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Crop Conditions

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212) & *(Peter M Hirst, hirst@purdue.edu, (765) 494-1323)*

The warm weather is pushing crop develop rapidly. Grapes are at bunch closure, summer red and black raspberry harvest has begun. Some primocane fruiting types are beginning to flower. Gooseberry and currant harvest has begun. Apples are 1-2 inches in diameter. Strawberry harvest is over and renovation has begun. The chemical thinning window has closed and hand thinning is underway. Growers should hand thin the most biennial cultivars first. Japanese beetles are plentiful!

Summer red raspberry (Nova)

White currants.

Black currant nearing harvest

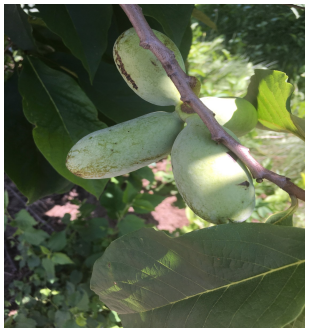
Gooseberry ready for harvest

Petite Pearl grapes at bunch closure

Frontenac grapes at bunch closure

Japanese beetles congregate on grape tendril

Apples are at 1 to 2 inch diameter



Paw paw fruit developing quickly

Elderberry in full bloom

Opportunistic Canker Pathogens

(Janna L Beckerman, jbeckerm@purdue.edu, (765) 494-4628)

Diseases that affect the twigs, branches, and the main trunk of a tree are referred to as cankers or blights. Canker diseases can be a serious problem in the orchard, vineyard, berry or bramble patch when they are not properly managed, and even when they are. All woody plants can be infected by canker pathogens.

Cankers appear as a general sunken area of darkened tissue on the twigs or branches, often surrounding a branch stub(Fig. 1). Many canker pathogens produce perithecia, which contain sacs of spores (asci) that forcibly release the spores when the conditions are right. The perithecia are easy to find on the surface of the canker (Figure 2). As the canker grows, the twig or branch may become girdled, causing the wilting and death of the leaves past the point of infection on the tree. On stone fruit, this can cause gummosis, too (Fig. 3).

What causes cankers? Many different fungi (and a few bacteria!) cause cankers. Some of the major players are: Nectria twig blight (pathogen: *Nectria cinnabarina*), Nectria canker (*Nectria galligena*), anthracnose canker (*Pezicula malicorticis*), Phomopsis canker (*Diaporthe perniciosa*), nailhead canker (*Biscogniauxia marginata*), and Monochaetia twig canker

(*Seiridium unicorne*). Cytospora canker, caused by many different species asexual forms of *Valsa* or *Leucostoma*, are also common opportunistic pathogens. All of these can be a problem for Indiana growers.

Figure 1. The branch stub serves as a wound that enables a pathogen, in this case, Nectria spp., to infect. Photo by Janna Beckerman.

Figure 2. The erumpent pimples on the surface are where the perithecia are breaking through. Photo by Janna Beckerman.

Figure 3. Opportunistic canker pathogens on peach, plum and cherry are often associated with gummosis. Photo by Janna Beckerman.

Symptoms and Signs

Nectria twig blight is often mistaken for fire blight because of the wilting that occurs due to the girdling of the twig by small cankers . However, unlike fire blight, there is no blighting of the blossoms, and the shoots do not die from the tip. Bright pink cushions of fungi called sporodochia can be found in the dead tissue of the canker (Fig. 4). This disease is more common on trees of moderate vigor.

Nectria canker is first found at the node , and appears as a darkened elliptical, sunken area. Bright red to orange perithecia are often observed on the canker in the winter. It is most common on Gravenstein, Delicious, McIntosh, Newtown, Spitzenburg, Cox's Orange Pippen, and Honeycrisp, but other cultivars are also susceptible.

Anthracnose canker first appears as small, circular red or purple spots when moist. As the canker enlarges, the spots become elliptical, sunken orange to brown areas. Cracks will eventually develop between the healthy and infected tissue, and cream-colored acervuli will appear. The cultivars Ruby Mac, Linda Mac, Spartan, Gravenstein, and Baldwin are most susceptible to anthracnose canker.

Phomopsis canker (Fig. 5) and Monochaetia twig canker are generally secondary and only infect dead or dying tissue. This often happens after herbicide injury or winter injury.

Nailhead canker, also called blister canker, tends to flare up after drought years. This opportunistic pathogen attacks stressed trees. This was a serious problem leading up to the 1900s in the Midwest and resulted in many growers no longer planting Ben Davis or Baldwin, which were considered most susceptible. The 'nailheads' are composed of perithecia (Fig. 6), each filled with sac of ascospores (Fig 7).

