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Tree Fruit News

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Degree Day Accumulations (through Tuesday 4/27/15)

Location	Base 43F	Base 50F
Chazy	85.0	20.6
Peru*	100.6	25.3
Crown Point	n/a	n/a
Clifton Park*	138.8	42.6
Hudson*	162.4	57.4
Highland HVRL	191.9	73.6
Marlboro*	169.6	61.4
Watermill, LI*	123.0	28.6

* includes estimated data

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Tree Fruit Phenology (Tuesday, April 28th)

Location	Crop	Growth Stage
Champlain Valley	Apple	Green Tip (GT)
Capital District	Apple	Late Half Inch Green (HG)
Hudson Valley (HVRL)	Apple	Early Tight Cluster (TC)
Hudson Valley (HVRL)	Pear	Bud Burst
Hudson Valley (HVRL)	Apricot	Full Bloom
Hudson Valley (HVRL)	Peach	Calyx Red
Hudson Valley (HVRL)	Sweet Cherry	Tight Cluster

Upcoming Pest Events (Degree Day Base 50F)

Pest	Timing	Degree Day Range
Green Fruitworm	Peak Catch	51 - 151
Pear Psylla	1st Egg Hatch	174 - 328
Redbanded Leafroller	1st Catch	112 - 178
Green Apple Aphid	Present	127 - 297
Rosy Apple Aphid	Nymphs Present	91 - 291
Pear Thrips	Present in Pear Buds	137 - 221
Spotted Tentiform LM	1st Catch	81 - 274
Spotted Tentiform LM	1st Oviposition	142 - 273
Obliquebanded LR	Larvae Active	158 - 314

Pink: Spray or Not to Spray (TPB)

By Peter Jentsch, Cornell University Department of Entomology, Hudson Valley Research Lab

The most effective period of the season to control San Jose scale is during the pre-bloom period. Less foliage provides the best opportunity for greater application coverage to the limbs and trunk. Your 2014 harvest pack out data will be the indicator for SJS presence in the orchard (location) and % damage from SJS culls. Multiple approaches for SJS will be needed if multiple blocks suffered injury successive years. (See "Dogwood Borer and Scale: Not to be taken lightly"). This insect aside, is there a need to make insecticide applications to your pome fruit during pink in Eastern NY?

During tight cluster through pink insects begin to emerge from overwintering sites. They overwinter in, or make their way to tree fruit orchards beginning at tight cluster. As each orchard may have dramatically different insect pest pressure during the pre-petal fall period, your orchard should be assessed at pink to determine the need for insect management prior to bloom.

Some factors that play into pre-bloom management decision making:

I. Insects species in your orchard that will or have caused injury to developing flowers and fruitlets
II. Bees: native or commercial honeybee hives and the bee keeper contract constraints
III. Timely honey bee hive removal
IV. Successful pollination and preservation of the king fruit during bloom

Pre-Bloom Insect Species Causing Injury to Developing Flowers and Fruitlets:

Tarnished Plant Bug, *Lygus lineolaris* (TPB). The insect infests over half of the cultivated plant species grown in the United States. It has piercing-sucking mouthparts and is a serious pest of fruit and vegetable in the Eastern US. Tarnished plant bug overwinters in the adult stage under leaf litter, stone walls, tree bark and other protected places along the edge of orchards. At the end of April, the adults become active and begin laying eggs in crop and weed hosts. The overwintering adult population peaks at about the pink stage of apple (early May in New York State).

Adults are 0.25 in. long, oval, and somewhat flattened. They are greenish brown in color, with reddish brown markings on the wings. A distinguishing characteristic is a small but distinct yellow-tipped triangle in the center of the back, behind the head.

Tarnished plant bug will move to buds and developing clusters as temperatures increase, moving back to suitable ground cover as temperatures fall. Maintaining the area beneath tree canopies 'weed-free' and the fescue-based sod in alleyways mowed will prevent buildup of flowering plants and reduce TPB activity.

TPB Injury to Gala. Hudson NY, 2008

The tarnished plant bug causes injury to tree fruits when it feeds and lays eggs. Damage occurs primarily in the spring on flower buds, blossoms, and young fruit, although bleeding of sap may result from twig and shoot injury. On apple trees, some early egg laying may take place in the buds. However, most eggs are laid in the developing fruit starting at bloom.

