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Crop Conditions

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

In Lafayette, apples are at tight cluster and peaches at half-inch green. In southern areas of the state, apples and cherries are approaching full bloom, while peaches are almost at petal fall.

Fruit crops are beginning to develop across the state. The southern areas are well along, with peaches in bloom, apple development past tight cluster, grapes at bud burst and strawberry flowers emerging from crowns. These areas are at risk from any frost or freezing weather that might occur. Peaches, grapes and strawberries are at highest risk of damage. As noted recently, cold air is expected to move into the state this weekend. In central and northern parts of the state, fruit crops are at less risk due to more delayed development. In Lafayette, apples are at half-inch green to tight cluster, grapes are at early swell or still dormant, brambles are beginning growth with flowering laterals developing on floricanes and new primocanes emerging. Strawberries have new leaves but flower buds have not pushed from the crowns. Peaches have half-inch vegetative shoots, but in our plantings there does not appear to be many (if any) live flower buds, which is a bit surprising given the relatively mild winter. Plums are also at half-inch green and flower buds appear live and healthy. Among the less common fruits, pawpaw flowers are swelling, honey berries are at early bloom as are currants and gooseberries. Elderberry shoots are 2 to 3 inches long.



Apple at half inch green



Apple at tight cluster



Grapes at early swell



Strawberry pushing new leaves



Thornless blackberry with first leaf unfolded



Thornless blackberry primocanes emerging



Peach with half inch vegetative shoots. Note dead flower buds



Plums at 1/2 inch green



Pawpaw blooms swelling



Black currant in early bloom



Elderberry shoots developing



Honey berry in early bloom

Was March any indicator of the next few months?

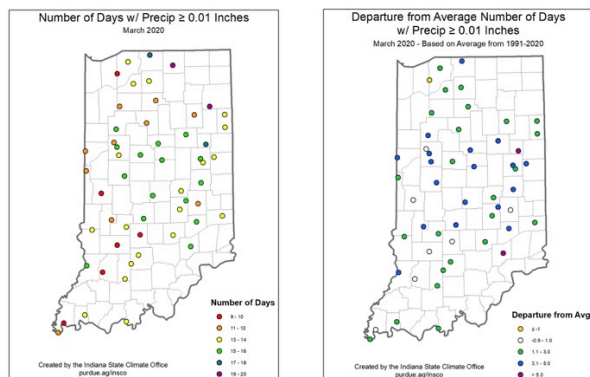
(Beth Hall, hall556@purdue.edu)

Staying true to global climate trends these days, March 2020 finished warmer and wetter than the 1981-2010 climate normal period. Snowfall across the state was below normal and localized flooding was a common feature. There were 3-to-5 more days than average in March where rainfall was observed (Figure 1). This has led to saturated soils throughout the state and a desperate need for some drying out.

Will that happen? The national Climate Prediction Center is currently sending mixed messages. The April outlook suggests increased confidence in temperatures being warmer than average and slight confidence that precipitation will be above normal. However, shorter-range outlooks are suggesting even greater confidence for cooler temperatures throughout the rest of the month with uncertainty about rainfall amounts relative to normal. A significant cold wave is expected to pass through the state over the next several days into next week. Overnight lows will be at or below freezing, so the recent period of warm days may have set up vegetation to be at significant risk for frost/freeze damage. At this time, it does not look as if April 2020 will be as wet as April 2019. However, delayed planting may be necessary so keep an

eye out for those dry periods to get planting and condition monitoring in when you can!

To keep track of recent frost/freeze data and explore climatological probabilities of frost/freeze events still occurring, checking out the Midwestern Regional Climate Center's Vegetation Impact Program's [Frost Freeze Guidance products](#). This suite of tools can show the date of the most recent freeze event (32°F and 28°F), how many days since the last freeze event (can be an indicator of early growth and green-up), how many frost/freeze days have occurred over the past 14 days and a variety of freeze climatologies.



Strawberry Growers Should be Prepared for Cold Protection

(Wenjing Guan, guan40@purdue.edu)

Warm temperatures this week greatly encouraged strawberry growth and development. Some of the early cultivars may have entered the open blossom stage especially if they are grown with the annual plasticulture system in southern Indiana. Open flowers cannot tolerate temperatures lower than 32°F, while popcorn stage flowers (Figure 1) and tight buds may tolerate temperatures low to 26 and 22°F, respectively, according to information from Barclay Poling from NCSU. Lower than threshold temperatures may completely kill flowers or damage flowers that lead to misshaped fruit. Depending on the crop stages, this may result in devastating yield losses and/or delay the start of harvest season.



