



#### In This Issue

- Crop Conditions
- Uncertain Climate Outlook for May
- Early season management of grape diseases and insect pests
- Strawberry Observations from an Entomologist
- After the Freeze 2020
- Managing Diseases on Stone Fruits
- Canada thistle
- Strawberry Cold Protection Made a Difference
- Annual Plasticulture Strawberry Update at Southwest Purdue Agriculture Center
- Guidelines to exercise essential status for a farmers market
- Spring temperatures
- Freeze damage
- Assessing Fruit Bud Survival and Crop Potential
- Frost recovery treatments
- Extension Events

## Crop Conditions

(Bruce Bordelon, [bordelon@purdue.edu](mailto:bordelon@purdue.edu), (765) 494-8212)

Apples in Lafayette are approaching pink. IN more southern areas of the state apples are past full bloom and into petal fall. Frost damage to crops has been widespread in southern areas of the state.

Fruit crops are in early stages of growth across the state. In southern areas peaches and apples are in bloom and grapes have 1-3 inch shoots. Strawberry flowers are still mostly tight bud stage in matted row plantings and in bloom in plasticulture plantings. Brambles have 3 to 6 inch shoots. There was some damage from the frosts and freezes of April 15-17 but damage is spotty and it is still too early to tell the full effects on overall yield. Peaches and grapes were likely the most heavily affected followed by apples and strawberries. Brambles should be okay. We will learn more as crops continue to develop with warmer weather this week. In central and northern parts of the state, fruit crops have developed very little over the past couple of weeks. Apples are from tight cluster to pink, with some crabapples starting to bloom. Grapes are mostly at early to full swell with a few at bud break. Strawberry flower buds are out of the crown.

Brambles have 1/2 to 1 inch shoots. Gooseberries and currants are in bloom as are honey berries. Pawpaw flowers are swollen but have not begun to open. Damage appears to be minimal except for strawberry, where most exposed flower buds were injured. There is some leaf burn on brambles and elderberries.



Apple at early tight cluster



Apple at late tight cluster



Late tight cluster apple with king blossom cut to check for damage



Apple at pink



Grape at full swell. Note secondary bud developing below primary



Grape at bud burst



Strawberry flower buds out of the crown



Strawberry flower showing freeze injury



Quachita blackberry at 1 inch shoots. Notice some freeze damage.



Black currant in early bloom



White currant strips. Note some damage to flowers



Gooseberry in bloom



Elderberry shoots showing freeze injury





Honeyberry in full bloom. Note some freeze damage

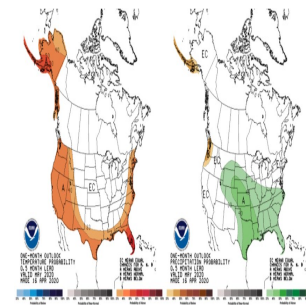


Pawpaw flower cut to show healthy tissue with no damage

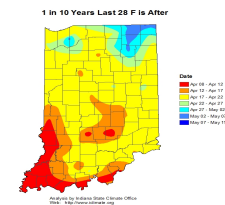


Pawpaw flowers and shoot tip

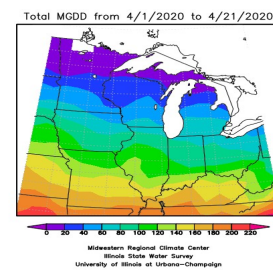
seems like a relatively typical spring in Indiana.



May outlook Temp Precipitation



1 in 10 years last 28 F is after



Total MGDD from 4/1/2020 to 4/21/2020

## Uncertain Climate Outlook for May

(Beth Hall, [hall556@purdue.edu](mailto:hall556@purdue.edu))

The Climate Prediction Center's outlook for May is dominated by uncertainty regarding both temperature and precipitation (*Figure 1*). The computer models could not settle on a consistent pattern for either above- or below-normal temperatures for the month and precipitation outlooks are only slightly confident that there will be above-normal precipitation in southern Indiana. Shorter-term outlooks through mid-May are predicting increasing confidence for continued below-normal temperatures but very little guidance regarding precipitation.

Climatologically speaking, there is less than a 10-percent chance that a hard freeze (at or below 28°F) is still likely to occur aside from the northeastern counties in Indiana (*Figure 2*). However, forecasts are predicting above-freezing overnight lows for this region, so the threat of any expansive, hard freeze is minimal.

