PURDUE UNIVERSITY
PURDUE EXTENSION
FACTS FOR Fancy Fruit
Issue: 16-04
May 13, 2016

In This Issue



# Crop Conditions

*(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)* & *(Peter M Hirst, hirst@purdue.edu)*

Grapes are at the 4 to 8 inch stage in Lafayette. Blackberries are just starting to bloom. Raspberries have a few flower buds starting to show. Strawberry bloom continues. Blueberries are at petal fall.

Fruit set for apples and peaches has generally been adequate and thinning will be necessary. Cloudy weather during early fruit development will increase natural fruit drop of apples, so keep this in mind for chemical thinning decisions.

# Important Pre-bloom Sprays for Grape Disease Management

*(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)*

Grapes in the southern half of the state will soon be reaching the critical pre-bloom stage, which is a key time to control important diseases such as black rot, downy mildew, and powdery mildew. The next three or four sprays will be critical in controlling fruit infections. Growers should pay extra attention to getting thorough coverage and use the best fungicides available. The Midwest Fruit Pest Management Guide lists a wide range of products recommended. A protectant such as mancozeb or captan plus one of the sterol inhibitors such as Bayleton, Mettle, Procure, Rally or generic tebuconazole is the recommended fungicide treatment. Rotating with of one the strobilurins such as Abound, Sovran, Flint, or Pristine is a good option as well. The combination products such as Inspire Super, Revus Top, Quadris Top and Adamant should also be good for broad-spectrum disease control. Be sure to read the warnings about phytotoxicity with fungicides containing difenconazole. These next few sprays are critical to producing sound, clean fruit. Pay attention to detail now to assure excellent fruit quality at harvest.

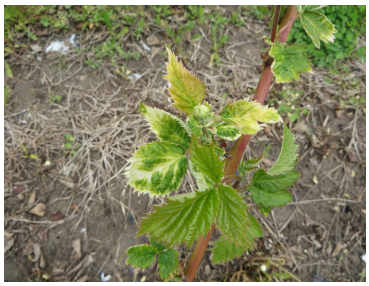
Grape cluster at immediate pre-bloom stage

Grape cluster at early bloom

# Callisto Herbicide Injury to Brambles

*(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)*

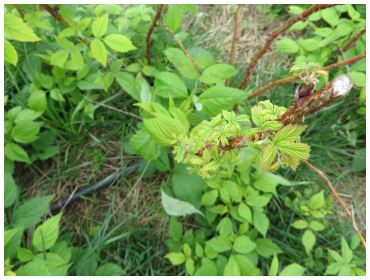
Callisto (a.i. mesotrione) has been labeled for blueberries for the past five years, but the label was expanded to include brambles this year. We used it at the 3 fl. oz. per acre rate on our bramble plantings in Lafayette and significant damage occurred on several varieties. Both blackberries and raspberries were affected. The floricanes appear to be more heavily damaged than primocanes. In some cases, damage is so severe that a complete loss of the summer crop is expected. At this time, primocanes appear to be relatively normal, but we will know more in a few weeks. We have heard of similar damage from commercial growers. If you used Callisto on brambles this year, please contact Bruce Bordelon (bordelon@purdue.edu) whether you had damage or not. We would like to know the full extent of the problem.



Mesotrione damage on thornless blackberry floricane foliage

Mesotrione damage on thornless blackberry floricane foliage

Normal thornless blackberry primocane growth



Mesotrione damage on Heritage red raspberry

# Codling Moth

*(Ricky E Foster, fosterre@purdue.edu)*

I achieved biofix today (May 9) in our orchard at the Meigs Farm near Lafayette. I have also talked to other growers who had also caught 3-5 moths or more in their pheromone traps. For me, I had caught one moth last week and caught three more over the weekend. This constitutes a sustained flight and thus we have biofix. The assumptions that go with biofix is that if we are catching male moths in the traps, female moths are also flying, are probably being mated, and are laying eggs. Because insects are

