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Crop Conditions

Grapes have grown quickly this past week and most varieties are now past bud burst. The earliest have 4 to 6 inch shoots at this time. Blackberries and raspberries are also growing rapidly, with new primocanes emerging from the ground and laterals on floricanes out to 4 inches or longer. Flower buds are visible on the earlier varieties. Strawberry bloom continues.



Peach – almost out of shuck



Apple - fruit set



Black raspberry
- prebloom



Blackberry – prebloom



Strawberry – full bloom





Grape - 4-6"

Protecting Peaches

It isn't every year we get our peach trees to produce, but when we do, we want to make sure we get them to harvest! One of the most important sprays to protect peaches from leaf curl (Fig. 1) should have gone in late fall (best time) or in late winter (by end of February), if all else fails. Infection by the leaf curl fungus occurs as the bud swells while under wet weather conditions (which would be most springs): late spring applications are simply not as effective. Several fungicides are effective when applied in the fall or late winter, including Bravo weather Stik and Ziram; although coppers are labeled and effective, I worry about phytotoxicity and recommend avoiding coppers with stone fruit whenever possible. Hopefully, this was taken care of and is a non-issue and none of you are seeing curl.



Leaf curl causes blistering and distortion on peach leaves in the spring. A single fall applications of fungicide is all it takes to prevent

The biggest worry for our peaches (and other stone fruit) is brown rot, and fortunately, you have time to be proactive and prevent infection! Brown rot control needs to begin at pink and peach scab control needs to be added to that around petal fall. Both fungal diseases need to be managed throughout the season until harvest. A lot of growers had significant problems with brown rot last year. Mummy (Fig.2) removal, pruning out cankers, good orchard sanitation, and timely application of fungicide, especially after rains exceeding 2" are essential for control of both diseases. Both brown rot and peach scab are capable of producing spores now; keeping trees protected with fungicide during wetting periods is essential to bringing the crop to harvest. The worst thing about these two pathogens is that the symptoms and signs of these disease seem to appear suddenly around harvest; in reality, the infection process often began two months ago (meaning as you are reading this now!). See the 2017 Midwest Fruit Pest Management Guide

(https://ag.purdue.edu/hla/Hort/Pages/sfg_sprayg uide.aspx) for more information regarding peach disease management.



Mummies from previous brown rot infections serve as a source of inoculum to cause infections this year

Powdery Mildew on Apple

Upticks in powdery mildew last year, plus a mild winter (which allows the fungus to overwinter in buds) set the stage for powdery mildew (Fig.3). Early season rains kept things at bay, but the recent change to drier weather while leaves continue to grow sets the stage for this disease. Powdery mildew is active during dry periods above 50 degrees and below 90, but happiest on dry, mild, spring days. Keep an eye on the most susceptible varieties (Jonathan, Baldwin, Ginger Gold, Ida Red, Cortland, Rome, Stayman Winesap...). We saw an uptick of PM on our Honeycrisps last year, so keep an eye on them, too! Remember that captan and mancozeb are not effective for controlling this disease, but DMI fungicides (Frac 3: Rally, Topguard, Indar, Inspire), strobilurins (Frac 11: Flint, Sovran), and 11+7 premixes (Pristine, Merivon, Luna Sensation) all are, and will help with rust and scab, assuming resistance is not an issue! SDHIs (Frac 7: Aprovia, Fontelis) are effective on PM, rust and scab, as well.



Powdery mildew is a problem in dry springs, especially on susceptible varieties

Codling Moth

Codling moths are flying in some parts of the state. Place your pheromone traps in the orchard during bloom. I have not yet caught any in my traps but expect to soon. We define biofix as the

first sustained flight of moths. Therefore, we don't determine biofix when that first moth shows up in the trap, but rather when we have caught 3-5 moths. That way we know that the general population of moths is active. Codling moths have a developmental threshold of about 50° F, which means that they don't develop at temperatures below 50. To calculate degreedays, we just take the mean of the high and low temperatures for that day and subtract 50. There are a couple of tricks to those calculations. First, if the low temperature is below 50 and the high is above, adjust the low to 50 before calculating the mean. Second, if the high is above 85, adjust it down to 85 before calculating the mean. This is because they don't develop faster when temperatures are above 85. Once I reach biofix, I will again tweet out my daily degree-day calculations. If you want to follow my tweets, you can do so at Rick Foster@PurdueFVInsect.

If you look at the table on page 31 of the Midwest Fruit Pest Management Guide, you can see the proper timing for various insecticides for codling moth control. Timing is very important for codling moth control. The closer you can make your application to optimal timing, the better your control will be.

It is common for the first spray for codling moth to coincide with the first cover spray, which is also for control of plum curculio. If so, you should choose a product that will effectively control both pests. For example, Avaunt may be a good choice for plum curculio control at petal fall, but it would probably not be a good choice for the next spray, which needs to control plum curculio and codling moth. Other than the pyrethroids (see article in the first issue of FFF for 2017), Imidan and Assail are probably the best products for control of both pests.

