

# FANCY FRUIT

Issue: 22-02  
April 19, 2022

*A Newsletter for Commercial and Advanced Amateur fruit growers.*

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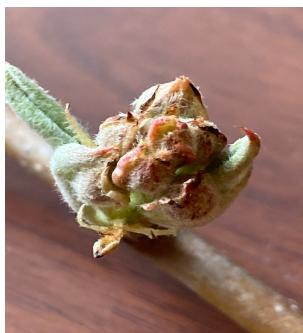
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## Crop Conditions

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



Peach- swollen bud



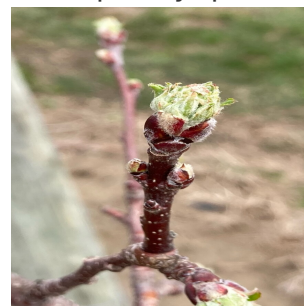
Pear- tight cluster



Grape- bud swell



Black raspberry- pre-bloom



Apple- half inch green



Red raspberry- pre-bloom

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# Easter snowfall

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

Many people, including me, were surprised to look out the window Monday morning and see the ground and trees white with snow. A heck of a way to start the week! Although it looked frightening to see trees, buds and flowers covered in snow, luckily temperatures did not drop too low. In general, lows were around 25F in northern areas of the state, and 30-33 in central and southern areas. Of course, the amount of crop damage depends not only on the temperature, but the stage of crop development. In northern areas of the state, apples are at early tight cluster and peaches at pink. Here in Lafayette peaches are in pink and apples at tight cluster and in southern areas peaches are pink to petal fall (depending on variety) and apples between pink and full bloom. So in northern areas of the state, minimum temperatures were lower but crop development was not very advanced and so less cold sensitive. The opposite was true in southern areas – more advanced crop development and so more cold sensitive, but higher minimum temperatures. The bottom line is that I wouldn't expect to see any significant damage from the low temperatures over Easter. A general guide to minimum temperatures expected to cause damage at different stages of crop development shown in the table.

**Damaging temperatures  
Apple**

	10% kill	90% kill
Dormant		
Silver tip	15°	2°
Green tip	18°	10°
Half-inch green	23°	15°
Tight cluster	27°	21°
Pink	28°	25°
Bloom	28°	25°

Minimum temperatures (°F) causing damage to apples at different stages of crop development.



Apple flowers at the Purdue Meigs farm after snowfall on Monday April 18, 2022. Temperatures were not cold enough to cause significant damage.



Peach flowers at the Purdue Meigs farm after snowfall on Monday April 18, 2022. Temperatures were not cold enough to cause significant damage.

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## Spring conditions

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

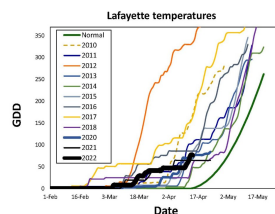
One way we measure how this year's weather compares with previous years is by looking at the accumulation of "Growing Degree Days" (GDD). This allows us to see if we're running ahead or behind previous years at the same date. In this graph showing temperatures over the last 12 years in Lafayette, we can see a number of things happening:

1. Every year of the past 12 years has been



earlier than the long term average - maybe listing this as "normal" is not appropriate anymore!

2. This year we're about the middle of the pack of the last 12 years. Not particularly early and not particularly late
3. Many people remember how early the 2012 season was and how we suffered significant freeze damage. 2012 stands out on the graph as an extremely early year
4. Warm temperatures are forecast for later this week (80°F predicted for Lafayette), which will change the graph considerably. As flowers are opening we're hoping this will be good weather for pollinators.



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## Strawberry Chat, Matted-Row System

(Wenjing Guan, [guan40@purdue.edu](mailto:guan40@purdue.edu)) & (Miranda Purcell, [mrpurcel@purdue.edu](mailto:mrpurcel@purdue.edu))

Listen to Strawberry Chat Apr. episode, featuring Dr. Bruce Bordelon talking about spring activities for the strawberry matted-row system.

Strawberry Chat is hosted by Dr. Wenjing Guan and Miranda Purcell of Purdue University.

