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Fruit Bud Development

As of **Monday May 16**, fruit development at the UNH Woodman Horticulture Farm in Durham was as follows:

Pioneer McIntosh apple: bloom.

Peaches: bloom.

Japanese plums: petal fall.

European plums: petal fall.

Pears: bloom.

Blueberries: pink bud to early bloom.

Apple Scab Situation

As of Monday May 16, we had accumulated 615 degree days (base 32) since the scab biofix in Durham. That translates into 75% of the season's supply of ascospores being mature by May 16 in Durham.

We are nearing the end of the rapid maturation phase of ascospore development. Scab risk should remain high for a while. With all the rainy weather due Monday, Tuesday & Wednesday, this should be a major infection period, despite the cool temperatures.



Cedar-apple rust gall releasing spores

Rust Fungi on Apples

Most of you know about cedar-apple rust, and the fact that it requires BOTH hosts, red cedar and apple, in close proximity. Spores from the lesions on apple leaves infect red cedar and create the galls. Spores from the galls on red cedar infect apple foliage. Break the cycle by eliminating one of these hosts, and the disease stops for you. The same is true of quince rust and common juniper. These diseases usually are not too serious. Golden Delicious is probably the most susceptible to cedar-apple rust, but Arlet, Braeburn, Fuji, Gala, Ginger Gold, Goldrush, Idared, Jonathan, Lodi, Mutsu, Prima, and Rome are also susceptible. Quince rust attacks the fruit of apples. I rarely see quince rust injury, but all (?) apple varieties are susceptible under favorable weather conditions. I've seen it on Delicious and Golden Delicious fruit.

In 2009, we confirmed another new rust disease here: **Japanese apple rust**, caused by *Gymnosporangium yamadae*. Basically it is similar to cedar-apple rust, but the leaf lesions of Japanese apple rust on apple show relatively long, finger-like extensions growing from the lower leaf surface. Otherwise, they look orange, just like the familiar form.

Today's photos show the galls on wet May days, with the fleshy orange telial horns fully extended and releasing spores. The bright orange should say to you "hey, we're releasing spores now". The round ones are cedar-apple rust galls (photo on page 1). The quince rust galls are hard to notice unless the telial arms are extended. Those galls extend along the branch. In this example, the gall was eight to ten inches long.



Quince rust gall releasing spores

Fire Blight Risk

This newsletter comes out too infrequently to be much help in monitoring fireblight risk. Also, since I'm not a plant pathologist, I don't monitor the risk very closely. But plant pathologists Glen Koehler (University of Maine) and Dan Cooley (U.Mass.) both actively monitor and report on fire blight risk, and have places for you to follow. Consultants Kathleen Leahy (Polaris Orchard Management) and Robin Spitko & Glen Morin (New England Fruit Consultants) can also help.

Remember that growers have several tools available, including: 1) selecting less susceptible varieties to grow 2) selecting less susceptible rootstocks, 3) copper sprays at green tip, 4) streptomycin sprays around bloom, 5) pruning out, then disinfecting shears, 5) monitoring temperature and wet periods (especially around bloom), 6) controlling pear psylla and potato leafhopper.

Many growers track the hours of wetness and temperature in their orchards. Maryblyt, a predictive model was developed by Paul Steiner at the University of Maryland. The other commonly used model is Cougarblight, developed by Tim Smith, Washington State University. If you don't have access to the tables that show fireblight risk, you can go online. Glen incorporates one (both?) models into his fireblight forecasts, on orchard radar. Remember that we have one NH weather site feeding into [orchard radar in Hancock NH](#).

Dan Cooley's recommendations & predictions are in his newsletter and other locations. [The website](#) is a good place to connect with his information, and learn how to subscribe. Kathleen's company is [Polaris Orchard Management](#). Glen and Robin do not have a website. Their company (New England Fruit Consultants) email address is nefcon@aol.com.

By the way, Dr. Jay Norelli of USDA gave a fire blight workshop here in 2007. His paper and photos are still on [our website](#). It has photos, too.