Figure 1. The two flowers on the left are in 'Popcorn' stage.

According to USDA Midwest Climate Hub briefing, warm

temperatures this week will be followed by several days of freezing chances this weekend into early next week, and cold is likely through mid-April at least. The current forecast in southern Indiana predicts low temperatures that are in the mid 30's for a few nights. It is important to note that even when air temperatures are forecasted to be in the upper 30's at the weather shelter height (5 ft), it is still possible to have a killing frost at the strawberry canopy level.

When is it necessary for strawberry growers in southern Indiana to apply cold protection? Evaluating crop stage is extremely important. Growers may randomly pick 20 plants, calculate the average number of *emerged flower buds/plant*, *popcorn stage blossoms/plant*, and *open blossoms/plant*. If there are no open blossoms, growers in southern Indiana may not need to apply cold protection assuming predicted low temperatures stay in the mid 30's. With 2-3 open blossoms per plant, growers may weigh the economic benefit of applying cold protection. Assuming strawberries are 20 grams each, if there are 15,000 plants/acre, loss 2-3 blossoms per plant may result in yield loss of about 1,600 lb/acre. Growers need to judge whether the yield loss is acceptable. If the plants are in the main blooming period, with more than 10 open blossoms per plant, there may be a risk of losing more than 60% yield without cold protection in the coming days. In northern Indiana, although it may still be early for strawberries to enter the open blossom stage, with predicted temperatures in the 20s, cold protection for emerging flowers is needed.

Hopefully, strawberry growers already have sprinkler irrigation set up or have middle to heavy row covers (1 to 2 oz/sq) handy for cold protection. Overhead sprinkler irrigation is the most effective for frost/freeze protection of developing and open blossom. But it can be risky if wind speed is more than 10 mph. Row covers can also provide 3 to 4 degrees of cold protection but they have to be pulled back in the morning following a night of cold protection as flowers need to be pollinated.

Twitter @VeggieGuan

Properly timing fungicide sprays

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

"Timing is everything." No truer statement has ever been uttered, especially in the orchard, where the timing of fungicide sprays from "pink" (bud stage) through petal fall requires an almost psychic ability to anticipate pesticide timings. Abundant ascospores production occurs at pink and continues through petal fall, increasing the risk of infection until petal fall through first cover (Fig. 1). Although primary infections no longer occur by first cover, any ascospores (primary infections) that successfully infected the apple tree have the potential to create a tremendous number secondary infections. Therefore, protection during bloom is protection during the peak period of susceptibility. The timing of this protection is then coupled with another phenological event, petal fall. These timings need to be anticipated so that trees are fully protected through bloom but are due for another fungicide

spray to combine with the necessary insecticide sprayed at petal fall to control curculio and leafroller hatch. Factoring this timing is difficult enough—factoring the unpredictable arrival of petal fall to correctly time your spray may prove beyond your “psychic ability.” “Stretching” spray timing just a few days so one can reach petal fall can be a costly mistake if trees are left unprotected during critical bloom-time infection periods, but understanding how to best deploy fungicides can help keep you covered until first cover.

Prior to peak spore release periods (Fig. 1), protect trees prior to the anticipated petal fall spray by applying mancozeb or captan, or captozeb (3-5 day ideally, but 7 days in reality, 10 if spring is really, really dry) when the risk of infection is lower. Thorough coverage is easily achieved through tight cluster, but becomes much more difficult as trees more fully leaf out and more ascospores are being released. Early on, repeated applications of captan and/or mancozeb are essential to protect new growth; other options include the FRAC 9 fungicides Scala and Vanguard which provide good protection during cooler periods of lower scab pressure. Other options include Syllit (FRAC M), prior to pink and the FRAC 7 fungicides (Aprovia, Fontelis, Sercadis) from half-inch green through pink.

To improve protection when there is more plant tissue to protect AND a higher spore load, use the systemic fungicides. The FRAC 3 fungicides have been around for so long that we have a new generation of them, including Cevya, Inspire, Topguard, and Indar to provide greater scab control than the FRAC 3 fungicides that preceded them (Rubigan, Nova, or Procure). These newer FRAC 3 fungicides have more intrinsic activity against apple scab (and protect against powdery mildew and rust) and once again provide the flexibility for timing sprays compared to the first generation FRAC 3, and the traditional contact fungicides (mancozeb, captan, polyram, or ziram). We know that fungicide resistance is inevitable, which means we still need to apply FRAC 3 fungicides strategically and within 24-48 hr of infection if we wish to best control scab and minimize the risk of resistance.