cold-blooded, their development is primarily driven by heat. The warmer it is, the faster they develop. All insects have a developmental threshold, a temperature below which no development takes place. For codling moth, that temperature is 50° F. So if the temperature is less than 50°, no development takes place. Because growth of insects is temperature dependent, we measure their development in degree days rather than in days. A degree day is when the average temperature for the day is 1 degree above the threshold, so for codling moth, an average temperature of 51° means that that 1 degree day has been accumulated. When approximately 250 degree days have been accumulated after the egg was laid, it can be expected to hatch. Knowing the number of degree days helps to time your insecticide applications better. Please note the chart on page 29 of the Midwest Fruit Pest Management Guide (ID465). Insect growth regulators like Dimilin and Rimon should be applied at 50-75 degree days. Others, like Confirm and Intrepid should be put on at 100-200 degree days. A number of products should be applied at 150-250 degree days and the remainder should be applied at 250 degree days.

You can calculate degree days by taking the average of the high and low temperature for the day, dividing by 2, and subtracting 50. If the low is below 50 and the high is above 50, adjust the low to 50 and then divide by 2. If you are unsure about how to calculate degree days, follow me on Twitter at Rick Foster@PurdueFVInsect where I can be doing my calculation daily. Also, feel free to call or email if you have specific questions.

## San Jose Scale

*(Ricky E Foster, fosterre@purdue.edu)*

I have seen some pretty impressive infestations of overwintering San Jose scale this spring. These infestations re-emphasize the importance of putting on a dormant oil spray each spring, as scales are one of the pests controlled by that application. SJS overwinters as an immature and is now at the point of maturing. Shortly after, they will mate and the females will begin giving birth to live young, known as crawlers. Other than a dormant oil spray, the crawler stage is the one we want to target for control. If you have overwintering scales, you can monitor for crawlers by wrapping a piece of black electrical tape around a branch near the overwintering scales with the sticky side out. When the crawlers become active, they will move around to look for a good place to settle down and feed and can be captured in the tape. Catching crawlers this way will signal you that the timing is right for an insecticide spray. See page 22 of the Midwest Fruit Pest Management Guide for insecticides recommended for scale control.

Adult San Jose scales with protective covering removed

Apple branch with heavy San Jose scale infestation

San Jose scales with protective covering in place

Heavy infestation of San Jose scale

Figure 2. Juniper rust gall with spore horns

# Juniper Rusts

*(Janna L Beckerman, jbeckerm@purdue.edu)*

Although the season for primary scab infection is winding down, this cool, wet weather is making for an excellent infection period for juniper rusts (*Gymnosporangium spp*). John Obermeyer and I created this time-lapse video to help explain the complicated lifecycle of this fascinating pathogen: **http://tinyurl.com/j3s3t92**

The juniper rusts standout due to the conspicuous nature of the disease, and the fact the fungus completes its life cycle on two plant hosts—the Juniper (cedar) (Fig. 1), which none of us cares about, and the apple (Fig. 2), and to a less important degree here, the pear, quince, hawthorn, serviceberry and crabapple are other hosts.

Figure 1. Infected apple

All potential host plants are commonly planted or are native throughout the Midwest, and all serve as hosts to more than 70 juniper rust diseases. The three most common, and damaging to the apple orchard are:

**Cedar-apple rust**, caused by the fungus *Gymnosporangium juniperi-virginianae*, requires two host to complete its life cycle: the fungus must infect apple or crabapple in the spring, and an alternate host, Eastern red cedar (*Juniperus virginiana*) or Rocky Mountain juniper (*J. scopulorum*) in the late summer, before infecting apple (Fig. 3).

Figure 3. Cedar-apple rust gall on juniper

**Cedar-hawthorn rust**, caused by *Gymnosporangium globosum*, alternates between junipers and hawthorn, crabapple, and apple in addition to several other rosaceous hosts (Fig. 1). This rust creates the big, conspicuous galls that everyone associates with ‘cedar-apple’ rust.