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## Strawberry Field Day

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

Time: Thursday, May 12, 2022, 1:30-4:00 pm EST  
Location: Southwest Purdue Ag Center, 4369 N. Purdue Rd, Vincennes, IN, 47591

Register:

[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_dgK5N8Ws9m2cJWC](https://purdue.ca1.qualtrics.com/jfe/form/SV_dgK5N8Ws9m2cJWC), or call 812-886-0198

- Visit strawberry research at Southwest Purdue Agriculture Center; see strawberry production on a plastic culture system, in high tunnels, and in bench systems.
- Discuss season extension in strawberry production, and understand challenges faced by each production system.



## STRAWBERRY FIELD DAY

### Strawberry Field Day & Open House

Thursday, May 12, 2022, 1:30-4:00 pm EST

Southwest Purdue Ag Center,

4369 N. Purdue Road Vincennes, IN 47591

The tour is free, register  
[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_dgK5N8Ws9m2cJWC](https://purdue.ca1.qualtrics.com/jfe/form/SV_dgK5N8Ws9m2cJWC)  
or call 812-886-0198  
If you have any questions, please contact  
Wenjing Guan ([guan40@purdue.edu](mailto:guan40@purdue.edu))



- Visit strawberry research at Southwest Purdue Agriculture Center; see strawberry production on a plastic culture system, in high tunnels, and in bench systems.
- Discuss season extension in strawberry production, and understand challenges faced by each production system.



This Strawberry field day is sponsored by Purdue University and North-Central Sustainable Agriculture Research and Education (NC-SARE). Project number LNC21-454.



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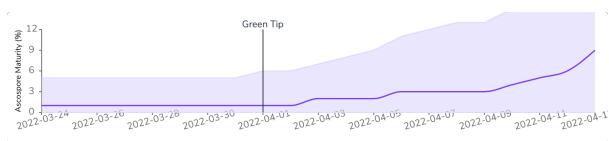
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## Apple Scab and Ascospore Maturity

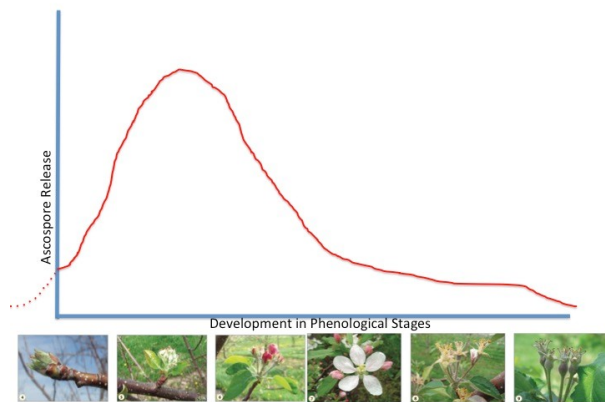
(Janna L Beckerman, [jbeckerm@purdue.edu](mailto:jbeckerm@purdue.edu), (765) 494-4628)

The only thing predictable about Indiana weather is that it will certainly be unpredictable! The past few weeks of cool weather and intermittent freezes has slowed some things down. Unfortunately, scab isn't one of those things.

Failure to control early season scab infections increases the risk of economic losses. When managing scab, it is important to realize that ascospores don't all 'shoot' at once but occurs over a period of weeks to months, depending upon the weather. As the temperature warms and snow turns to rain, fruiting bodies (called pseudothecia) develop on the leaf litter. As the fruiting bodies mature, they release ascospores when temperatures are above 50 degrees WITH rain (more than 1/100<sup>th</sup> of an inch). As you can see from the NEWA station, the process is only beginning:



The rate of ascospore maturation and release follows a bell curve—they increase, reach a peak, and then decrease.



Infection events are shown in red below. Even though we are only at green tip to half-inch green, we have had four infection events. We used copper to knock down scab and keep it from getting a toehold in the orchard. This protects against scab while allowing us to preserve our captan and mancozeb as disease pressures increase in the coming days and weeks.