The insect begins feeding first on buds and later on developing fruit. Small droplets of sap may be present on the surface of injured buds. Within 1 or 2 weeks after feeding, the flower clusters may appear dried and the leaves distorted, with a distinct hole where the insect fed.

Generally, later damage to developing fruit is more important than earlier feeding on flower buds. In apples, feeding can cause punctures or deep dimples to form as the fruit develops, and in peaches various deformities known as "catfacing" occur.

The damage to apples caused by egg-laying is usually deeper, resulting in more distorted fruit often with blemishes or "scabs". Damage early in the season tends to be near the calyx end of the fruit, and later injuries tend to be

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TPB Adult

Pink: Spray or Not to Spray (TPB), continued from previous page

elsewhere. Cultivars differ in their susceptibility to damage, with depressions or scabs in some being less pronounced. Location of tree fruit near broad-leaf weed hosts edges of ponds or hedge rows also influences the likelihood of injury from TPB.

The use of unbaited, nonreflective, white sticky boards hung low in the trees to effectively monitor TPB can help in determining TPB activity. The best places to set the traps are in lower areas such as ditch banks and in hedgerows, which are favorable overwintering sites of the adults. White sticky traps are available commercially.

A biological control parasite introduced into the Northeast from Europe that has been attributed to reduced TPB populations in both apple and alfalfa. This wasp parasite of the TPB, P*eristenus digoneutis* (hymenoptera: braconidae) is believed to have reduced both damage and occurrence of the TPB.

TPB Management:

- If your pack-out has greater than 4% culls from TPB an application is warranted.
- In varieties such as Honey Crisp in high density systems, lower injury levels may equate to economic injury.
- Target for application: sustained temp. >70 for three days or more beginning at TC.
- Applications at both TC and Pink were found most effective in years when TPB feeding is early and high.
- Pyrethroids have been shown to be very effective against TPB during the pre-bloom period.
- Neo-nicotinoid insecticide use at pre-bloom is less effective, and may NOT be acceptable to bee keepers.
- In years where the king fruit sets & grows, followed by cooler delayed bloom, it becomes susceptible to plum curculio injury. A pink pyrethroid will protect fruit by reducing early PC migrations during late pink and early bloom.
- In years when bee keepers are delayed in hive removal, pink applications will reduce European sawfly and plum curculio injury to sizing fruit.

So, to answer the question "to spray or not to spray at pink' for TPB. If economic injury has been observed in the past few years in high valued fruit that exceeds the cost of the applications per block then treatment is warranted.

Important to note: The mite, *Typhlodromus pyri*, is a very effective predator, shown to manage European red mites (ERM), Panonychus ulmi. ERM feed on leaves of apple trees and interfere with photosynthesis and production of carbohydrates, reducing yield, fruit color, overall quality and subsequent fruit bud development. The use of pyrethroids and multiple applications of Manzate dramatically reduce or eliminate *T. pyri* populations. Reduced predation can contribute to mite flare-ups during the growing season.

TPB Nymph

TPB parasitoid *Peristenus digoneutis*

Tree, Post & Trellis Wire Exchange

Orchard planting is underway, soon to be followed by trellis installation. If you find yourself with trees, posts, and wire left over, or if you are just a little short to finish the block, The TPTW Exchange is here to help. Email Dan Donahue (djd13@cornell.edu) with the particulars:

-Trees: Variety, Strain, Rootstock, Caliper, Structure (feathered or whip), quantity
-Posts & Tree Supports: Material (type of wood, conduit, bamboo), diameter, length, quantity
-Wire: Material, Gauge, Length.

Include your farm name, at minimum a township & county, contact phone number & email.

Pricing information is not required. Any transactions between growers are the responsibility of those growers, Cornell Extension is only providing a forum to get buyers together with suppliers.

I will post these "classified ads" on the ENYCHP website at enych.cce.cornell.edu. - *Dan*

Precision Chemical Thinning in 2015 for Gala and Honeycrisp

By Terence Robinson and Poliana Francescatto, Cornell Univ. Dept. of Horticulture; Mario Miranda Sazo, CCE LOF Team; and Dan Donahue and Anna Wallis, CCE ENYCHP

To view the Precision Chemical Thinning presentation from April 29, 2015 by Terence Robinson, et al. click on the following link: http://rvpadmin.cce.cornell.edu/uploads/doc_304.pdf

What is Precision Thinning?

