21[1]:6–9; 12 March 2012). In this article, we revisit a few key issues related to the effectiveness of copper.

In the past, copper products applied to tree fruits at or near bud-break were almost all "fixed coppers" that had low solubility in water. When fixed copper products are mixed with water in a sprayer, the spray solution is actually a suspension of copper particles, and those particles persist on plant surfaces after the spray dries. Copper ions are gradually released from these copper deposits each time the plant surface becomes wet. The gradual release of copper ions from the copper deposits provides residual protection against plant pathogens. At the same time, the slow release of copper ions from these relatively insoluble copper deposits reduces risks of phytotoxicity to plant tissues.

Fixed coppers include basic copper sulfate (e.g., Cuprofix Ultra Disperss, Basic Copper Sulfate), copper oxide (e.g., Nordox), copper hydroxide (e.g., Kocide, Champ), copper oxychloride sulfate (e.g., COCS), and copper ions linked to fatty acids or other organic molecules (e.g., Cueva). Note that basic copper sulfate behaves differently than the non-basic form of copper sulfate, also known as copper sulfate pentahydrate or bluestone. The addition of hydroxyl ions changes copper sulfate into a relatively non-soluble fixed copper. With traditional Bordeaux mix, which is a mixture of copper sulfate plus lime, the chemical change occurs in the spray tank as the hydroxyl ions from the lime complex with the copper sulfate to form a fixed copper.

Efficacy of fixed coppers is dependent on both the amount of elemental copper applied and on how finely the copper has been ground. The impact of particle size becomes obvious when one realizes that a spherical particle with a diameter of 2.8 microns, common in older copper formulations, contains 64 times more volume than a sphere with a diameter of 0.7 microns. Therefore, copper products with a median 0.7-micron particle size theoretically have 64 times more copper particles distributed across and adhering to treated plant surfaces than would occur following application of a

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copper product with a 2.8-micron particle size if rates of both products were adjusted so as to generate the same rate of metallic copper per acre. Furthermore, research has shown that the larger copper particles are more subject to removal by wind or rainfall acting on the leaf surfaces after sprays have dried. Thus, one can achieve both better coverage and better residual activity with a finely ground copper compared with a coarsely ground copper. That fact has allowed manufacturers to gradually reduced the labeled rates for actual amounts of copper applied per acre in new products.

Reducing the total amount of copper applied in each spray is desirable so long as efficacy is maintained because copper can accumulate in soils. High levels of copper in soil have negative impacts on both plant growth and on earthworms and other non-target organisms. However, even with the best formulations, there will be an end-point where the amount of elemental copper applied in bud-break sprays will no longer provide enough residual activity to suppress fire blight and bacterial canker. That low-rate end-point has not been defined for tree fruit applications, but it undoubtedly varies both with the product used and with the post-application weather in any given year. Copper applied to suppress fire blight may have little impact on disease development if all of the copper residues are removed by heavy rainfall before trees reach the tight cluster or pink stage of bud development.

Over the last several years, a number of new copper formulations have appeared on the market with labels that allow for only very low rates of elemental copper in each application. Some of these products (MasterCop, MagnaBon, Phyton 27AG) contain copper sulfate pentahydrate rather than a fixed copper, and they therefore are more soluble in water. Manufacturers are claiming "systemic activity" for some of these products, and the higher solubility of these products may in fact allow more uptake into plant tissue. However, efficacy of these "low-rate" copper products in bud-break sprays is questionable because we lack convincing evidence that the low rates of copper that can be applied with these products will provide the residual activity that we believe is needed to suppress bacterial diseases in deciduous tree fruits. These low-rate copper products may work very well where repeated applications are made at regular intervals as occurs with citrus and some vegetable crops, but more research is needed before they can be recommended for sprays at bud-break on apples and stone fruits.

Most copper labels list a broad range of rates for bud-break sprays. In general, the upper end of labeled rates are suggested for applications that are made at silver tip or green tip on pome fruits, especially when those bud stages occur early and one can therefore expect a long, drawn-out timeframe for bud development. The lower ends of labeled rates are suggested for applications at green tip (or even at half-inch green, in an emergency) if one expects trees to advance rapidly from bud break to bloom. Using excessive rates of copper, especially finely ground coppers that have good residual properties, could result in fruit russetting on some apple cultivars if copper ions are splash-dispersed to developing fruit tissue after flowers reach pink or bloom.