Infection Events Summary

Download CSV

Events: Dry Wet

Date (2022)	Infection Events	Average Temp (°F) for wet hours	Leaf Wetness (hours)	Hours > 90% RH	Rain Amount
Apr 9	no	34	11	6	0.03
Apr 10	no	33	1	0	0
Apr 11 Forecast	combined	60	10	0	0.21
Apr 12 Forecast	yes	46	9	9	0.01
Apr 13 Forecast	combined	65	15	0	Night: 29% Day: 87%
Apr 14 Forecast	yes	49	8	0	Night: 66% Day: 76%
Apr 15 Forecast	no	-	0	0	Night: 6% Day: 7%
Apr 16 Forecast	no	-	0	0	Night: 20% Day: 19%

Infection events, shown in red above, are based on the [Revised Mills Table](#) and are calculated beginning with 0.01 inch of rain. The word "Combined" means the wetting event on this day is being combined with another wetting event using the following rule: two successive wetting periods, the first started by rain, should be considered a single, uninterrupted wet period if the intervening dry period is less than 24 hours. When an infection event is in the 5-day forecast, the actual weather data logged may or may not translate into an actual infection event. Therefore, the table output may change once actual weather data are logged.

## NEWA MILLS

As per the NEWA website: "Infection events, shown in red above, are based on the **Revised Mills Table** and are calculated beginning with 0.01 inch of rain. The word "Combined" means the wetting event on this day is being combined with another wetting event using the following rule: two successive wetting periods, the first started by rain, should be considered a single, uninterrupted wet period if the intervening dry period is less than 24 hours. **When an infection event is in the 5-day forecast, the actual weather data logged may or may not translate into an actual infection event. Therefore, the table output may change once actual weather data are logged.**"

## How to manage early season scab?

Early season sprays are critical for controlling scab. Without these spray interventions, the cool and wet weather pattern is setting the stage for potentially big outbreaks of scab.

First and foremost, check buds for damage if the weekend freeze was an issue. Without a crop, spraying can obviously be curtailed. In the south, these freezes may have caused anything from a little thinning to significant damage, depending upon location, cultivar, and growth stage. In past years, we found 100% loss after examining a hundred buds...but still had a decent crop on Rosalee. ☹️All of us have been surprised to find apples after a significant freeze so I really caution giving up too early!

Second, assuming you still have a crop, begin weekly or even more frequent monitoring of orchard blocks to determine growth stage, pest activity and weather. Continue monitoring weather conditions for apple scab infection periods and spray accordingly. Early season sprays should rely more heavily on captan, mancozeb, Syllit, Scala, Vanguard, and some of the SDHIs, like Fontelis. I would save Aprovia for later use, as it is the one SDHI fungicide that is effective against bitter rot management later in the season.

Third, it's important to note that a well-managed orchard with 1% leaf scab or less would still produce ~900,000 ascospores per acre. In an unmanaged or poorly managed orchard (due to crop loss), a greater number of ascospores will be released with rain events, and scab levels will uptick, resulting in up to billions (with a B) of ascospores per acre (Gadoury and MacHardy (1986), an increase of more than 5000-fold.

**Even if only a small percentage of the total number of ascospores are being discharged now—1% of 5 billion still leaves us with 50 million ascospores, more than 50 times what would be present in a 'normal' year.**

If any of these ascospores successfully infect at green tip, conidia will also be adding inoculum when flowers, fruit and leaves are most susceptible. These small numbers of ascospores that result in successful infections now (green tip, half-inch green) increase the likelihood of conidia before petal fall, exacerbating the risk of fruit scab.

Finally, because of this epic spore load, it may seem as if fungicides aren't as effective. Unfortunately, the numbers game we are playing is the problem, not necessarily the fungicides. Most fungicides are ~99.999% effective (a 5-log kill). Using any fungicide against our 1% spore load of 50 million (1%) still leaves us with 500

spores capable of infecting—and that is assuming perfect coverage. Of the 500 surviving ascospores, each one can create a lesion producing 95,000 conidia per day.