Precision chemical thinning is the second leg of managing apple crop loads more precisely (the first is precision pruning). It utilizes sequential chemical thinning sprays guided by the use of the carbohydrate model and the fruit growth rate model to **more consistently achieve a target crop load**. It uses the carbon balance model as a predictive tool for predicting thinning response prior to application of thinners and the fruit growth rate model for early assessment of thinning response, immediately following application in time to re-apply another spray if needed.

The method begins with first calculating the final fruit number (target fruit number) per tree and secondly, assessing the number of flower clusters on the trees (after pruning) by counting five representative trees. The initial flower number can be estimated by multiplying the number of flower buds by five, the number of flowers per cluster. Once the initial number of flowers per tree is determined, sequential chemical thinning sprays are applied, followed by rapid assessment of the results. Sequential thinning sprays are continued until the final target number of fruit per tree for each variety is achieved.

How is Precision Thinning Implemented?

1) A bloom thinning sprays at 60 to 80% full bloom.
2) The bloom spray is followed by a petal fall spray applied 2 days after petal fall (about one week after the bloom spray) when fruits are 5-6mm in diameter. Before the petal fall spray the results of the carbohydrate model are used to guide the rate of chemical and the exact timing of the petal fall spray.
3) The first two sprays are followed by an assessment of the efficacy of those two sprays using the fruit growth-rate model which indicates the percentage of thinning achieved with the first two sprays.
4) If needed, a third spray is applied at 10-14mm fruit diameter (about 1 week after the petal fall spray). Before the 12mm spray the results of the carbohydrate model are used to guide the rate of chemical and the exact timing of the third spray.
5) The third spray is followed by an assessment of the effectiveness of all previous sprays using the fruit growth rate model, which indicates the percentage of thinning achieved with all 3 previous sprays.
6) Lastly, if still more thinning is needed, a fourth spray is applied at 16-20mm (about 1 week after the third spray) to achieve the target fruit number. Before the 18mm spray the results of the carbohydrate model are used to guide the rate of chemical and the exact timing of the fourth spray.

So You Want to Participate in the 2015 Precision Thinning Program? Excellent, Here's How:

1) Select a mature orchard of either Gala or Honeycrisp.
2) Count flowering clusters the whole tree on five representative trees at pink.
3) Calculate target fruit number for a high yield.
4) Tag 15 spurs per tree on each of five representative trees (75 total spurs) at pink.

continued on next page

What are Your Spray and Timing Options in 2015 for Precision Thinning of Gala:

Option 1	Option 2
Apply a Bloom Spray NAA (4oz/100=8oz/acre on Tall Spindle)	
Apply a Petal Fall Spray (5mm) NAA (3oz/100=6oz/acre) + Sevin (1pt/100=2pt/acre)	**Apply a Petal Fall Spray (5mm)** NAA (3oz/100=6oz/acre) + Sevin (1pt/100=2pt/acre)
Apply a 12 mm Spray Maxcel (48oz/100=96oz/acre) + Sevin (1pt/100=2pt/acre)	**Apply a 12 mm Spray** Maxcel (48oz/100=96oz/acre) + Sevin (1pt/100=2pt/acre)
Apply an 18 mm spray (if needed) Maxcel (48oz/100=96oz/acre) + Sevin (1pt/100=2pt/acre) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)	**Apply an 18 mm spray (if needed)** Maxcel (48oz/100=96oz/acre) + Sevin (1pt/100=2pt/acre + Oil (1pt/100gal water **don't concentrate oil**) (directed to the upper part of the tree)

Precision Chemical Thinning in 2015 for Gala and Honeycrisp, continued from previous page

5) Apply one of two spray protocols of thinning sprays as shown in the tables below/on the next page.
6) Use the carbohydrate model to adjust rates up or down based on model recommendations.
7) Measure fruit diameters on 75 spurs 6 times (3 and 8 days after petal fall spray, 3 and 8 days after 12mm spray and 3 and 8 days after 18 mm spray). **For 2015, it is not necessary to number the individual fruitlets in each cluster**. This protocol change will save much time and trouble. We recommend the use of a caliper with a dial read-out in millimeters. A second person with a clipboard and data form can record the data and greatly ease the process.
8) After each 8-day measurement, enter the data in the provided spreadsheet, and email the spreadsheet within 24 hours to Terence Robinson.
9) Within 24 hours, Dr. Robinson will return an assessment of thinning progress in order to determine the need for a subsequent spray.