With the recent cold temperatures, modified growing degree-day (<https://www.agry.purdue.edu/ext/corn/news/timeless/HeatUnits.html>) accumulations have slowed. As of April 20, 2020, GDDs are running 20 to 45 units below normal (*Figure 3*).

Enjoy the warmer and drier conditions when they come. This

## Early season management of grape diseases and insect pests

(Bruce Bordelon, [bordelon@purdue.edu](mailto:bordelon@purdue.edu), (765) 494-8212)

Grapes are in the early stages of growth across the state, from bud break to 4 to 6 inch shoots. Significant frost and freeze damage occurred in central and southern areas so that will set growth back a couple of weeks as the secondary buds break. With a reduced number of primary shoots, protection of all the secondary shoots will be critical to assure a full, balanced crop. And now that the temperatures are warmer there is an increased risk of damage from climbing cutworms and flea beetles. Growers should scout their planting regularly and be ready to make an insecticide application if more than 10% of the buds are showing damage. There are a number of options, depending on which insect pest is present, or both. IRAC 3A products such as Baythroid or Danitol are effective on both pests. Carbaryl, or Sevin, is also effective on both.

This early stage of growth is also the most important time to maintain "preventative" control of the major grape diseases such

as Phomopsis, black rot, powdery and downy mildew. Phomopsis is of special concern. If left unchecked, the early shoot infections will spread to cluster stems and developing berries. The organism then remains latent in those lesions during most of the season and cannot be controlled with additional fungicide applications. 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, Chardone, La Crescent, and Marquette are highly susceptible to Phomopsis. So prevention of the early season infections is critical.

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. Captan is weak on black rot. 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 day interval through bloom. This is usually about four spray, but may need to be more if rainy weather persists. When vines reach the “immediate pre-bloom” stage, addition of a demethylation inhibiting (DMI) fungicides in the FRAC 3 group greatly improves black rot control and provides powdery mildew control. Rally, Tebustar, Procure, and Mettle are common FRAC 3 fungicides. This group is systemic, thus very rainfast. There are a number of other options available, but this simple approach (mancozeb plus a FRAC 3) has been very effective in our trials. This tank mix should be applied through the post bloom stage. One note; since mancozeb has a long pre-harvest interval (66 days), growers may need to substitute a different protectant in the post bloom sprays, especially on early ripening varieties. Captan or Ziram are effective. Another option to to alternate or switch to one of the strobilurin FRAC 11 fungicides like Sovran, Flint or Abound, or with one of the pre-mix products that contain FRAC 3, 7, or 11 ingredients in the bloom time sprays. Pristine, Quadris Top, Revus Top and Luna Experience are examples of pre-mix products. A “Suggested Grape Spray Schedule” is available on my web site, along with the full spray program in the 2019-2020 Midwest Fruit Pest Management Guide. Find both at: <https://ag.purdue.edu/hla/fruitveg/Pages/Grapes.aspx>

strawberries in a high tunnel. It didn't take much for our own Wenjing Guan to convince me to plant some; who doesn't love to eat fresh strawberries? We planted them back in October and I just peeked at them every couple of weeks throughout the winter, looking for hungry herbivores wanting to share the impending treats. There were spider mites at first (Fig. 1) and we made a few releases of the predatory mites *Phytoseiulus persimilis* and sachets containing *Amblyseius (Neoseiulus) californicus*.

This spring, when the weather started warming up and the extra cover was lifted inside the tunnels we found less mites, almost none at all at this point, but an explosion of aphids (Fig. 2) and an increasing presence of whiteflies (Fig. 3). The whiteflies take a bit more patience to locate, but now that I know they are there I shake the plants to dislodge them while I am conducting my surveys. The aphids, in such high numbers, are easy to spot by looking for the shiny honeydew excretions on the row covers (Fig. 4). While I wait patiently for some commercially-purchased lacewing larvae to arrive to help control the aphid populations, I am enjoying watching syrphid fly larvae feast on them (Fig. 5). For now, I will continue to monitor the whiteflies and begin to enjoy the tasty fruits of my labor.



Figure 1: Two-spotted spider mites on strawberry leaves (left) and under a microscope camera (right).



Figure 1: Two-spotted spider mites on strawberry leaves (left) and under a microscope camera (right).

## Strawberry Observations from an Entomologist

(Laura Ingwell, [lingwell@purdue.edu](mailto:lingwell@purdue.edu))

This winter-spring has been my first excursion into growing





Figure 2: Heavy aphid infestation of the buds of strawberries in a high tunnel.