As noted earlier, Bordeaux mixture is made by mixing copper sulfate and spray lime. With the fixed copper products, there is no published evidence that adding spray lime for tree fruit applications will either reduce phytotoxicity or extend the residual activity of the copper. However, some sweet cherry growers have reported that they achieve better control of bacterial canker when they add spray lime to copper sprays even if they are using a fixed copper that theoretically does not need any additional lime. Lab evaluations of seven different fixed copper formulations revealed that, when mixed at rates commonly used for dilute applications, the copper solutions in the spray tank will have a pH near 8, whereas adding spray lime at 2 lb/100 gal raises the pH to 11.0–11.5. (The old traditional Bordeaux mix formulation of 8-8-100 that was recommended for bud-break sprays also

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as a pH near 11, whereas a Bordeaux mix with 8 lb of copper sulfate and only two lb of spray lime has a pH near 8.) Thus, it may be that the high pH of both the old 8-8-100 Bordeaux mix and of the fixed copper-plus-lime solutions used by some cherry growers can reduce populations of the bacterial canker pathogen in ways that exceed the capabilities of a fixed copper applied alone.❖❖

RESIST CHANGE?

FUNGICIDES FOR EARLY SEASON DISEASE CONTROL IN APPLES

(Dave Rosenberger and Kerik Cox, Plant Pathology, Highland and Geneva; dar22@cornell.edu, kdc33@cornell.edu)

For apple growers in New York, the list of available fungicide chemistries has changed very little since last year. However, fungicide strategies may still need to be adjusted to compensate not only for increasing levels of fungicide resistance in the apple scab pathogen, but also for resistance problems in apple powdery mildew.

By now, most apple growers know that the DMI fungicides (Rally, Procure, Indar, Inspire Super, Topguard, etc.) no longer control apple scab in some orchards. Initially, we felt that Indar and Inspire Super might continue to control scab in orchards where Rally and other first-generation DMI fungicides were no longer effective. In fact, trials at Geneva clearly showed that Indar and Inspire Super provided control of scab on Empire apples where Rally was no longer effective. However, those same trials showed that the advantage of Inspire Super over Rally was less apparent on the more scab-susceptible Cortland cultivar.

When McIntosh growers attempted to control DMI-resistant scab with Inspire Super, disastrous levels of scab often develop very quickly. Therefore, we strongly recommend that growers completely avoid Indar and Inspire Super during the spring scab season if they know (based on lab tests) or suspect (based on control failures) that Rally, Procure, or other DMI fungicides are no longer effective against apple scab in their orchards.

Many Michigan and Pennsylvania orchards have apple scab populations that are also resistant to the QoI or strobilurin fungicides (Flint, Sovran, Cabrio, Pristine). So far as we know, the QoI fungicides are still effective against scab in most orchards in New York and New England, although a shift toward resistance has been noted in lab tests for some orchards. To maintain the effectiveness of the QoI fungicides against scab, they should be used only in protectant spray programs wherein products are applied at roughly 7-day intervals during the peak scab and mildew period between tight cluster and first cover.

More recently, both DMI and QoI fungicides have been showing weaknesses against apple powdery mildew. For reasons that are not entirely clear, Inspire Super has always been weaker against mildew than Rally or Topguard. However, even Rally used at 6 or 8 oz/A is no longer controlling mildew in some orchards, and we must therefore assume that mildew is fully resistant to DMI fungicides in these orchards. Dr. Keith Yoder at the Winchester fruit research station in Virginia has also shown the mildew activity of QoI fungicides such as Flint has gradually decreased in his test orchard in recent years. Some growers have also been reporting more mildew than would be expected where Flint or other QoI fungicides had been applied several times during the key mildew control period between tight cluster and second cover.

Apple growers must now face the possibility that both the DMI and QoI fungicide groups may fail to provide acceptable control of mildew, especially if they are applied in only a few sprays per year as was the common practice after DMIs were introduced. New York growers should consider incorporating sulfur into their spray programs in orchards where DMIs and/or QoIs were used last

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year and mildew was still a problem. There is no evidence that mildew will ever become resistant to sulfur.

Sulfur lacks post-infection activity against mildew and therefore must be applied earlier in the season than was typical when mildew was controlled with DMI fungicides. Sulfur at 3 to 8 lb/A (depending on tree size, inoculum levels, cultivar susceptibility, and the brand of sulfur used) should be incorporated into every spray starting at half-inch green if other fungicides are no longer working against mildew. Where other fungicide chemistries are still working, their useful life might be prolonged by including sulfur in at least two or three sprays between tight cluster and second cover, thereby reducing selection pressure for fungicide-resistant mildew both by using different chemistries in successive sprays and by avoiding inoculum build-up that occurs if no mildewcides are applied until petal fall.