**Cedar-quince rust**, caused by *Gymnosporangium clavipes*, that infects junipers and a wide range of rosaceous hosts, namely hawthorn, but also quince,

pear, and serviceberry (Fig.4).

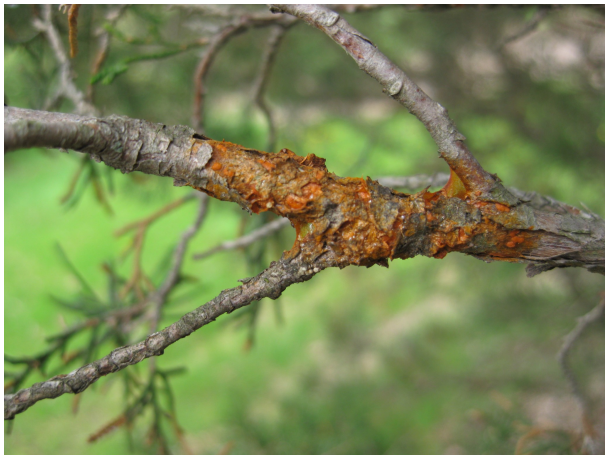


Figure 4. Cedar-quince rust on juniper

Symptoms and signs of the disease occur in the spring; orange gelatinous horns develop from gray to brown colored fungal galls on the branches of infected junipers. These horns produce wind blown spores that infect apple and/or pear, hawthorn, serviceberry and/or crabapple trees. Symptoms on apple initially appear on the upper leaf surface as small yellow spots that later enlarge and turn orange. As the fungus continues to grow, yellow-brown lesions develop on the underside of the leaf and form small, whisker-like structures containing rust-colored spores. These spores are blown to susceptible junipers, and continue the infection cycle by producing galls. The following spring, these galls produce orange gelatinous horns that release spores and continue the infection cycle. Dead galls on cedar and juniper may remain attached for a year or more.

In the orchard, where systemic or translaminar fungicides are used regularly to manage scab, rust is rarely a problem. Growers who have been dealing with fungicide resistance with DMI and QoI fungicides and no longer use these classes of fungicides may find it challenging to control this disease with just mancozeb, which provides good control when used preventatively, but fair to poor control when used after infection events. *Remember that neither captan nor Topsin M controls rust*. Even growers with a history of DMI resistant scab may consider still using Rally (or other DMI fungicides like Topguard, Indar, Inspire) simply to control rust. As always, remember post-infection applications (aka 'curative') will not provide the same level of control as preventative applications of fungicide.

Removal of nearby junipers (cedars) may help, but remember that spores may be blown from neighboring trees (from a two mile radius) allowing the disease to continue.

Lastly, there are always new rusts being found, or worse still, being introduced in Indiana. One such rust, Japanese apple rust, *Gymnosporangium yamadae*, had only been found in Asia (China, Japan and Korea) where it can be a serious pathogen of cultivated apples wherever *Juniperus spp*. occur in close proximity. This fungus was recently reported from the United States (DE, PA) in its aecial state on the ornamental crabapple*, Malus toringo*(Yun et al. 2009). This rust looks very similar to cedar-hawthorn rust. For more information see: http://nt.ars-grin.gov/taxadescriptions/factsheets/index.cfm?thisapp=Gymnosporangiumyamadae

Hopefully, you won't see any rust on your apples, but if you do see anything unusual, please contact me or the Purdue Plant and Pest diagnostic lab.

Yun, H.Y. Systematic Mycology and Microbiology Laboratory, ARS, USDA. . Invasive Fungi. Japanese apple rust. Retrieved May 9, 2016, from /sbmlweb/fungi/index.cfm

# Apple Chemical Thinning

*(Peter M Hirst, hirst@purdue.edu)*

The pollination season was challenging this year and it appears that chemical thinning won't be simple either. I think in most cases, pollination turned out to be adequate to set full crops. If growers are in doubt they should cut a few fruit in half and look for normal seed development. Before we talk about chemical thinning, let's review the basic process and what controls the effectiveness of a chemical thinner application.