Figure 3: A whitefly on strawberries in a high tunnel.



Figure 4: Honeydew residue from aphid infestations on plastic mulch. An indication of the pest, inhabiting the underside of the strawberry leaves.



Figure 5: A syrphid fly larvae feasting on aphids in a developing bud (left) and under a microscope (right).



Figure 5: A syrphid fly larvae feasting on aphids in a developing bud (left) and under a microscope (right).

## After the Freeze 2020

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

In the Midwest, extreme weather events are, unfortunately, regular occurrences, even in extremely unusual times. At this point, though, it just feels like a pile-on. Most fruit crops planted in Indiana are tolerant of the cold when they are fully dormant. In the spring, as trees break bud and begin to flower, they lose cold hardiness. This is especially true of flower buds: Winter cold snaps below -15 F kill dormant stone fruit buds, and any that make out of winter are at risk if temperatures drop to less than 23F during flower development in spring (Fig.1). These cold snaps cause severe damage and often result in crop loss. Early blooming fruit crops (apricot, sweet cherry, peach) are more likely to be damaged due to the higher risk of frost occurring later in the spring than apples, but all can be lost to late spring freezes. Despite crop loss, trees still need to be managed to prevent disease buildup from damaging future crops. This brief focuses on low cost methods to manage tree fruit disease to protect future crops from infection.

### Apples and Pears:

Despite the potential loss of fruit crops, disease management, particularly for fire blight, is of the utmost importance right now. Improper management of trees from this point on can profoundly affect future harvests. Freeze injury, much like hail injury, results in damage to young and succulent shoots and leaves, providing a means for the fire blight bacterium to cause shoot blight. Running both Cougar Blight and MaryBlite right now shows zero risk of infection, as temperatures remain below 60 degrees F. Despite the negligible risk of infection, you may wish to protect some of the most susceptible varieties, like Fuji, Gala, and Ida Red (For a list of susceptibility see the new Extension Brief [Disease Susceptibility of Common Apple Cultivars](https://www.extension.purdue.edu/extmedia/BP/BP-132-W.pdf), at <https://www.extension.purdue.edu/extmedia/BP/BP-132-W.pdf>) especially if these are grafted on M.26 and M.9 rootstocks should temperatures rise above 70 degrees F with rain. Streptomycin or a low rate of copper (0.2 -0.6 lb of metallic copper/acre depending on tree row volume) will provide protection against fire blight. Keep in mind that copper can cause injury on some varieties, and application should occur after the temperatures are above 50 degrees F to prevent phytotoxicity. Suggested coppers include Cuprofix, Kocide, or C-O-C-S. Turner Sutton, at North Carolina

State University reports using the 0.2 and 0.4 lb rates on Golden Delicious during the summer without any problem. If you think you might have a crop on a copper sensitive variety, use streptomycin if you are concerned about possible injury and may still have a small amount of fruit to harvest. Should you still have a crop, based upon regional weather forecasts, you should plan on applying streptomycin prior to any anticipated warm weather+rain.

According to the prevailing wisdom, dead flowers that don't fall off are not good hosts for the fire blight bacterium. Many of our apple varieties at Meigs seem to be asynchronous with their bloom time this year and any of these slow to flower side blossoms or "rat tail" blooms that are still alive can become infected. Continue monitoring until bloom is over, and apply streptomycin as needed, not to exceed four applications per season.

If your orchard has a history of fire blight, I would strongly encourage you to consider applying Apogee (Prohexadione-Ca). Apogee is a growth regulator that does not directly kill the fire blight bacterium, but reduces shoot growth, thereby increasing plant resistance by reducing host vigor. Apogee suppresses apple shoot growth when applied near petal fall as a single spray, or as several applications over time. Apple response to Apogee depends upon the cultivar, timing, rate of application, crop load, and even geographical location. Regardless of this variability, Apogee remains the best management tool available for controlling the shoot blight phase of fire blight that growers may be faced with after a freeze, particularly after the vigor that may result after crop loss.