Obviously, the apple scab house rules definitely favors the fungus! If you were unable to get urea onto your orchard floor in the fall or spring (see [FFF #1-18](#) for more info for next year!), you can improve fungicide efficacy with higher rates, tighter intervals and improved coverage, until the weather turns hotter and drier.

There are many factors that contribute to 'bad' apple scab years. Keep in mind that every day of dry weather after bud break delays scab development in trees by one more day. If your weather is dry prior to tight cluster or even pink, the earliest primary infections occur too late in the season. This means that you avoid the repeating cycles of secondary spore production PLUS apple leaves and fruit also become less susceptible to scab. Furthermore, ascospores mature and develop but remain stuck in the fruiting body, never to be released.

Unfortunately, at least for us in most of the state, as long as the weather remains cool and wet, trees must be protected from the threat of early season scab.



# Tree fruit pests to be on the lookout for – now and up to bloom

(Elizabeth Yim Long, long132@purdue.edu)

Beginner and experienced tree fruit producers will want to be on the lookout now for a few mite and insect pests of tree fruit: the European Red Mite, Rosy Apple Aphid, and San Jose Scale. With the back-and-forth between warm and cool temperatures this spring, you may have fruit trees at different stages of development, so here's just a few helpful tips of *what to look for* and *when* as it pertains to these three key early season mite and insect pests:

**1) San Jose Scale:** these are small, mostly sedentary insects that may be easy to miss to the untrained eye! These insects feed on twigs, limbs, and fruits of apple, peach, plum, and pear trees. While feeding, these scale insects inject toxins that damage wood, causing discoloration. You are most likely to see the female insects, which are wingless and sessile, living under a waxy, protective scale covering (Figure 2). San Jose scales overwinter on trees as immature scales and so are best managed with superior oil at Green Tip, which targets and suffocates the overwintered, immature scales. Be sure that you apply oil when temperatures are above 32 °F, for 24 hours before and after a planned application of oil. If your orchard has a history of San Jose Scale pressure and damage, you might consider using pheromone traps and tracking degree days to monitor the activity of adult males, which are very small and fly for only a short period of time. Insecticides can also be used later in the season to target the crawler stage and immature scale-stage of this pest.



Figure 1. Adult female San Jose scales under protective waxy covering (dark gray) and removed from waxy protective covering (yellow). Photo: John Obermeyer, Purdue Entomology

**2) European Red Mite:** these are small mites (Figure 2) that feed on the foliage of pome and stone fruit trees. The key management window for this pest is between Green Tip and Pink, and the specific life stage you are targeting during this window of time are the eggs. European red mites survive the winter as eggs, which are typically located at the base of buds and spurs. The eggs are best managed after Half-Inch Green and prior to Pink with superior oil, which does a great job suffocating and killing the eggs. However, good coverage with dormant oil is critical for controlling European red mite eggs. Again, be sure that you apply oil when temperatures are above 32 °F, for 24 hours before and after a planned application of oil. Last, but not least, the adult mites are susceptible to predatory (beneficial) mites that occur naturally in the orchard, and you can help conserve the “good mites” by using reduced risk rather than broad spectrum insecticides.



Figure 2. European red mite adult and egg on leaf surface  
(Photo: John Obermeyer, Purdue Entomology)

**3) Rosy Apple Aphid:** these are serious piercing-sucking pests of apple that while feeding, inject a toxin that causes leaves, shoots, and fruits to become distorted. The rosy apple aphid overwinters as an egg in tree bark crevices, bud axils, and twigs of apple trees, with eggs hatching after Silver Tip. This insect is best managed with superior oil alone or in combination with insecticides at Half-Inch Green

to target newly hatched aphids, and through Pink to target established aphids (Figure 3), before serious leaf curl develops and limits good coverage necessary to manage this pest. A final reminder to be sure that you apply oil when temperatures are above 32 °F, for 24 hours before and after a planned application of oil.



Figure 3. Rosy apple aphids and their white cast-off skins on the underside of an apple leaf. Photo: John Obermeyer, Purdue Entomology

Here's to a good bloom for all fruit producers and few issues with these mite and insect pests!

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