Figure 4. The coral fungus, Nectria spp., gets it

name from the pink fruiting bodies that break through the bark. Photo by Janna Beckerman.

Figure 5. Phomopsis canker on blueberry causes flagging and dieback. Photo by Bruce Bordelon.

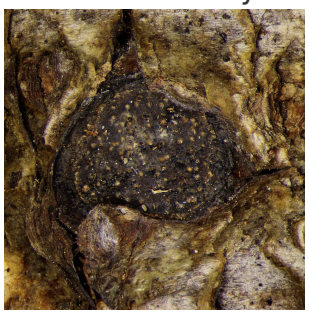


Figure 6. Perithecia of nailhead canker. Photo by Paul Cannon.

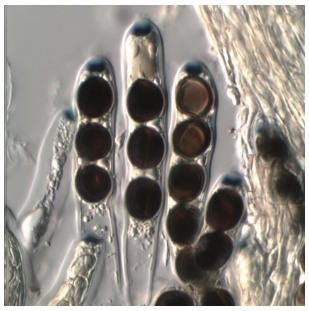


Figure 7. Asci and ascospores of the naihead pathogen. Photo by Paul Cannon.

Disease Cycle

Canker diseases generally survive the winter in the canker tissue as mycelium and/or conidia. The pathogens spread by conidia and/or ascospores that are dispersed by either wind or water. Most canker-causing fungi infect through a wound such as a pruning cut, a leaf scar, herbicide drift injury, or other damaged tissue. The one exception is the anthracnose pathogen which penetrates through the bark directly. Moist weather tends to favor disease development, and disease development can occur at a wide range of temperatures. New cankers tend to form in either the fall or spring, and this is also when most canker diseases are actively producing inoculum.

Management

Although there are many different pathogens that cause canker, management strategies are quite similar for all of them. The most effective tool in managing canker diseases is the removal of cankered tissue from the orchard, vineyard or berry patch. Infected branches should be pruned and then removed from the orchard or burned. Be sure to prune back at least 15” to remove the fungus completely. By removing infected plant material from the orchard, the inoculum level is reduced, and the chances for new infection to occur are reduced. As the diseases generally enter through a wound, care should be taken in pruning, and mechanical damage from machinery should be minimized. You can’t treat trees with a fungicide after infection. The best you can do is prevent infection from occurring by irrigating during drought periods, careful use of all herbicides, proper fertilization (not after July 1 to allow trees to harden off before winter), and proper pruning to minimize branch stubs. Most fungicides used to control other diseases (captan, and the 7-11 fungicides like Pristine, Merivon, and Luna Sensation) are effective in preventing these diseases, particularly after a wind or hail event. However, fungicide use should be reserved for blocks with a history of problems with the diseases, and even then, underlying problems need to be corrected.

Crop Management in Grapes

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

Now that we are past fruit set, it is easy to tell what level of crop we are carrying. With the fairly extensive winter injury this year, many varieties will have a light crop borne on secondary or tertiary shoots. Little if any crop control will be needed in those. However, many of the plantings I've seen have a very good crop and some crop control will be necessary to balance the vines. A crop load ratio (yield to pruning weight) of 8 to 12 is a good rule of thumb for vine balance. This means we need to leave only enough clusters to produce 8 to 12 lb of fruit on low to medium vigor vines with 1 lb of prunings. For large clustered varieties such as Vidal and Chambourcin, clusters can weight 0.40 lb. So 10 clusters will contribute 4 lb of yield and we would need 25 clusters to produce 10 lb of yield. Medium clustered varieties such as Chardonel, Traminette, and Noiret will have clusters that weight 0.3 to 0.4 lbs. Small clustered varieties like Foch, Vignoles and Marquette will have clusters that weigh 0.15 to 0.25 lbs. More clusters can be retained on the medium and small clustered varieties. And higher vigor vines would carry correspondingly higher cluster counts.

Grape Pest Management

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

Grapes across the state are post bloom a week or more. As berries reach 3 to 5 weeks post bloom they become naturally resistant to infection by black rot and powdery mildew fungi. So our spray program can relax a bit. Growers normally extend to a 14 to 21 day schedule supported by regular scouting. At that time we can begin to focus on leaf diseases such as downy and powdery mildew. Downy is likely to be a big problem this year because it favors hot, humid conditions, exactly what we've been experiencing. There are a number of excellent fungicides specifically for downy mildew as well as older products such as Captan and phosphorous acid products. Scout your most susceptible varieties twice a week and make an application as soon as any downy mildew lesions are noted.