Despite the potential, or real loss of crop, it is imperative to maintain a least a minimum spray program to protect future harvests. Failure to do so will result in defoliated trees that fail to produce next year, or may not survive the next winter. Normally, the greatest risk of scab would be right now, from pink to bloom. However, nothing is normal about this year. For these reasons, I am recommending:

- EDBC fungicide (3 lb/acre) program through bloom. Alternate with copper or sulfur from second cover on to remain under label limits. Remember to stay within the 21.0 lb/acre/season limit for your EDBC's. I like the EDBC's as they also protect against bitter rot, black rot and white rot. Use this schedule if cedar-apple rust is a particular problem.
- Alternatively, Captan can be used earlier in the season for better scab control instead of the EDBC's, but provides no control of rust or powdery mildew.
- **NOTE:** Do not use Captan 50 Wettable Powder in combination with or closely following or in alternation with wettable sulfur products, or oil. Sulfur sensitive varieties of apples such as Red Delicious, Staymen, and Baldwin, can suffer severe injury and defoliation. Captan 50 WP has a 64 lb limit per acre per year.

One other option that can be used is copper (0.2 – 0.6 lb metallic copper per acre based on tree row volume) + sulfur (6-30 lb/acre

depending on brand/formulation) every 10-14 days between now until the first week in June, depending upon weather conditions. Suggested sulfur formulations include Thiolux, Microthiol Disperss, or Microfine Wettable sulfur. This spray program protects against scab and mildew, and slightly against rust. Remember, copper can russet fruit, and should not be used if you want to use your crop for anything except cider. **Do not use sulfur if temperatures are going to exceed 90 degrees F, or drying conditions are extremely poor. Do not use sulfur or copper within two weeks of an oil application.**

Neither of these programs is going to provide complete scab control but should reduce leaf infections. Organic trials in both Michigan and North Carolina regularly apply 6 lbs of sulfur per treatment without any reported phytotoxicity due to temperature.

If powdery mildew is particularly bad, you may wish to consider applying a sterol inhibitor like Rally or Procure, or a strobilurin like Flint or Sovran prior to second cover to knock down powdery mildew and reduce the likelihood of it overwintering in bud tissue, particularly are on higher value cultivars (like Honeycrisp, Jonagold, etc). Reducing inoculum levels to maintain plant health while reducing overwintering inoculum is important for longterm plant health, and to reduce inoculum buildup which contributes to fungicide resistance.



Figure 1. Freeze damage to apple blossom buds. Photo by Janna Beckerman.



Figure 2. In 2021, fire blight still caused infection of freeze killed blossoms in highly susceptible varieties like Gala and Fuji. Photo by Janna Beckerman.

---

## Managing Diseases on Stone Fruits

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

Late spring freezes and severe winter cold regularly causes stone fruit crop losses to approach 100%. With this level of irregular cropping, disease management must focus on protecting foliage to ensure a good potential crop for next year, while reducing over



wintering spore loads. Copper is fairly phytotoxic to peaches and should be avoided. Bravo is another low(er) cost alternative if disease pressure become high, but fruit is absent.

- Captan at the 1.3 lb/ 100 gallon rate should sufficiently control brown rot twig blight, scab on peaches and cherry leaf spot.
- If the season is excessively wet, higher rates of captan may be required.
- Captan will not control powdery mildew.
- Wettable sulfur at the 6 lb per 100 gallon rate is probably the least expensive material you can use and provides excellent control of powdery mildew of all stone fruit
- Wettable sulfur should aid in controlling brown rot twig blight, and peach scab.
- Flame Out (Oxytetracycline) or Mycoshield should be used to control bacterial spot on peaches, particularly if the weather is wet in late June and July.

For more information, see: <http://BP-179 Disease Management for Fruit Trees After Crop Loss at https://www.extension.purdue.edu/extmedia/BP/BP-179-W.pdf>

---

## Canada thistle

(Stephen Meyers, [slmeyers@purdue.edu](mailto:slmeyers@purdue.edu))

Spring is here and with it comes the emergence of weeds- especially problematic perennials like Canada thistle (Figure 1). Many weeds in perennial fruit crops are controlled during site preparation, but can become problematic again after crop establishment. Below is some information about Canada thistle and methods to manage it. Keep in mind two things: 1) many of these strategies will work for other weeds, and 2) management of perennial weeds often requires persistence and an integrated approach.

Scientific name: *Cirsium arvense* (L.) Scop.

Legal status: Canada thistle is considered a noxious weed in 46 states including Indiana. It is a non-native invasive species from Europe, and landowners with Canada thistle on their property are obligated to take measures to control it.