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Correction Regarding Actara (and other neonics) for Leafminers

I noticed too late (and Lorraine Los at Univ of Connecticut noticed) that I mentioned Actara for leafminers in the last issue...but failed to correct that it is now a **post-bloom** material. Hopefully you noticed that I mentioned this change at the last twilight meeting, and repeat it in the “protecting pollinators” section later in this newsletter. Even though the wording on some neonicotinoid labels technically might allow pre-bloom use (Calypso for example), I suggest you delay until post-bloom.

Three New Publications

I mentioned this at a couple of meetings already, but here’s a chance to link directly to three new publications of mine. The first should be useful to anyone growing peaches or sweet cherries, since both are susceptible to X-disease. The second should be helpful to apple growers, both commercial and backyard growers. The third should be helpful to anyone who grows fruit, vegetables, or corn, and gets bird injury. Enjoy! More are coming, so long as my job continues.

1. [Identifying Choke Cherry -- Source of X Disease](#) (Nov 2010, 4 pgs, color)
2. [Borers in NH Apple Trees](#) (April 2011, 9 pgs, color)
3. [Bird Damage Prevention for Northern New England Fruit Growers](#) (August 2010, 20 pgs, color)

Report Bird Damage to Seedling Field Corn and Sweet Corn

I know that some of you also grow corn, so I thought this reminder would be valuable. Many of you have heard me talk about a new taste repellent for bird control, a chemical called anthraquinone. There is an opportunity to get a special-use exemption (from EPA) for this material in New Hampshire. First, that requires documenting the seriousness and extent of the problem.

If you grow corn in New Hampshire and **have bird damage to seedling corn this year**, please report it to Rob Calvert at USDA/APHIS/Wildlife Services. Rob needs to document how much acreage is affected, and other details. You can reach Rob by telephone at 223-6832, or via email at Robert.T.Calvert@aphis.usda.gov If you have more questions on details, please direct them to Rob’s office.

Pollinators in NH Tree Fruit

Many commercial orchards in New Hampshire rely heavily on honeybees to pollinate the crop. This makes sense, because honeybees are excellent pollinators for most of our tree fruit, and by placing a hive or two in the orchard, you are could be introducing tens of thousands of bees with each hive (if they were strong colonies). Honey bee is a European species. It requires fairly warm temperatures (60F or higher) for foraging. If there is a significant breeze, foragers huddle close to the ground, or in other sheltered spots. If the wind picks up, honey bee foraging stops. Rain stops it, too. Honey bees can forage a long distance, even over a mile from the hive. If they find flowers with nectar close by, they’ll concentrate on those, rather than searching farther afield. Apple blossoms have a relatively high sugar concentration in their nectar, so they are readily pollinated. Pear nectar has much less sugar, so it is difficult to attract honey bees to pollinate them, when there are other choices. Dandelions are great bee lures, and some growers mow the orchard floor, to reduce this competition (for a day anyway).

To improve honey bee pollination:

- 1) place hives in groups across the orchard, rather than large numbers of hives at one end,
- 2) place hives on a pallet or other board, rather than directly on the ground. This reduces the chances of cool water soaking into the bottom, cooling & slowing down activity,
- 3) place hives in a sheltered spot, out of the wind,
- 4) place hives where the morning sun will reach the hive (opening facing east or southeast) and warm it up early,
- 5) If there is no clean water close by (within a hundred yards or so) provide some. Otherwise, your bees will have

to spend some of their time finding and carrying water. Bill Lord told me they used to float a rough pine board in a shallow tray of water nearby. This gave them a landing spot where they could easily drink, but not fall in.

What about native bees? There are over 100 species of NH bees in our collection at UNH. It would not surprise me to learn that there were 200 species of native bees living here in New Hampshire. A similar number has been documented for Maine. Most of our native bees do not have common names. Most live singly, not in nests with hundreds of companions. A few (bumble bees for example) live in nests with a few---perhaps as many as a couple dozen --- in a colony.



Andrenid bee pollinating plums at UNH



Colletid bee I photographed guarding her burrow

Some of our natives fly in rather cool, even wet weather.