Please contact Dan Donahue djd13@cornell.edu or Anna Wallis aew232@cornell.edu of the Cornell Cooperative Extension Eastern New York Commercial Horticulture Program if you would like to train your farm employees to conduct fruit measurements this year. Do not forget to send your target fruit number and flower cluster counts to Terence Robinson (tlr1@cornell.edu) by full bloom).

What are Your Spray and Timing Options in 2015 for Precision Thinning of Honeycrisp:

Option 1	Option 2
Apply a Bloom Spray NAA (4oz/100=8oz/acre on Tall Spindle)	
Apply a Petal Fall Spray (5mm) NAA (4oz/100=8oz/acre) + Sevin (1pt/100=2pt/acre)	**Apply a Petal Fall Spray (5mm)** NAA (4oz/100=8oz/acre) + Sevin (1pt/100=2pt/acre)
Apply a 12 mm Spray NAA (3oz/100=6oz/acre) + Sevin (1pt/100=2pt/acre)	**Apply a 12 mm Spray** NAA (3oz/100=6oz/acre) + Sevin (1pt/100=2pt/acre)
Apply an 18 mm spray (if needed) Sevin (1pt/100=2pt/acre) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)	**Apply an 18 mm spray (if needed)** Sevin (1pt/100=2pt/acre) + Oil (1pt/100gal water) **don't concentrate oil** (directed to the upper part of the tree)

CCE Videos about Precision Crop Load Management

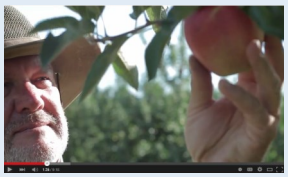
By Mario R.+ Miranda Sazo, CCE LOFT

Learning and implementing precision apple thinning won't be difficult this year. We are launching three new videos to educate and help more NY growers before the chemical thinning season.

The video titled "Precision Crop Load Management – Terence Robinson" shows and explains how precision crop load management can be implemented by Professor Terence Robinson.

Precision Crop Load Management - Terence Robinson

https://www.youtube.com/watch?v=DixETqPgLa4&feature=youtu.be



The video titled "PCLM: Conversations with Growers" shows a group of NY growers who has benefited by adopting this technology in 2013 and/or 2014.

PCLM: Conversations with Growers

https://www.youtube.com/watch?v=S-CFHzA6hJM&feature=youtu.be

There is also a video titled "Learning Precision Apple Thinning" that shows how to implement the precision chemical thinning protocol at your farm.

Learning Precision Apple Thinning

https://www.youtube.com/watch?v=VoC2rRIsb-g&feature=youtu.be

The work of the Precision Chemical Thinning Program is supported by the Apple and Research Development Fund.

Controlling Early-Season Apple Diseases in Organic Orchards

By Dave Rosenberger, Cornell University Department of Plant Pathology, Hudson Valley Research Lab

Until recently, the mantra for disease control in organic orchards was to plant scab-resistant cultivars, to use sulfur and liquid lime sulfur (LLS) for scab where scab-susceptible cultivars were grown, and to use a delayed-dormant copper spray to suppress fire blight followed by streptomycin sprays during bloom when conditions favored that disease. These options left organic apple growers struggling with several problems. First, the heavy use of sulfur and LLS depressed productivity. Second, sulfur, LLS, and copper have not been very effective for controlling rust diseases. Many of the best scab resistant cultivars are highly susceptible to cedar apple rust, and almost all apple cultivars are susceptible to quince rust. The recent change outlawing the use of streptomycin in organic orchards adds a third challenge for organic apple growers this year. Fortunately, recent research from various parts of the US and Europe have provided some new options for addressing the challenges.