In states other than New York, apple growers have some new options this year. Four new products, Fontelis from DuPont, Merivon from BASF, and Luna Sensation and Luna Tranquility from Bayer have all been registered by EPA for use on apples. These new products all contain the SDHI chemistry (SDHI = succinate dehydrogenase inhibitors) and therefore block a different biochemical pathway than either the DMI or QoI fungicides.

It seems unlikely that any of these new SDHI-containing products will gain NY registrations in time for the 2013 season. The lack of NY registrations for the new SDHI fungicides in 2013 is less important than one might initially assume because none of these new products will provide "silver bullet" solutions for controlling fungicide-resistant scab and mildew. The new products are relatively expensive (as new chemistries always are), and even when/where they are available, they will need to be mixed with a contact fungicide (captan or mancozeb) for scab control. The SDHI fungicides should never be used as "bail-out" sprays to arrest scab epidemics after lesions are visible because doing so may lead to very rapid development of resistance to the SDHI fungicides.

Merivon and the Luna products have excellent activity against mildew. Fontelis, though slightly less effective against mildew than the others, is still quite good. However, SDHI-resistant mildew may develop quickly if the new SDHIs are used as a stand-alone chemistry to control mildew. That scenario could develop where the DMIs and QoIs have failed or are failing against mildew. Thus, even when/where SDHIs are available, we may need to start including sulfur at various timings in all spray programs as a resistance management strategy for powdery mildew.

In summary, key points for effective scab and mildew control in 2013 include the following:

1. **Keep inoculum levels low**:

- Use urea sprays or leaf shredding (fall or spring before green tip) to reduce overwintering scab populations where scab was a problem last year.
- Maintain tight scab spray schedules during the prebloom period to prevent primary scab that would otherwise produce huge quantities of conidia during late bloom and petal fall.
- Including a mildewcide in all sprays between tight cluster (or half-inch green if using sulfur) and second cover to prevent mildew from getting a head start as will occur if no mildewcides are applied until petal fall.

2. **Avoid using fungicides that are no longer effective in your specific orchard**:

- The first warning sign for fungicide resistance is decreasing effectiveness of products or chemistry groups that always worked well in the past. Heed the early warning signs by switching to different chemistries BEFORE resistant pathogens create disastrous losses.
- If necessary, plan to control scab and mildew by using combinations of mancozeb, captan, and sulfur. A tank-mix that includes all three of these fungicides will provide excellent protection against scab, rust, and mildew so long as there are no gaps in coverage.

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3. **Where dodine, DMIs, and/or QoI fungicides are still effective, continue to use them judiciously**:
- When they are working, programs that include these fungicides are more powerful than those that consist of only captan, mancozeb, and sulfur.
- Dodine (Syllit) can provide valuable added protection against scab in high-inoculum orchards if it is tank-mixed with mancozeb or captan in one or two applications between green tip and tight cluster. However, the manufacturer has specified that Syllit should never be mixed with copper or chlorpyrifos because, under some conditions, those tank mixes have generated nozzle-clogging coagulates in the spray tank.
- QoI fungicides (or one of the new SDHI fungicides if/when they are available) provide extra protection against both scab and mildew when used in two applications sometime between tight cluster and first cover. However, both the QoIs and the SDHI products must still be tank-mixed with captan or mancozeb for scab control.
- Where they are still working against mildew, DMIs (other than Inspire Super) are best used at petal fall and first cover to target the peak risk periods for mildew and rust diseases. Inspire Super may still be useful in prebloom sprays where DMIs are still working against scab or in summer sprays targeted at sooty blotch and flyspeck. ❖❖

CHEM NEWS

THEM CHANGES

PRODUCT REGISTRATION UPDATE

(Art Agnello, Entomology, Geneva, ama4@cornell.edu; Dave Rosenberger, Plant Pathology, Highland, dar22@cornell.edu; Debbie Breth, CCE LOFT, Albion, dib2@cornell.edu)

Following are some of the more significant changes (so far) to the list of insecticides and fungicides available for use in NY tree fruit crops for the 2013 growing season; more are sure to follow:

Insecticides

Guthion/Azinphos-methyl - Last year, the EPA released an order allowing the use of existing stocks in the rest of the country through September 2013, but up until last week, this use was prohibited in New York State because all state-approved labels prohibited its use after September 30, 2012. However, on March 18, 2013, the NYS DEC reversed its stance and approved the continued use of azinphos-methyl products in New York State until September 30, 2013. The Supplemental Label should be available on PIMS later this week; we'll provide a link when to it when it appears.