Good control going into pink and bloom with protectant fungicides early also preserves the FRAC 11 fungicides for the pink through petal fall period when multiple fungal pathogens like rust, powdery mildew and bitter rot begin their infection cycle. This is also the period of time when scab is reaching maximum ascospore release and the beginning of powdery mildew, rust and bitter rot. In years with a very extended bloom period, this approach allows the alternation of FRAC 3 (Cevya, Inspire, Topguard, Indar, Rally) with FRAC 11 (Flint Extra, Sovran) or a FRAC 7+11 (Luna Sensation, Merivon, Pristine). Be careful using the FRAC 7+11 fungicides if you relied upon the FRAC 7s (Aprovia, Fontelis, Sercadis) earlier in the season.

Peaches

Assuming that your peaches have made it this far, the biggest worry for them and other stone fruit is brown rot (Fig. 2). 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. Mummy 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 wet 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 2020 Midwest Fruit Pest Management Guide <https://ag.purdue.edu/hla/Hort/Documents/ID-465.pdf> for more information regarding peach disease management.

Final note:

“Upticks in powdery mildew last year, plus a mild winter (which allows the fungus to overwinter in buds) set the stage for powdery mildew on both pome and stone fruit crops (Fig. 3,4). 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 apple varieties (Jonathan, Baldwin, Ginger Gold, Ida Red, Cortland, Rome, Stayman Winesap). We continue to observe 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 FRAC 3 fungicides (Rally, Topguard, Indar, Cevya), FRAC 7 (Fontelis, Sercadis) FRAC 11 (Flint, Sovran), and FRAC 7+11 (Pristine, Merivon, Luna Sensation) are good to excellent on powdery mildew and most will help with rust and scab for apples, or brown rot and peach scab in peaches, assuming resistance is not an issue! Note: Aprovia is not labeled for stone fruit at this time.

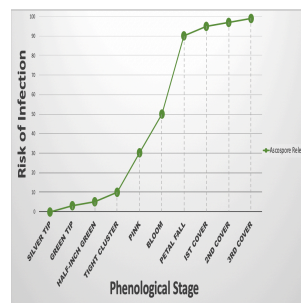


Fig 1 Risk of apple scab infection at each phenological stage.



Fig 2 Brown rot of peach.



Fig 3 Powdery mildew is a problem in dry springs, especially on susceptible varieties. I would still rather not eat a Red Delicious, though!



Fig 4 Powdery mildew on peaches.



control chapter in the 2019-2020 Midwest Fruit Pest Management Guide for a complete list of registered products.

In most situations, there will be some emerged weeds present in the weed-free strip. These could be winter annuals, perennials, or recently germinated summer annuals. A post-emergence herbicide can be used to control these emerged weeds. Common broad-spectrum, post-emergence herbicides are glyphosate (Roundup, Touchdown, etc.), glufosinate (Rely, Forfeit, etc.), and paraquat (Gramoxone). Some fruit crops are extremely sensitive to glyphosate, specifically peaches and brambles. Avoid spraying glyphosate near stems/trunks that are “green” or not sufficiently covered with bark. Also, avoid spraying glyphosate on crops with actively growing suckers, as it could move into the rootstock and/or scion of the crop. Glyphosate works best on actively growing weeds. Activity will be slow in cooler conditions, and it may take a week or more to observe control.

Glufosinate and paraquat function more as contact herbicides, meaning that they kill plant tissue they come in contact with. With contact herbicides, coverage is important. Control will be quicker with these herbicides than glyphosate, but they may not be as effective in controlling perennial weeds. Low-hanging blueberry branches and stems of some thornless blackberry (Figure 2) varieties may be injured by these two herbicides, but yield is not usually affected. If you plan to use paraquat in this year, you must take an approved training course. More information on that is available [here](#).



Figure 2. Gramoxone injury on ‘Arapaho’ blackberry floricanes.

Spring Weed Management

(Stephen Meyers, slmeyers@purdue.edu)



Figure 1. A blackberry field with well-defined weed-free and row middle areas.

Early spring is a good time to make the first herbicide application of the year in fruit plantings where a weed-free strip is maintained in the row (Figure 1). There are several options for fruit crops including both pre- and post-emergence herbicides. See the weed

In order to avoid injury to brambles, a postemergence herbicide application should be made before primocane emergence.