In this article, I will not take time to review all of the basic components that must be considered when establishing an organic apple orchard. Suffice it to say that while site selection, soil preparation, cultivar selection, and planting design are essential for any new orchard, these preplant components are even more critical for establishing a successful organic orchard because organic protocols disallow many of the measures (fertilizers, synthetic pesticides, plant growth regulators) that conventional growers can use to compensate for less-than-ideal sites or poor soil preparation. Risks of losses to diseases in organic orchards can be significantly reduced if—

- The orchard is planted with scab-resistant cultivars;
- Orchards are kept at least several hundred feet away from woodlots, hedgerows, and overgrown meadows that provide inoculum for cedar apple rust, sooty blotch & fly speck, and bitter rot;
- Orchards can be located on sites with excellent air drainage so that leaves dry quickly after rains.

Following are updates on disease control strategies for several early-season apple diseases in northeastern United States.

Apple scab: As noted above, apple scab can be avoided or diminished by planting scab-resistant apple cultivars or conventional cultivars that are fairly resistant to scab. Avoid cultivars such as McIntosh, Cortland, and Ginger Gold that are disease magnets and that may require eight to 10 sulfur sprays to control scab. Multiple field trials in various locations have shown that repeated applications of sulfur and/or LLS will reduce apple yield by 25 to 35% compared to comparable plots not sprayed with these products. Most of these sulfur and LLS sprays can be avoided in orchards of scab-resistant cultivars. However, scab-resistant cultivars will still need several sulfur sprays to suppress powdery mildew and to reduce selection pressure scab populations that overcome the Vf scab resistance gene. The Vf gene provides resistance to scab in most of the currently available scab-resistant cultivars. A minimal program that includes sulfur at pink, petal fall, and first cover should help to protect the Vf gene.

In Europe, where the Vf gene no longer provides protection against scab in some localities, organic growers have developed scab control programs that utilize copper, potassium bicarbonate (PB) plus sulfur, and LLS. Converting application rates and timings from the European system can be complicated, not only because of conversions from the metric system, but also because they express product rates as percentages active ingredient in 300 liters of spray solution. The following program is my interpretation of their approach from a published article (Jamar et al., 2010) and from conversations with Marc Trapman, a private consultant.

To control apple scab, some European programs use copper (at 2.1 oz/A of metallic or elemental copper) applied ahead of infection periods between green tip and pink. The labels for copper products indicate what percentage of elemental copper in the formulations. For example, *Kocide 3000* contains 46% copper hydroxide, but only 30% metallic copper. Therefore, the low rate of 2.1 oz of metallic copper/A would be equivalent to 7 oz of *Kocide 3000*/A, which is just a bit below the 0.5 lb/A listed on the *Kocide 3000* label for in-season control of apple scab and fire blight. Copper should never be applied to wet leaves, and risks of fruit russetting can be reduced if it is applied using low volumes of water per acre and if applications are made under fast-drying conditions. Applications after pink are not recommended for scab control because of the risk of fruit russetting, but copper may be needed during bloom to control fire blight.

If copper protection is not in place before rains during the prebloom period, then a tank mix of potassium bicarbonate (PB) at 4.3 lb a.i./A and sulfur 4.3 lb a.i./A

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Controlling Early-Season Apple Diseases in Organic Orchards, continued from previous page

can be used to arrest scab development. This combination is also preferred after pink when copper is no longer considered safe, but rates of both products can be cut in half during bloom to minimize phytotoxicity. PB is very effective against scab spores that are germinating, but it has virtually no residual activity and therefore cannot be applied ahead of rains because it would be washed away before the germinating spores become susceptible to it. Because PB is not systemic, it will not arrest scab development if it is applied after the infection process has been completed. Therefore, PB applications must be timed rather precisely for the period after criteria for a Mill's infection period have been met and during the interval between the accumulation of 200 and 540 degree hours (base 32 F) counting from the time that the Mill's criteria were met. Thus, if temperatures held steady at 52 F during an infection period, it would take 11 hr of wetting before the infection criteria were met (using the revised Mill's criteria established by McHardy and Gadoury). After that, one would accumulate 20 degree-hours (dh) during every hour and PB applications therefore would need to be made between 21 hr from the start of the rain (11 hr for the Mill's period, plus 200 dh divided by 20 degree hours/ hr) and 38 hr from the start of the rain. Using similar calculations, PB applications for a wetting period at 62 F would need to be completed between 12 and 24 hr after the start of the rain whereas for a wetting period at 41 F the application timing would be 28 to 66 hr after the start of the rain. Sulfur is usually mixed with PB to provide forward protection because, as noted earlier, the potassium bicarbonate acts more like a wash that kills spores and then disappears.