Maybe that is

why our early-blooming tree fruit (plums and apricot) at UNH are mostly pollinated by natives. It is usually too cool then for honeybee. Most natives fly short distances to seek nectar. That means that **significant pollination from native bees requires nesting habitat in or close to the orchard**. Some bees nest in tunnels in stems, stumps and twigs. Many bumble bees nest in old chipmunk, mouse or vole nests. About 70% of our native bees nest in the ground. Most of them prefer bare soil to dig their nest tunnels, like the colletid bee I photographed guarding her burrow in Lee.

Preserving Pollinators

If you are lucky enough to have lots of native pollinators, you can preserve them by maintaining the nearby nesting habitat, and possibly consider improving or creating habitat. NRCS is interested in working with growers to do this, and they have a program to assist you. (Contact your county NRCS office.)

You could also consider minimizing insecticide (and some fungicide) use. We recommend not spraying insecticide on crops in bloom. In general, dust formulations are the most toxic, followed by wettable powders, followed by emulsifiable concentrates. The most toxic insecticides seem to be carbamates (like Ambush, Asana, Pounce, Danitol), Diazinon, Guthion, Imidan, Lorsban, Pennacp-M, and Carbaryl. I worry about some of the neonicotinoid insecticides, like Belay. Even though they are now registered only post-bloom on orchard crops, you could kill a lot of bees if there are lots of flowering plants in bloom in the orchard floor. Other neonicotinoids that might pose a similar risk are Provado (only post-bloom use now allowed on apple), Assail, Calypso and Actara (now label says post-bloom only). The Assail label says for leafminers on apple: treat before larvae reach tissue-feeding stage. So basically that is post bloom, but before mines become visible on the **upper** leaf surface. The wording on the Calypso label (under leafminers, apples) allows pre-bloom use, but I suggest targeting sap-feeders just post-bloom). Dr. Marianne Fraser reported to us that the fungicide chlorothalonil was quite toxic to honeybees. Many growers don't think of fungicides as being very toxic to bees, so this was a surprise.

The time of day can affect bee mortality from spraying. In general, the risk is lowest if the application is made at dusk, and therefore has all night to dry before bee activity starts up. Higher risk comes from spraying during the warmth of the day.

Check Apples at Pink for Green Pug Moth?

For most of you, this will not be of concern, but if you have encountered a problem with this insect before, you may need to check this year, too. Green pug is a looper. The tiny yellow-green caterpillars (photo on right) feed a bit on opening leaves and petals. Once flowers open up, the caterpillars move to their preferred site: eating pistils and stamens of the flowers. Then, they leave and pupate. It can puzzle some growers who discover things just a bit too late. They see chewed off pistils & missing stamens, but can't find what did it. In many cases, it is this insect. The fully grown larva is still tiny, and usually has a brick-red line down the back.



Green pug caterpillar

Check for these early in the pink stage. The easiest way is to carry an 8 ½ by 11 pad of white paper (or a white frisbee), and **firmly** tap the flower clusters onto it. This dislodges the caterpillars, and they are easy to see against the white background. At early pink stage, some have not developed the red-brown line down the center of the back. If you see a significant number of them, you might consider an insecticide spray immediately. To my knowledge, no one has figured out a threshold. I assume that one caterpillar can damage one or two flowers.

Consider Checking Cortland Apples at Pink for Rosy Apple Aphid

Rarely do I see rosy apple aphid on other varieties, but on Cortland it is fairly common. The best time to check for them is early in the pink stage. What you're looking for is **opening leaves that are curling up**, with a few aphids inside. The aphids could be dark green, yellow, and a few might even be pink or purplish this early. Their feeding causes fruit in that cluster to be ridged and stunted, sometimes severely. Once the leaves really curl up, you just can't get sprays to reach them. If you've got only a few, don't bother spraying...the cost and other negative effects will be too great to justify.

Don't bother checking other varieties, but if you're really interested, you might see them on Delicious, IdaRed, Rhode Island Greening, or Monroe.