Another concern is insect pests. Japanese beetles have emerged and adults are present throughout the state. We had very high populations this past year so there is potential for Japanese beetles to cause problems again this year. Sevin has been the standard for treatment for a number of years, but its label requirements for REIs of 2 to 6 days make its use impractical for some growers. There are several options including Assail, Brigade, Danitol, etc. Check the spray guide for a list and check the labels for other restrictions. I've also noticed quite a bit of leaf phylloxera and potato leaf hopper damage. A well timed insecticide application can take care of multiple pests.

Strawberry Renovation

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

This was a very short year for strawberries due to the record warmth in May. By now, most harvest is over. As soon as harvest is done, it's time to begin the renovation process. Matted row strawberry plantings must be renovated each year to establish new crowns for the following year's crop. For best results, renovation should be started immediately after the harvest is completed to promote early runner formation. This is especially important in the northern part

of the state with its shorter growing season. The earlier a runner gets set, the higher its yield potential. Growers should begin renovation as soon as the last marketable berries are harvested. Delaying renovation is one of the most common mistakes growers make. Renovation should be completed by the end of July in normal years. The following steps describe renovation of commercial strawberry fields.

1. Weed control: Post emergent application: Annual broadleaf weeds can be controlled with 2,4-D amine formulations. Check the label as only a few products are labeled for use on strawberries. e.g. Amine 4 [Dimethylamine salt of 2,4-D (3.74 lb./gal.)] at 2 to 3 pts/acre in 25-50 gallons of water applied immediately after final harvest. Be extremely careful to avoid drift when applying 2,4-D. Even though the amine formulation is not highly volatile, it can vaporize under hot, humid conditions and cause damage to sensitive plants a considerable distance from the site of application. Some damage to strawberries is also possible. Read and understand the label completely before applying 2,4-D amine. If difficult to control broadleaves such as Canada thistle is a problem, Spur (clopyralid) can be applied either broadcast or spot treatment. If grasses are a problem, sethoxydim (Poast 1.5 EC) or clethodim (Select 2 EC) will control annual and some perennial grasses. However, do not tank mix these materials and 2,4-D. See the Midwest Fruit Pest Management Guide and the product label for rates and especially for precautions.
2. Mow the old leaves off just above the crowns 3-5 days after herbicide application. Do not mow so low as to damage the crowns.
3. Fertilize the planting. Generally, nitrogen should be applied at 25-60 lbs/acre, depending on vigor. It is more efficient to split nitrogen applications into two or three applications at regular intervals, rather than apply it all at once. A good plan is to apply about half at renovation and half again in late August when flower bud development is occurring. A soil test will help determine phosphorus and potassium needs, but foliar analysis is a more reliable measure of plant nutrition. For foliar analysis, sample the first fully expanded leaves following renovation.
4. Subsoil: Where picker traffic has been heavy on wet soils, compaction may be severe. Subsoiling between rows will help break up compacted layers and provide better infiltration of water. Subsoiling may be done later in the sequence if crop residue is a problem or if soils are too wet at this time.
5. Narrow rows: Reduce the width of rows to a manageable width based on your row spacing, the aisle width desired, and the earliness of renovation. A desirable final row width to attain at the end of the season is 12-18 inches. Wider rows lead to low productivity and increased disease pressure. This means that rows can be narrowed to as little as 6 inches during renovation. Use a tiller or cultivator to achieve the reduction. Since more berries are produced at row edges than in the middle, narrow rows are superior to wide rows. Narrow rows will give better sunlight penetration, better disease control, and better fruit quality.
6. Cultivate: Incorporate the straw and other plant material between rows and throw a small amount of soil over the row by cultivation. Strawberry crowns continue development at the top, and new roots are initiated above old roots on the crown, so

1/2 – 1 inch of soil on the crowns will facilitate rooting. This also helps cover straw and old strawberry leaves in the row and provides a good rooting medium for the new runner plants.