Growth habit: Deep-rooted and colony-forming perennial. Plants form a low-growing rosette in the spring prior to bolting in mid-to-late May.

Reproduction: By seeds carried up to 1/2 mile by wind and through adventitious shoots that develop from root buds.

Control: Often multiple types of control measures are needed. Consider a combination of the following:

- Exclusion and sanitation: Avoid spreading thistle roots, shoots, and seeds by implements such as mowers between fields. Control Canada thistle in roadsides, field roads, and fencerows. Use tested seed when planting row middles to minimize the risk of contamination with weed seeds (Figure 2). If you bring hay on-farm, use a reliable source.

- Herbicides: There are essentially two herbicide strategies. Many herbicides registered in fruit crops may burn back the top growth of the weed, but do very little to suppress the extensive root system. This type of herbicide application is sometimes referred to as a “chemical mowing”. A second option is to use effective systemic herbicides. Two with good efficacy are glyphosate (ie. Roundup) and clopyralid (ie. Stinger). At the moment, clopyralid is labeled for use in apple, stone fruits (peach, nectarine, plum, cherry), and blueberry. Avoid contact of either herbicide with the crop. Target Canada thistle from the rosette to the bud stage. For instructions on how to use each herbicide, consult the Midwest Fruit Pest Management Guide (<https://ag.purdue.edu/hla/Hort/Documents/ID-465.pdf>) and the product labels.

- Mowing: Mowing just before flower buds open can stop the development of Canada thistle seeds. However, timing is critical as viable seeds can be produced within 8 to 10 days after flowers open. Using multiple mowings, one at bud stage and one targeted toward fall regrowth, will help deplete root energy reserves.

- Cultivation/plowing: Cultivation may be used during site preparation and early crop establishment. Use caution when using tillage around Canada thistle. Standard, light tillage will cut the roots into fragments and move them throughout the field. Tillage is not a stand-alone treatment. If tillage is used as the primary method of control, it should be done often and deeply to deplete root reserves. Do not use tillage prior to applying systemic herbicides, which could reduce their efficacy.

- Cover crops: There is some evidence that shows cover crops can be useful for suppressing Canada thistle growth. Depending on the fruit crop grown, cool-season crops like cereal rye can be planted in row middles in the late summer/early fall and will compete with Canada thistle as it emerges in spring.

- Biological controls: There are limited options. Although some insects feed on foliage, stems, crowns, and developing seeds, control is often highly variable. Seeds at or near the soil surface are often consumed by birds, rodents, and insects.





Figure 1. Overwintered Canada thistle shoots emerge in April in central Indiana.



Figure 2. Seeds, like this cereal rye, can contain other crop and weed seeds

## Strawberry Cold Protection Made a Difference

(Wenjing Guan, [guan40@purdue.edu](mailto:guan40@purdue.edu))

Spring weather is unpredictable. One of the major risks associated with strawberry production is cold damage in the spring. Open strawberry flowers can not tolerate temperatures lower than 30°F, popcorn stage flowers and tight buds may tolerate temperatures low to 26 and 22°F, respectively. If strawberries are in the early blooming stage, the damage might be delayed harvest. However, if strawberries are in full blooming stage, low temperatures may cause dramatic yield loss. This is because inflorescences are initiated at day length <14h (June-bearing cultivars). If all the flowers were killed by low temperatures before setting fruit, there would be no more flowers for the year.

In this article, we update the cold damage that happened last week on plasticulture strawberries in Vincennes, IN. Figure 1 is the recorded temperatures (°F) at the height of strawberry canopies from 2:00 pm Apr. 13— 1:00 pm Apr. 18. Temperatures dropped below 30°F and lasted for about 8 hours on the night of Apr. 15. The lowest recorded temperature was 24.5°F (Figure 1). Not surprisingly, the temperature killed all open blooms. Some 'popcorn'-stage flowers were killed by the low temperatures (Figure 2).

Row cover (1.5 oz/sq) was used for cold protection. Under row covers, temperatures were about 30 °F on the coldest night. Very few strawberry flowers were damaged under row covers. The cold protection strategy successfully saved open strawberry flowers

during this frost event.