For longer-term weed control, consider applying a pre-emergence herbicide as well. Pre-emergence herbicides can be tank-mixed with a post-emergence herbicide and applied together. Most pre-emergence herbicides will provide only 4 to 6 weeks of control as they break down in the environment. So, if applied in very early spring, they may not provide sufficient control of summer weeds (foxtail, barnyard grass, goosegrass, crabgrass, lambsquarters, ragweed, etc.). If those are weeds of concern, growers may want to delay application of pre-emergence herbicides until a bit later in the season. A good option is to apply a broad-spectrum, post-emergence herbicide, then come back in about 4 weeks with a

second application of post-emergence tank-mixed with a pre-emergence herbicide. That should provide reasonably good season-long weed control. Another option is to apply a tank-mix of pre- and post-emergence herbicides now, and a delayed pre- plus post-emergence application later in the growing season or after harvest.

Growing season

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

It can be useful to compare this growing with previous years. The typical way we calculate growing conditions is by calculating Growing Degree Days (GDD). This is somewhat similar to the method many are familiar with for calculating codling moth emergence. In Figure 1, we see the accumulation of GDD over the last 10 years. What is labelled as "Normal" really isn't that normal anymore. It's the long-term average. Each of the last 10 years have been ahead of average. The year that stands out is 2012. Many will remember the especially early flowering time and a result of warm temperatures in March, and the subsequent freeze resulting in almost complete crop loss.

This year is marked with a heavy black line. We're not especially early compared with the last few years. Those in southern Indiana, where peaches are towards the end of flowering and apples approaching full bloom, will be hoping for warm weather to favor pollination and early fruit growth. Growers in more northern areas of the state will be hoping for cool weather for another week or two to hold back development. With cooler weather forecast for the next week or so, it seems this won't be an especially early year. As experience growers know, the later the spring the lower the chance of frost damage, but as these growers also know, you don't want to count your chickens too early.

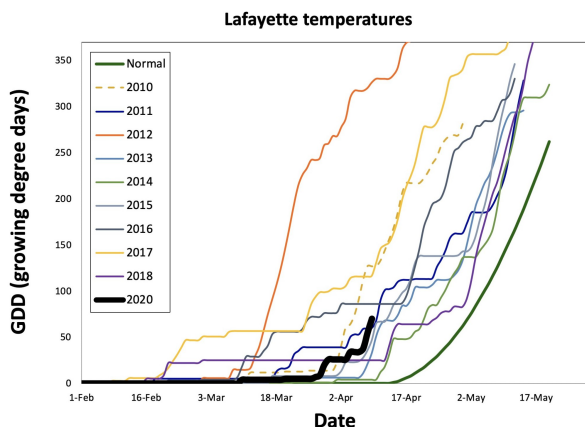


Figure 1 Lafayette temps 4-9-20

Spending time in nature reduces stress and anxiety

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

A new study from Cornell University has found that it takes as few

as 10 minutes in a natural setting for college students to feel happier and lessen the effects of stress both physically and mentally. Just think what a visit to a farm market or an afternoon U-picking with the family could do. More details about the Cornell study is here:

<https://www.vet.cornell.edu/news/20200225/spending-time-nature-reduces-stress-and-anxiety>

Extension Events

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

Due to the COVID crisis, all Purdue Extension meetings have been cancelled until further notice. Some may be offered by distance education, but no in-person meetings will be allowed.

Most Purdue Extension staff are working from home. We are available to answer your questions by email, phone or through social media. Our contact information is at the end of the newsletter.

July 30, 2020 Small Farm Education Field Day
Daniel Turf Center, Purdue Student Farm
Contact Lori Jolly-Brown, ljollybr@purdue.edu

September 10-12, 2020 Purdue Extension Master Gardener State Conference
Sponsored by the Hamilton and Howard County Master Gardener Associations
Hamilton County Fairgrounds, Noblesville, IN (September 10 and 11)
Tours of Howard County gardens, Kokomo, IN (September 12)

[2020 State Conference Guide](#)

(Registration open to Purdue Extension Master Gardener volunteers and Extension staff only)

TBA September 2020 Hydroponics Workshop
Deans Auditorium/HLA Greenhouse
Contact Lori Jolly-Brown, ljollybr@purdue.edu

October 16, 2020 Indiana Flowers Growers Association Conference
Daniel Turf Center
Contact Lori Jolly-Brown, ljollybr@purdue.edu

January 19-21, 2021 Indiana Green Expo
Indiana Convention Center, Indianapolis, IN
Contact Brooke Ponder, bponder@purdue.edu

January 20 & 21, 2021 Indiana Horticultural Conference & Expo
Indianapolis Marriott East
Contact Lori Jolly-Brown, ljollybr@purdue.edu

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