Thionex - All endosulfan products are currently registered for use in apples and pears only, and EPA has mandated a stop-use date of July 31, 2013 for endosulfan in pears.

Provado - This original formulation of imidacloprid has been replaced by AdmirePro and is no longer being sold by Bayer CropScience.

Isomate OFM TT (Pacific Biocontrol, EPA Reg. No. 53575-29) - This is the replacement

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product for Isomate M-100, which is in the process of being discontinued. This twin-tube tie dispenser has a field life of 180+ days, and is therefore being recommended for full-season mating disruption of oriental fruit moth and lesser appleworm in all tree fruits.

Two new pre-mix insecticides have been registered in NY by Syngenta, Agri-Flex and Voliam Flexi; both are restricted-use products and their use in Nassau and Suffolk Counties is prohibited. For best effectiveness and insecticide resistance management, the use of pre-mix products should be reserved for situations when multiple pest species are present and appropriately matched to the combination of active ingredients and modes of action contained in the product.

Agri-Flex (EPA Reg. No. 100-1350) is registered for use against a range of pests in apples and pears. This product is a mixture of thiamethoxam, the a.i. in Actara, and abamectin, the a.i. found in Agri-Mek. In apples and pears, it is labeled for control of plum curculio, European apple sawfly, green peach aphids, Comstock mealybug, leafminers and leafhoppers, and mites. Additionally in pears, it is labeled for pear psylla. It has a 12-hour REI, and a PHI of 35 days. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds; it may not be applied between early pink and petal fall in apples, or between green cluster and petal fall in pears.

Voliam Flexi (EPA Reg. No. 100-1319) is registered for use against a range of pests in pome and stone fruits in NYS. This product is a mixture of thiamethoxam, the a.i. in Actara, and chlorantraniliprole, the a.i. found in Altacor and Voliam Xpress. The label lists lepidopteran pests such as codling moth and oriental fruit moth, obliquebanded leafroller, leafminers and green fruitworm; plum curculio; European apple sawfly; leafhoppers and aphids (except woolly apple aphid); pear psylla; plus (in stone fruits only) cherry fruit fly, stink bugs, tarnished plant bug and thrips. It has a 12-hr REI, and a PHI of 35 days in pome fruits, 14 days in stone fruits. This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds; it may not be applied between early pink and petal fall in apples, between green cluster and petal fall in pears, and between swollen bud and petal fall in stone fruit.

Fungicides & Bactericides

Tree Tech **OTC** (Florida Silvics, EPA Reg. No. 64014-11) is a formulation of oxytetracycline, an antibiotic registered for foliar use on peaches and nectarines to control bacterial spot. It is also registered on peach for microinjection to manage peach X-disease, and for control of fire blight on apples and pear, but is not as effective as streptomycin.

Topguard (flutriafol, Cheminova, EPA Reg. No. 67760-75) is a member of the triazole group of sterol inhibitor fungicides. It is exceptionally effective against apple powdery mildewcedar apple rust, and quince rust. Its activity against scab on apples is similar to that of Rally. It will not control scab in orchards where DMI-resistant populations have reached economic thresholds (i.e., where Rally and other DMI fungicides are no longer working). As with Rally, Topguard must be mixed with a contact fungicide both for resistance management and to protect fruit against scab infections.

Herbicides

Sinbar WDG is now registered for use by TKI NovaSource and it is still labeled for use at 0.5 lb/acre in newly planted trees after the first soil settling rainfall. Alion was registered by NYS DEC Oct. 5, 2012, for use in pome and stone fruit established at least 3 years at 5 oz/acre. It is a broad-spectrum, long residual herbicide with no post-emergent activity. Many growers might have applied this last fall.

Please note that the 2013 Cornell Pest Management Guidelines for Commercial Tree Fruit Production are now available as both a hard copy (https://psep.cce.cornell.edu/store/Guidelines/Item.aspx?Item=9) and online at: http://ipmguidelines.org/treefruits/.

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–3/25/13):	31	8
(Geneva 1/1–3/25/2012):	243	130
(Geneva "Normal"):	50	16
(Highland 1/1–3/25/13):	37	8

Coming Events:	Ranges (Normal ±StDev):	
Green fruitworm 1st catch	52–154	13–71
Pear psylla adults active	31–99	8–34
Pear psylla 1st oviposition	40–126	11–53
Redbanded leafroller 1st catch	110–178	40–82
Spotted tentiform leafminer 1st catch	113–213	41–101
McIntosh silver tip	60–110	18–42
McIntosh green tip	95–147	36–62

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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