Although the post-infection applications using PB as described above have been proven effective, they have the disadvantages of requiring rather precise timing. Meeting those timing criteria will sometimes require spraying during the rain and/or under windy conditions. Nevertheless, the post-infection activity of PB can be useful in some situations.

LLS also provides some post-infection activity, but it will burn leaves and fruit if applied to wet foliage. It will cause some fruit drop if applied during or shortly after bloom because it shuts down photosynthesis for several days after application. For that same reason repeated applications of LLS can significantly reduce yield. In my opinion, one of the best descriptions about how to use sulfur products for scab control was published by Dr. Art Burrell in the 1945 Proceedings of the N.Y. State Horticultural Society. That publication can be accessed on-line via a link at the bottom of the apple scab page on my blog (http://blogs.cornell.edu/plantpathhvl/apple-diseases/apple-scab/). Several cover sprays of sulfur may be needed after bloom to control both scab and powdery mildew. If LLS is used to reduce crop load, then no additional fungicides are required during the week(s) when LLS is applied.

Fire blight: The biocontrol material *Blossom Protect* has provided good control of blossom blight in Europe, the Pacific Northwest, and Virginia (Yoder et al., 2015a), but it has performed with less reliability in trials in Michigan. *Blossom Protect* must be applied several days ahead of anticipated infection periods because it must have time to colonize the flower stigmas before the fire blight bacteria reach levels that could trigger infections. *Blossom Protect* must be applied with the buffer provided by the manufacturer. It can be inactivated by copper, LLS, and potassium bicarbonate, but it is compatible with sulfur.

Copper can also be used to protect against fire blight in organic orchards, although copper applications during bloom may cause fruit russetting. The delayed dormant copper spray using high rates of copper can help to suppress inoculum in orchards with a history of fire blight, but the high-rate copper application at green-tip is not needed (and probably should not be used) if low rates of copper will be applied repeatedly during the prebloom period to control apple scab. Copper should be applied at very low rates during bloom (about 1.5 to 2.0 oz/A of metallic copper), and applications should be made only to dry leaves under rapid drying conditions. The copper must be in place ahead of infection periods because it has no post-infection activity against fire bight. To protect open flowers while minimizing the number of copper sprays that may be needed, copper applications during bloom should be made only when one of the blossom blight models (MaryBlyt or Cougar Blight) indicates that infections are immanent.

Recent work by Dr. Keith Yoder in Virginia has shown that the biocontrol material *Double Nickel*, when applied with low rates of copper either during bloom or to control shoot blight during summer, can reduce the amount of russetting that is otherwise attributable to copper sprays (Yoder et al., 2014a, 2015a). It is not yet clear why this occurs or whether other *Bacillus*-containing biocontrols would act similarly to reduce copper-induced russetting.

Cedar rust diseases: Cedar apple rust and quince rust are notoriously difficult to control with sulfur, LLS, or copper. Eradicating red cedars within several hundred feet of orchards was recommended in older literature and

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Controlling Early-Season Apple Diseases in Organic Orchards, continued from previous page

can significantly reduce disease pressure, but in some locations it is almost impossible to eradicate enough cedars to keep apples free of rust diseases even if trees are regularly protected with sulfur or copper sprays. Most quince rust infections occur between pink and petal fall, but cedar apple rust infections can infect terminal leaves for four to six weeks after petal fall. Quince rust infects apple fruit and therefore usually causes the most losses.

In recent trials, Dr. Keith Yoder in Virginia has shown that the biocontrol material *Regalia* (an extract from giant knotweed) provides good suppression of both cedar apple rust and quince rust (Yoder et al., 2014, 2015). *Regalia* at the full rate of 4 quarts/A applied with *JMS Stylet Oil* provided post-infection activity against quince rust equal to that of *Rally*, but it is not clear whether *Regalia* would have performed as well in post-infection mode if used at lower rates or without oil. Sulfur and oil are not compatible, so *Regalia* must be used without oil where sulfur is being used for scab control or where LLS is being used to adjust crop load. Lower rates of *Regalia* (2 quarts/A) provided good control of quince rust when applied on a regular 7-10 day interval, but the current label indicates that *Regalia* should not be applied to apples before petal fall, Ironically, further down on the label is a recommendation for 1 qt/A to be applied throughout the prebloom and bloom periods to control apple scab. However, it is not clear if the 1-quart rate of *Regalia* that is allowed before petal fall would suppress rust. (Incidentally, *Regalia* has only marginal activity against apple scab.) Combinations of Regalia and sulfur might provide the best approach for controlling rust, scab, and mildew, but I'm not aware that this combination has been tested and I'm not certain what rate of sulfur might be needed to complement the activity of *Regalia.*