Petal Fall on Apples: Leafhoppers Hatch

White apple leafhopper overwinters as eggs that the females laid just under the bark of shoots last September-October. Those eggs usually hatch at about the time of petal fall. A few days after petal fall is a GREAT time to check for the newly hatched nymphs. Check the undersides of cluster leaves, at least 50 or more, from a number of trees. If you find 25 or more nymphs out of 100 cluster leaves, it is worthwhile to apply an insecticide for them. Since most blocks will require treatment for plum curculio, you might check the labels for a pesticide that does both jobs. This is the best time of year to check (and treat if necessary) for white apple leafhoppers because 1) the young nymphs are the most vulnerable stage to insecticides and 2) this first generation is quite synchronous, so a single insecticide application is usually sufficient to stop the problem. If the problem is addressed later in the season, it often takes more than one insecticide application to completely control it. By the way, you can delay treating for a few days if you'd like. In fact, if all the nymphs you find are very tiny, then some might not have hatched yet.

Leafminers in Apples

At or shortly after petal fall, most apple blotch leafminers and spotted tentiform leafminers will be in the sap-feeding stage. That's when the tiny caterpillars are separating the lower dermis layer of the leaf from the middle layers (palisade layer) of the leaf. This creates a mine that is just visible as a slightly silvery blotch on the **underside** of the leaf.

Plum Curculio on Apples

Plum curculio is the most serious of our apple insect pests. They overwinter in leaf litter in the woods, and move into orchards in the spring. Research by Ron Prokopy and his students revealed that this insect heavily uses odor cues to find its hosts. That work continues today, with Tracy Leskey and Starker Wright (former Prokopy students, now working for USDA in West Virginia) leading the current multi-state project.

The odors from young apple fruitlets, together with that emitted from apple bark, twigs, branches, and odors released by the curculios themselves are major attractors that bring the insects into the orchard. Weather strongly affects movement. Warm (70's or higher) temperatures increase movement into and within the orchard. Warm, humid nights in particular can be periods of heavy activity.

In much of this state, apples that are not protected from plum curculio attack can suffer 80 to 100% loss. Protecting apples from curculio typically involves chemical pesticides plus attention to other factors. In this year's research plots, we are trying to see if "trap trees" located on the outside rows of the orchard can attract (and kill) a lot of the curculios. They have several odor emitters on each tree, and after the orchard gets one overall insecticide treatment, these trees will receive additional sprays. We are hoping it will be enough to control the curculios.

For the rest of us, it typically requires two curculio sprays, occasionally three. The first one often goes on at or right after petal fall. The others follow a week to 10 days later (depending on rainfall and temperature).

You can maximize the efficiency/timing of the treatments by considering several factors. One is the fruitlet size. They have to reach 6-7mm in diameter, for curculios to attack. Another is the 70 degree figure. If daytime temperatures reach or exceed that, expect curculio activity to be fairly high. Our weather forecasts are usually pretty good at predicting that. If night temperatures are 60 or higher (especially if there's light rain, too), that can be a formula for high activity.

Researchers in New York came up with a degree day formula to predict when the last PC spray should be applied. Some growers here feel it helps, and fits their situation well. Others don't have that much confidence in it. The model says to maintain insecticide coverage through 340DD (base 50) after petal fall. We expect that some residue will continue to control them for a little while past that.

Curculio Control for Organic Apple Growers

A kaolin clay-based material called Surround can be very effective to protect apples. The results are somewhat variable. In our tests at UNH, it did poorly, but at UVM, it did very well. The formula for success seems to be making one application at pink, and a second at petal fall. A critical point is that coverage **MUST** be excellent. We don't want the trees to look bright white...that's too high a rate. The proper residue should look even, giving a light grayish hue to the surfaces, without any gaps. It usually requires a second application to get the proper coverage, which is why a first one goes on at pink. Then another goes on a week to ten days later. If activity is still high, you may require a third treatment or more.

Unlike other insecticides, **Surround doesn't kill the curculios**. It protects the fruit from being attacked. Since the curculios are not being killed by the product, the attack period can be longer than that in a conventional orchard (where the sprays kill the weevils).

Plum Curculio on Other Tree Fruit

PC will attack other fruit, including peaches, nectarines, cherries, and plums. The timing and stages of attack are roughly the same as for apples --- they like to hit young fruit. The pesticide options are fairly similar, including the option to try Surround for organic growers.