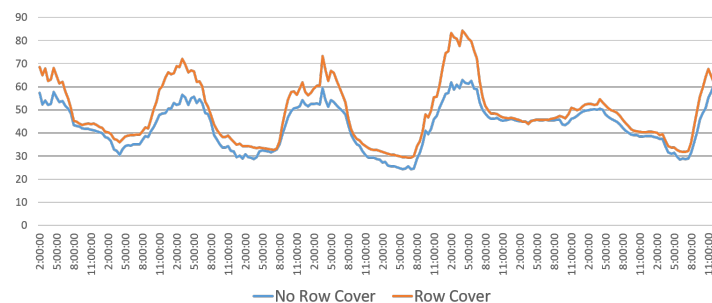


Figure 1. recorded temperatures (°F) at the height of strawberry canopies from 2:00 pm Apr. 13— 1:00 pm Apr. 18.



Figure 2. Cold damage on 'Popcorn' stage strawberry flowers.

## Annual Plasticulture Strawberry Update at Southwest Purdue Agriculture Center

(Wenjing Guan, [guan40@purdue.edu](mailto:guan40@purdue.edu))

At Southwest Purdue Agriculture Center in Vincennes, IN. We are conducting trials to evaluate annual plasticulture strawberry production systems. Here are the updates of strawberries from different production systems.

In a high tunnel, harvest of fall-planted strawberries started in early April. Cultivars Sensation, Radiance, Ruby June were early cultivars; followed by Beauty, Fronteras. So far, Radiance led the yield. Chandler, San Andreas, Camarosa, Liz and Camino Real were relatively later cultivars.

In the open field, most cultivars of fall-planted strawberries were in full bloom. As mentioned in the article [Strawberry Cold Protection Made a Difference](#), they are susceptible to frost damage. Cold protection is critical for them at this stage. Row cover was successfully used to protect the flowers from frost damage last week.

Day-neutral strawberry cultivars planted on March 9, 2020 established well. Plants were slightly larger under low tunnels. Frost happened last week killed most of the initiated flowers that might delay spring harvest. Instead of starting harvest in middle May as observed in 2019, the harvest may not start until the last week of May or early June. The following video provides updates on plant performance in this week.

---

## Guidelines to exercise essential status for a farmers market

(Peter M Hirst, [hirst@purdue.edu](mailto:hirst@purdue.edu), (765) 494-1323)

[Guidelines to exercise essential status for a farmers market](#)

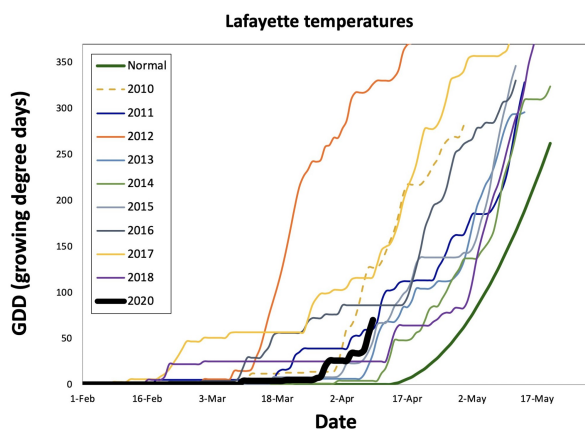
---

## Spring temperatures

(Peter M Hirst, [hirst@purdue.edu](mailto:hirst@purdue.edu), (765) 494-1323)

In Lafayette and more northern areas of the state, it's been a pretty typical spring. Temperatures at this time of the year are a two-edged sword. Cooler temperatures and the delay in crop development, reduces the chance of freeze damage to crops, but if flowers are already open, we want warm temperatures for bee movement, pollination and fruit set.

The last two weeks have been cool, delaying crop development. This will have lessened the damage to crops from recent freezes.



---

## Freeze damage

(Peter M Hirst, [hirst@purdue.edu](mailto:hirst@purdue.edu), (765) 494-1323)

Over the last week many areas of the state have experienced minimum temperatures likely to cause bud damage. Many areas experienced low temperatures of 24-26 F (according to weather stations) although one grower reported a low of 22 F. As experienced growers know well, it's not just the temperature as such that's important, but the stage of crop development when it hits.

As you can see in Table 1, low temperatures of say 20F will likely cause significant bud damage to apples if crops are beyond the half-inch green stage. The same temperatures before this stage probably will not cause widespread damage.