7. Weed control: Pre-emergence weed control should begin immediately. There are more options today than in past years. Chateau, Dacthal, Devrinol, Prowl H_2O, Sinbar and Spartan are labeled materials. See the Midwest Fruit Pest Management Guide and check the product labels carefully. Devrinol must be incorporated by irrigation, rainfall, or cultivation to be effective. Rate and timing of Sinbar or Prowl H_2O application is critical. If regrowth has started at all, significant damage may result. Some varieties are more sensitive to Sinbar than others.
8. Irrigate: Water is needed for both activation of herbicides and for plant growth. Don't let the plants go into stress. Ideally the planting should receive 1 to 1-1/2 inches of water per week from either rain or irrigation.
9. Cultivate to sweep runners into the row until plant stand is sufficient. Thereafter, or in any case after early September, any runner plant not yet rooted is not likely to produce fruit next year and can be removed. Coulter wheels and/or cultivators will help remove these excess plants in the aisles.
10. Adequate moisture and fertility during August and September will increase fruit bud formation and improve fruit yield for the coming year. Continue irrigation through this time period and fertilize if necessary. An additional 20-30 pounds of N per acre is suggested, depending on the vigor.

Congratulations to Huber's Orchard and Winery on 175 Years!

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

Huber's Orchard and Winery celebrated their 175th anniversary recently in Starlight. The Huber homestead, founded in 1843 by Simon Huber, has diversified into a multi-generational business now being led by 6th & 7th generation family members. A Welcome Ceremony and Press Conference kicked off the day's festivities. Guests included Matt Hall, Executive Vice President of One Southern Indiana, Mark Newman, Executive Director of Indiana State Department of Tourism, Jim Epperson, Executive Director of Southern Indiana Tourism, State Representative Ed Clere, and Purdue Wine Grape Team members Katie Barnett and Bruce Bordelon. A Certificate of Appreciation from the Purdue College of Agriculture was presented. At the close of the ceremony Father Sonny Day provided a blessing of the farm. It was a beautiful day for a celebration of the Huber farm. Congratulations to Ted, Dana, Greg, Jan and the entire Huber family.

Cake for Huber's 175th Anniversary

Summer Field Tour to be held at Garwood's Orchard La Porte, IN

(Peter M Hirst, hirst@purdue.edu, (765) 494-1323)

Following the success of last year's Summer Field Tour at Tuttle Orchards, this year we are again planning a combined summer field tour with the Indiana Horticultural Society, the Indiana Vegetable Growers' Association and the Indiana Farm Market Association. We will be hosted by Garwood Orchards in La Porte, IN. While we encourage membership in these industry organizations, all those who are interested are welcome and invited to attend, regardless of membership status.

Garwood Orchards is one of the largest and best managed orchards in the state. It may seem puzzling that they can manage such a large operation and manage it so well. That's why we're visiting – to not only be inspired but learn a few of their tricks and see how they do it. They have aggressively planted new cultivars and crops and have been on the forefront of adopting new technologies. They are major producers of fruits and vegetables and in recent years have greatly expanded their farm market.

It may seem like quite a drive to travel to the meeting this year, especially for those in southern parts of the state, but I'm confident you'll pick up some good ideas to implement at your farm making the trip worthwhile.

Farm history

The main orchard land has been in the Garwood family since 1831, and the Garwoods have been fruit farmers since the 1920's. The orchards are owned by Tom, Mike and Brian Garwood who represent the 6th generation. Carl is pretty much "retired" from major decision-making, but like many farmers have not quite fully understood the meaning of "retirement". He still works everyday doing many of the things nobody else wants to do. Tom's parents James and Phyllis passed away earlier this decade and were instrumental along with Carl in growing the business from the mid 50s to the mid 90s. Despite the long history of Garwood Orchards, this is still very much a family business. The Garwoods have been very active in the Indiana Hort. Society and both Jim and Brian Garwood are past presidents and Tom and Mike have served on the IHS Executive Board or on committees. They have also been strongly involved in the Indiana Vegetable Growers' Association.

The Garwoods currently farm over 450 acres which includes approximately 140 acres of apples. Peaches, raspberries, strawberries, plums, blueberries, cherries, and blackberries round out the rest of the fruit acreage. They now grow more vegetables than fruit which consist of bell peppers, several kinds of hot peppers, cucumbers, pickles, sweet corn, green beans, eggplant, tomatillo, and some pumpkins for u-pick.

The Garwoods have been actively replanting

their orchards with newer varieties, rootstocks and growing systems. Of the apples, about 90% of trees are less than 15 years old. All recent plantings have been on the tall spindle system with trees planted 3-4 feet apart in the rows giving tree densities around 1200 trees per acre. In terms of apple varieties, Gala, Honeycrisp, Evercrisp, Fuji, Pink Lady and Pixy Crunch make up most of the plantings made in the last 5 years.

The peach variety picture consists of about 50% of the newer Paul Friday selections (Brian says they have tried most of them). Then perhaps 25% are Redhaven and other standards, and 25% are the 'Stellar' varieties. There is a small planting of White Lady and some of the newer varieties from Adam's County Nursery. They have established "research" or "evaluation" blocks in which they have made small plantings of a number of new tree fruits or new varieties to test including 9 from the MAIA program.