Warnings: When using any of the products mentioned in this article, be careful to read the product labels and also to verify that the specific product you wish to use has been approved by OMRI for applications in organic production. Mention of specific products in this article is not meant to imply that the mentioned products are better than similar products that are not mentioned, although we lack data from controlled trials for many approved products. Some of the biorational products can burn petals and/or russet fruit of some apple cultivars, so new combinations of products should be tested on just a few trees of various cultivars to determine that they are safe and effective before they are applied to larger acreages.

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Disease Management in Stone Fruit

By Kerik Cox, Cornell University of Plant Pathology, and Debbie Breth, CCE Lake Ontario Fruit Program. From Scaffolds Fruit Journal, April 27, 2015 Volume 24, Issue 5.

A critical period for brown rot management starts when flower buds start to show color.

Brown rot and European Brown rot

In NY and even in neighboring states, sterol demethylation inhibiting fungicide (DMI or SIs: Indar, Rally, Tilt, Quash, Inspire Super, etc.) resistance in populations of *Monilina fructicola*, the causal agent of brown rot, is fairly widespread. However, DMI resistance in *M. fructicola* is affected by rate and intrinsic activity of the fungicide in question. Fortunately, some DMI chemistries such as difenoconazole in Inspire Super, and higher rates of older DMI chemistries, will allow us to better control DMI resistance brown rot. Hence, the DMIs may still be a viable option in early covers. Previously, we had observed a slow incremental resistance to the components of Pristine (QoI/Stroby & SDHI) in orchard populations in 2006–2010. Interestingly, we have still not found any populations with resistance to DMI and QoI fungicides in recent years. Although little can be said about the persistence of resistance in orchards in the region, it may be that both of these fungicide chemistries can be used sparingly and in rotation. Additionally, we still have

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Merivon under an SLN label. Like Pristine, Merivon is a QoI/Stroby & SDHI combination product that is labeled for stone fruit with a 0-day PHI. The SDHI component in Merivon is unlike the previous SDHI fungicide boscalid, which was included in Pristine. We found Mervion to be very effective against brown rot and other fruit rots when used pre- and post harvest. Most excitingly, Merivon can even be used on sweet cherries.

Currently, we are at the time of year when European brown rot is likely to play a larger role in brown rot infections, and the causal agent of European brown rot, *M. Laxa*, is incredibly sensitive to both DMI and QoI chemistries, even in the same orchard. Tart cherries, sweet cherries, apricots and nectarines are susceptible to European brown rot, which must be managed during cool, wet weather at bloom. If there's time and labor, consider removing any mummies from the orchard, as they will contribute to considerable inoculum. If you do remove mummies, take them from the orchard, as the spring winds could carry spores to the susceptible fruit if they remain on the orchard floor.

Begin fungicide sprays at pink or white bud using Bravo/Echo/Equus (chlorothalonil). If you had blossom or shoot blight in cherries, there is a strong possibility that you have European brown rot in your planting. In this case, start with one of the DMI or SI fungicides instead. After this application, continue with a Bravo/ Echo/Equus (chlorothalonil), program until shuck-split has passed. During this time, consider bringing in Rovral (iprodione), which is a different fungicide chemistry that can be used during the first few applications, but may not be used after petal fall.