So what happened this year? Most areas of the state experienced similar low temperatures, but since crops were at more advanced stages of development in southern areas, it's there we see the most damage. In southern areas of the state, peaches have been badly hit, with close to complete crop loss in some cases. Apples have also been extensively damaged. Remember that even with

10% of buds alive (90% kill), we are often still looking at a full crop, and may still need to thin. After seeing extensive freeze damage to flowers or small fruitlets it may be tempting to not even consider the need for chemical thinning. Don't fall into that trap. Luckily, we still have a little time, even in southern areas, before chemical thinning decisions need to be made. In more northern areas of the state, apples were often not as far along as tight cluster, so freeze damage would be expected to be minimal. Again, remember that if 10 or 20% of flowers are killed, this should be considered a form of early thinning and would not be expected to compromise the potential for a full crop.

Table 1. Spring temperatures that cause crop damage to apples and peaches.

Developmental stage	10% kill (°F)	90% kill (°F)
<b>Apples</b>		
Silver tip	15	2
Green tip	18	10
Half-inch green	23	15
Tight cluster	27	21
Pink	28	25
Bloom	28	25
Petal fall	28	25
<b>Peaches</b>		
Swollen bud	18	2
Half-inch green	23	5
Pink	25	18
Bloom	27	24
Petal fall	28	25

---

## Assessing Fruit Bud Survival and Crop Potential

(Peter M Hirst, [hirst@purdue.edu](mailto:hirst@purdue.edu), (765) 494-1323)

What is the best way to assess bud damage from cold temperatures? Drs. Tara Baugher and Jim Schupp at Penn. State University have put together a nice page with some excellent photos explaining how to assess fruit bud survival:

<http://extension.psu.edu/plants/tree-fruit/news/2016/assessing-fruit-bud-survival-and-crop-potential>

I would add that unless you find that more than 90% of your buds have been killed, then you should still plan on thinning. With warmer temperatures in the forecast, we expect rapid crop development and any damage should become apparent. Remember to look for damage to the pistil. This is the female part of the flower and is made up of the stigma, the style and the ovary. The normal course of events is that pollen is deposited on the top of the pistil (stigma) and the pollen grows down the style and then fertilizes the ovule to produce a seed. Generally speaking, without seed development we don't get fruit set. Pollen will not grow down pistils that have been killed by damaging temperatures, so look for brown, dead pistils in the center of the flowers.

---

## Frost recovery treatments

(Peter M Hirst, [hirst@purdue.edu](mailto:hirst@purdue.edu), (765) 494-1323)

There has been some talk about the use of promalin to help overcome the damaging effects of freezing temperatures. Only a

small amount of research has been conducted on this. Dr. Steve McArtney showed that Promalin applied after damaging freeze events could increase parthenocarpic (seedless) fruit development, but not every time. Keep in mind this was only shown to be effective for freezes during full bloom. In Dr. McArtney's research, Promalin did increase fruit set, but only to about 25% of a full crop. In similar work in Michigan, Promalin applications (1 pint/acre) were not effective in increasing apple fruit set.

Based on this research, it's clear Promalin is not a silver bullet, but MAY help a little in some cases. Don't expect this to work in all cases, but if you're lucky you may get some slight benefit.

---

## Extension Events

(Bruce Bordelon, [bordelon@purdue.edu](mailto: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](mailto: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)

<https://hcmga.org/2020sc>

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

### **September 10, 2020** Hydroponics Workshop

Deans Auditorium/HLA Greenhouse

Contact Lori Jolly-Brown, [ljollybr@purdue.edu](mailto:ljollybr@purdue.edu)

### **October 16, 2020** Indiana Flowers Growers Association Conference

Daniel Turf Center

Contact Lori Jolly-Brown, [ljollybr@purdue.edu](mailto:ljollybr@purdue.edu)

### **January 19-21, 2021** Indiana Green Expo

Indiana Convention Center, Indianapolis, IN

Contact Brooke Ponder, [bponder@purdue.edu](mailto:bponder@purdue.edu)

### **January 20 & 21, 2021** Indiana Horticultural Conference & Expo

Indianapolis Marriott East

Contact Lori Jolly-Brown, [ljollybr@purdue.edu](mailto:ljollybr@purdue.edu)

It is the policy of the Purdue University that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue is an Affirmative Action Institution. This material may be available in alternative formats. 1-888-EXT-INFO Disclaimer: Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may have similar uses. Any person using products listed in this publication assumes full responsibility for their use in accordance with current directions of the manufacturer.

Facts for Fancy Fruit © Purdue University - [fff.hort.purdue.edu](http://fff.hort.purdue.edu)

Editor: Peter M Hirst | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907 | (765) 494-1323