At this time of the year, various organs on the tree are developing very quickly. There could be over 800 developing fruit on the tree all requiring food and energy (carbohydrate) to grow. Also, developing shoots are not net contributors until they have at

least 5 leaves, so that also increases the demand. So here we have a high demand for carbohydrates and a limited supply because the leaf area of the tree is still developing. So when demand is greater than supply, there is a shortfall of carbohydrate and fruit drop off. This is an entirely natural process that is often called "June Drop". Thinners act by increasing this deficit causing more fruit to drop. Other factors that influence the carbohydrate balance are also likely to affect fruit drop and thinner response. One of the important factors here is sunshine, or lack of it. In cloudy weather, the light is lower therefore the rate of photosynthesis by the leaves is also lower. This increases the carbohydrate shortfall and increases fruit drop.

Ok, with this in mind, what should be the approach to chemical thinning this year? Given that:

1. Pollination weather certainly wasn't perfect so we may be slightly iffy on seed set
2. There was a lot of cloudy weather over the early fruit growth period

I would expect fruit drop to be heavier than normal this year. Growers may want to be a little more conservative than usual with their thinning approach. In almost every situation, the absolute worst decision is thinking that there aren't that many fruit on the trees and deciding not to thin. Come mid-summer, growers invariably regret this decision as fruit grow and become more visible, but by then it's too late to act. So here's the recommended strategy for this year:

1. Review your chemical thinning records from previous years. Consider the weather and how well those thinning applications worked.
2. Since we expect heavy fruit drop and a lot of natural thinning this year, for each block of trees, take the most conservative thinning approach that you have tried the last few years that has still been effective.
3. With varieties that are prone to be biennial, such as Honeycrisp, Fuji and Golden Delicious, don't be too conservative with your thinning. Inadequate thinning of these varieties will cost you, both in terms of this year's crop and next.

# Hort Society Summer Meeting

*(Peter M Hirst, hirst@purdue.edu)*

The summer meeting of the Indiana Horticultural Society will be held June 22 at Doud's Countyline Orchard in Wabash, IN. We will also visit a couple of other farms close to David Doud's. The final details are still coming together, but I encourage you to mark this date on your calendar and plan to attend. We will see apples, peaches, strawberries, blackberries, blueberries and high tunnels. And of course, this is one of the few opportunities in the year to meet with your fellow growers and discuss what is happening on your farm and in the industry. All are welcome to attend and we hope to see you there.

# Upcoming Meetings

*(Peter M Hirst, hirst@purdue.edu)*

**Blueberry Growers of Indiana Spring Meeting and potluck** June 9, 4:00 pm. Sider's Blueberry Farm. 6254 W. 200 North, Rochester, IN. More information will follow.

**Indiana Winery and Vineyard Association Summer meeting** July 19-20. Brown County Inn. Nashville, IN. More information will follow.

**Indiana Hort Society Summer Field** Day June 22 David Doud's Countyline Orchard 7877 W 400 N, Wabash, IN 46992  Apples, peaches, strawberries, blackberries, and high tunnels.

# Current Growth Stages in Lafayette, IN

*(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)* & *(Peter M Hirst, hirst@purdue.edu)*

Peach – out of shuck

Gala apples at 12 mm

Black raspberry pre-bloom

Blackberry pre-bloom

Grape 4 to 8 inch shoots

Strawberry: post bloom, green fruit

Sweet cherry at about 8 mm



Facts For Fancy Fruit © Purdue University - fff.hort.purdue.edu
Editor: Peter Hirst - 625 Agriculture Mall Dr, West Lafayette, IN 47907 | (765) 494-1323 | hirst@purdue.edu