On the small fruit side, at meeting time, the Garwoods should be just wrapping up harvest on their strawberries. They are using a 1 mil row cover for extending the season and for frost control. They also have portable irrigation. Plantings of red and black raspberries and thornless blackberries on ridges look very good. Increasingly, they are planting on plastic, especially for strawberries, peppers, eggplants, cucumbers and pumpkins.

Fruit and vegetables are sold both retail and wholesale. Retail and especially UPICK and school tours have become much more prominent at Garwoods, and the market at the farm has been expanded greatly over recent years and includes an enlarged bakery. A wide range of produce is sold in the market, as well as fresh donuts. A high percentage of their fruits and vegetables are still sold through wholesale outlets to large chain stores and through brokers. They have several cold storages, including one capable of being CA. The use of 'Smart Fresh' to extend storage life has been very helpful. The fruit packing line includes a waxer for wholesale sales.

They are now also concentrating on growing vegetables for wholesale including sweet corn, green beans, eggplant, pickles, cucumbers, tomatillos and peppers. They have also installed a new vegetable packing line. The Garwood's still make their own cider. The press is now a Frontier Technology continuous feed press housed in a separate press room. The cider is also pasteurized, using a Thermoline pasteurizer.

Garwood's also hold a Primus GFS certificate for food safety. They have completed that audit on the ranch, packing and harvesting for several years to satisfy requirements of wholesale customers.

For more information, visit Garwood's website: http://appleupick.com

Location
Garwood Orchards
5911 W 50 South
LaPorte, IN 46350

The orchard location can be found in Google maps:
https://www.google.com/maps/place/Garwood+Orchards/@41.600327,-86.815679,13z/data=!4m5!3m4!1s0x0:0x678e84d551c18e95!8m2!3d41.600327!4d-86.8156794?hl=en

Also, look on the Garwood orchard Website: http://appleupick.com/find-us/

Program schedule:Tuesday June 26:

NOTE: Garwood's are on Central Daylight (Chicago) time. Times listed are local time.

Garwood Orchard, LaPorte, IN

8:30 am	Registration. Coffee and donuts.
9:00 am	Welcome and Introductions

Orchard tour – fruit

11:15 am	Indiana Hort. Society business meeting
12:00 pm	Lunch – cookout at the farm.
1:00 pm	Field tour – vegetables
3:00 pm	Farm marketing and tour of facilities
5:00 pm	Conclude tour and depart

Motels in the LaPorte Co. area include:

Hampton Inn and Suites, Michigan City, IN. $129 + tax. Phone: 855-238-159

Holiday Inn Express, La Porte, IN. $116 + tax. Phone: 855-239-9222

Blue Jay Manor, Michigan City, IN. $80 + tax. Phone: 877-429-7381

Upcoming Events

(Lori K Jolly-Brown, ljollybr@purdue.edu)

June 26, 2018 Summer Field Tour- Fruits & Vegetables
Garwood Orchard, LaPorte, IN
Contact Lori Jolly-Brown ljollybr@ purdue.edu

July 17-18, 2018 Indiana Winery and Vineyard Association Summer Meeting
Brown County Inn, Nashville, IN
Contact https://indianawinevine.org/events to register

August 30, 2018 Small Farm Education Field Day
Purdue Daniel Turf Center
Contact Lori Jolly-Brown, **ljollybr@purdue.edu** or 765-494-1296
Register here: http://www.cvent.com/d/hgqx6g

September 5, 2018 Greenhouse & Indoor Hydroponics Workshop
Purdue University, PFEN 1159 & Purdue Horticulture Greenhouse
Contact Lori Jolly-Brown ljollybr@purdue.edu

Register here: https://tinyurl.com/yaxd4k2z

October 17, 2018 Indiana Flower Growers Conference
Daniel Turf Center
Contact Lori Jolly-Brown ljollybr@purdue.edu

January 8, 2019 Illiana Vegetable Growers Symposium
Teibel's Family Restaurant, Schererville, IN
Contact Liz Maynard **emaynard@purdue.edu**

https://ag.purdue.edu/hla/Extension/Pages/IVGS.aspx

February 12-14, 2019 Indiana Hort Congress
Indianapolis Marriott East Indianapolis, IN
Contact Lori Jolly-Brown, **ljollybr@purdue.edu** or 765-494-1296
http://www.inhortcongress.org

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