Clipper on Strawberry and Brambles

Strawberry bud weevil (a.k.a clipper) hits the flower buds of strawberries and bramble fruit, just before the flowers open. After laying an egg in the bud, the female chews at the pedicel, causing it to dangle or drop. The tiny grub grows inside that clipped bud, and emerges during the summer. There's only one generation per year, so summer or fall fruit on day-neutral varieties (like SeaScape) can escape attack, because they are so late. **In new beds, damage is always worst at the edges**, since the insects are invading from the outside. In older beds, the edge effect is less pronounced. Sometimes damage can be severe.

Formerly, we had a simple clipper threshold for strawberry: treat if you found an average of 2 or more clipper buds per row meter of strawberry. But that has been refined a bit, since the value of primary fruit is highest, and secondary fruit are the next most valuable, and so on. The new system takes into account the number of clipped buds and their type (primary/secondary/tertiary). The new threshold is 3 highly damaged fruit clusters per meter of row, or 3 clipped primary buds per meter or 30 clipped secondary or tertiary buds per meter. If that is confusing to you, you could always go back to the simpler method.

The 2010-11 New England Small Fruit Pest Management Guide lists current pesticides to handle the problem on strawberry. Often it takes two treatments. Of the products listed (Lorsban 4E, Brigade WSB, Danitol EC, Sevin 50WP, Pyganic EC, Pyrenone WSB), I would expect the last two to be less effective. Remember, if the infestation is only in the outer few rows, there's no need to treat the entire bed.

In brambles, there is no established threshold (to my knowledge) for clipper. There are fewer pesticide choices, too: Brigade 2EC, Sevin XLR plus, and Aza-Direct are listed in the guide. There may be others, too. I note that it says spraying late in the day may be more effective than doing it in the morning, for this pest. I didn't know that!

TPB on Strawberries

Tarnished plant bug starts attacking strawberries when the flower buds become visible in the crown. Attack rate goes even higher when the first blossoms open. Our monitoring recommendations for this insect have shifted a bit earlier. We want growers to start checking before bloom. That way, if insecticide treatment is required, you can do it before bloom, minimizing risk to bees.

The nymphs do most of the damage. They're yellowish-green in color, and run rapidly when dislodged from the plant. Sample for them by shaking flower clusters onto a large white surface. I found that the underside of a white frisbee is ideal for the purpose. It isn't harmed by moisture, is the right size, and has a lip to slow the nymphs down from running off the edge before they get counted. The nymphs show up well on the white surface. If you find 4 or more flower clusters infested, out of 30, it is worthwhile to treat. It is a good idea to check again a few days later, if numbers are below threshold. The nymphs feed on flowers or immature green fruit (up to about 1/3 grown fruit).

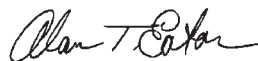
If you have large acreage to sample, the 2010-11 New England Small Fruit Pest Management Guide describes a sequential sampling technique. It is more complicated to follow, but if done correctly, it tremendously reduces the amount of sampling you have to do [saves lots of time & effort]. I won't reproduce it here. Check out the guide for the details, page 37.

Meetings

Wednesday, May 18, 2011. **Commercial Tree Fruit Grower Meeting.** Lavoie Farm, 172 Nardoff Rd, Hollis, NH. Registration is at 5:15 PM. Two (2.0) New Hampshire pesticide-license recertification credits will be offered. You must sign in by 5:30 p.m. to receive pesticide credits! For more information call 641-6060.

Wednesday, June 8, 2011. **Commercial Tree Fruit Grower Meeting.** Appleview Farm, 1266 Upper City Rd, Pittsfield 5:30 - 8 PM. (We have applied for pesticide applicator training recertification credits). For more information call Amy Ouellette at 603-796-2151 or amy.ouellette@unh.edu.

Thursday, June 9, 2011. **Workshop: Getting Ready To Sell at Farmers Markets.** Auburn Safety Complex, Auburn NH. 6:00 - 8:00 PM. Pre-registration is encouraged at: http://cecf1.unh.edu/formbuilder/forms/form352_FrmMktRg.htm or Contact Nada Haddad at 603-679-5616 or nada.haddad@unh.edu.



Alan T. Eaton
Extension Specialist
Integrated Pest Management

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