Eastern Flower Thrips in Strawberries

Eastern flower thrips are an occasional pest of strawberries. They are attracted to and feed on flowers, with the result being leathery fruit or fruit that fail to ripen. This problem occurs every year at low levels but has not been serious in recent years, with the last serious problem in 1994. Eastern flower thrips do not overwinter in Indiana and must migrate northward each year on winds from the South. It is likely that thrips migrate on the same winds that move potato leafhoppers, so if you see leafhoppers there is a likelihood that thrips will also be present. Eastern flower thrips are very tiny, 1/16 inch long, so they are barely visible with the naked eye. There are a couple of ways to sample for them. My favorite is to pick a flower and swish it around in a vial of alcohol. You can also shake the flowers over a white piece of paper or plate. If you find 2-10 thrips per flower, you should probably treat. Brigade and Danitol will provide excellent control. Both of those products are also highly toxic to pollinators that will be visiting your flowers, so you should treat as early in the bloom period as possible and apply the insecticides in the evening after pollinators have left the field. It is unlikely that Eastern flower thrips will be a problem, so be sure you sample and find thrips before you make an application.

Orange rust in brambles

Orange rust is one of the most common diseases of blackberries and black raspberries in the Midwest. It is a systemic disease that is confined to Rubus spp. (autoecious). There are two forms, a long-cycle form that occurs on black raspberry, and a short-cycle form that occurs on blackberries. There are two causal organisms:

Arthuriomyces peckiamus (the long-cycle form) and Gymnoconia nitens (the short-cycle form). All varieties of black raspberry and many varieties of erect blackberries are susceptible. Red raspberries are immune to orange rust.

Symptoms of the disease can be seen in early spring when new primocanes emerge. Infected plants produce an abundance of spindly canes that have misshapen leaves that are often pale green or yellow. Within a few weeks of emergence, the lower leaf surfaces become covered with blister-like masses of orange aeciospores. This is the most characteristic stage of the disease. Infected plants are quite obvious with brilliant orange leaves. They are showing up now.

The disease cycle of orange rust is complex. Aeciospores from infected canes spread the disease to mature leaves on canes of other plants. Infected leaves develop teliospores later in the summer, which germinate to produce a basidium, which in turn produces basidiospores. The basidiospores infect buds on primocanes at the base of the plants. These infections will spread down through the canes and into the crown, eventually infecting the entire plant. In subsequent years, new canes that emerge from infected crowns will be infected. The fungus persists in the crowns as perennial mycelium.

Damage from orange rust is significant. Even though infected plants seldom die, they are weakened and do not produce quality fruit. Thus they represent a complete loss. That said, heavy infestation of plantings is not common. The disease is usually sporadic. This helps growers manage the spread.

Since orange rust is a systemic fungal disease, management and control is primarily through rouging infected plants. Once infected, a plant cannot be cured. Removing infected plants entirely, including the roots, is the best way to

prevent spread. Remove infected plants as soon as they appear in the spring before they release spores. Eradicate infected wild Rubus plants in the near vicinity of your planting. Any management practice that encourages air circulation within the canopy such as thinning canes within the row, removing floricanes immediately after harvest, weed management and proper nutrition will aid in disease control by reducing the duration of leaf wetness. The multiple cycles of infection by the various spore stages make fungicide management very difficult. While a few fungicides are registered for use, chemical control alone is impractical. Proper management is key to controlling orange rust. Fungicide recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. https://ag.purdue.edu/hla/Hort/Pages/sfg spraygu ide.aspx



Wild blackberry showing normal and infected leaves



Close up of blister-like pustules on lower leaf surface



Infected and normal wild blackberries



Upper surface of black raspberry leaf infected with orange rust



Lower surface of black raspberry leaf infected with orange rust



Thornless blackberry plant with a mix of infected and normal canes



Orange rust

spores deposited on a mature leaf

Early season sprays for grapes

Grape growth is a bit ahead of normal this year. Grapes are at the critical early shoot growth stage when Phomopsis cane and leaf spot infections occur. This is a critical time to take preventative control measures for this disease. If left unchecked, the early shoot infections will spread to cluster stems and developing berries. The organism remains latent in those lesions during most of the season. As fruit maturity begins the fungus becomes active and damages berries or cluster stems, causing a soft, brown berry rot. Secondary spoilage organisms usually become involved at that time, resulting in very poor fruit quality. Losses can be 50% or higher and overall fruit quality is greatly diminished. Many of the popular varieties grown in Indiana such as Traminette, Seyval, Chardonel, La Crescent, and Marquette are highly susceptible to Phomopsis.

Control of Phomopsis is relatively easy with captan or mancozeb. Mancozeb is the preferred fungicide because it is broad-spectrum and also controls black rot and downy mildew. It is important to understand that captan and mancozeb are protectant fungicides and must be on the plant before any infection periods occur. So they must be applied *before* the next rain event and reapplied after a major rain event. Fungicide applications are needed on a 7-10 day interval through bloom. This is usually about four

sprays. Addition of a sterol inhibitor fungicide in the final early season sprays (immediate prebloom, bloom and post bloom) will provide additional control of black rot. A simplified version, a Suggested Grape Spray Schedule is available on my web site, along with the full spray program in the 2017 Midwest Fruit Pest Management Guide. Find both at: https://ag.purdue.edu/hla/fruitveg/Pages/Grapes.aspx



Grape shoot at 3 inch stage

Upcoming Events

Indiana Horticultural Society Field Day June 28, 2017

Tuttle Orchard

Greenfield, IN

More details to come but mark the date on your calendar and plan to attend

Indiana Horticultural Congress

February 13-15, 2018

Indianapolis Marriott East

Indianapolis, IN

For further information contact Lori Jolly-Brown @ljollybr@purdue.edu or visit

www.inhortcongress.org for more details.

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