As you approach pre-harvest periods, rotate between fungicide classes to minimize the risk of fungicide resistance in brown rot populations. Also, consider the following:

- Alternate DMI with QoI/SDHI (Pristine or Merivon) fungicides during cover sprays to prevent the development of quantitative fungicide resistance. With a 0-day PHI and excellent activity against post-harvest rot fungi, consider finishing your pre-harvest program with Merivon.
- Another possibility would be to use the SDHI fungicide Fontelis. It is effective against brown rot and other stone fruit diseases, but use caution tank-mixing Fontelis. The SLN label does indicate that Fontelis includes oil and cautions the user regarding tank mixes with sulfur and captan. Such captan and sulfur use is commonplace. Like Merivon, Fontelis has a 0-day PHI, and can be applied the day of harvest.
- If allowed on the crop and practical for your spray plan, use an AP fungicide (Scala SC, Vangard). Vangard at 5 oz/acre is labeled for a maximum of 2 sprays per season (but not on sweet cherries), or Scala at 9–18 oz/acre (but not on cherries) using the low rate in mixtures with other fungicides. Scala is labeled for use on apricots, peaches, and plums. Vangard is labeled on apricots, tart cherries, peaches, and plums. The AP fungicides cannot be used on sweet cherries.
- Bear in mind that if the weather is favorable for brown rot, product failures are possible, even with a little quantitative (incremental) resistance.
- The key to preventing the development of fungicide resistance is to use appropriate rates. Do not reduce rates or practice alternate row spraying.
- Make sure to provide considerable protection during the period from petal fall to pit hardening. This is a period when stone fruit (except tart cherry) are most susceptible to brown rot infection. However, such infections may not necessarily become active or apparent until the fruit gets closer to ripening.

Black Knot on Plums and Cherries

The black knots you see right now in plums and tart cherries will provide ascospores that will release under rainy conditions and infect succulent green twigs of the current season's growth, usually at the leaf axils.

Ascospores can be released from these black, tumor-like infections as early as bud break until terminal shoot growth stops. Within this time frame, most of the ascospores are available and the tissue is most susceptible between white bud and shuck split. However, the risk of primary infection can be extended through June if we have a dry spring. Only a few hours of rain are required at temperatures above 55°F to cause a black knot infection, whereas much longer rainy periods are required to produce infection at temperatures below 55°F.

Knots from the current season's infections may become visible by late summer, but are usually not noticed until the following spring, when they begin to enlarge rapidly. Young knots in the year following infection are capable of producing a few ascospores, but the majority of ascospores are often not formed until the second spring. In some situations, what you are seeing in your trees now is a result of an infection 2 seasons ago!

Control of this disease requires some vigilance in pruning out visible swellings from last season, as well as the black knots that have fully matured. Check your

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hedgerows for wild black cherry trees that may also harbor black knot. It may take a few seasons to clean up an epidemic. Be sure to burn the black knots you remove from the orchard, since they will continue to release ascospores from the knots until they are destroyed. In severe pressure years, you should consider an application of fungicide as early as budburst. Under lower pressure, fungicide applications can be delayed until white bud. The fungicide that has performed best in trials is Bravo (chlorothalonil sold as other generics), but alternatives include captan or Topsin M. Be sure to stop chlorothalonil applications at shuck split. Chlorothalonil and captan applied for black knot will also double for brown rot blossom blight protection in tart cherries and plums.

New Apple Grower Page

Backpack Sprayer Videos

Learn to use sprayers more efficiently, learn how to better use modified backpack sprayers to save time and money, and improve safety, by watching the 7 videos created by Rutgers Research Farm. This may be a helpful resource for small, organic and urban farmers, both beginning and experienced. To watch the videos, visit http://snyderfarm.rutgers.edu/snyder-backpack-sprayers.html.
Source: Cornell Small Farms Program.

Quick Links to Tree Fruit Resources on the Web

- Cornell NEWA Website for Weather Info, Computer Models, Pest Management
- Scaffolds Fruit Journal, edited by Dr. Art Agnello, Posted Weekly around 3:00pm Mondays
- Peter Jentsch's Blog on Eastern New York Entomological Challenges *no link there
- Dr. David Rosenberger's Blog on Eastern New York Phytopathological Challenges
- NYS Pesticide **P**roduct, **I**ngredient and **M**anufacturer **S**ystem (**PIMS**) – NYS DEC Sanctioned Information
- The AGRIAN database: Quick Access to Pesticide Labels and Registration Information

Visit the ENYCHP Website

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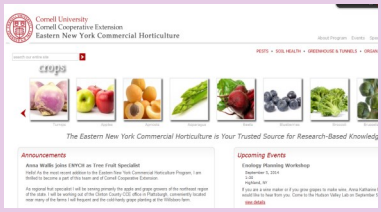

Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide. This material is based upon work supported by Smith Lever funds from the Cooperative State Research, Education, and Extension.

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