

# VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service



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## Seedcorn Maggots and Wireworms in Cucurbits

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In addition to delaying much of our fieldwork, the cool set spring has wreaked havoc on some of the plants we have been able to squeeze in during brief dry periods. We have received reports of damage caused by seedcorn maggots (Figure 1) and wireworms (Figure 2). In preparation of this article I browsed the *Vegetable Crops Hotline* archives and came across eight articles published by Rick Foster. What do they have in common? Associations with weather and limited strategies for control. Capture LFR® remains the only product labeled and for *wireworms only*. Rick Foster did some work with this product and had some promising results.

Seedcorn maggots typically lay their eggs in organic matter and feed on seed in the soil, however, they can also cause damage in cucurbit transplants. The adults are active in April and May laying eggs in the field. When soil temperatures reach 70°F the flies will no longer lay eggs. Black plastic mulched beds can help reduce damage in cool springs because of the increase in soil temperature. The cool, wet weather we are currently experiencing exacerbates the problem. In some cases, you may decide to replant.

Wireworms are not as common and often only appear when following corn. If you are concerned about potential wireworm infestations in a field, you need to take action prior to planting. There are effective methods of trapping the worms to monitor a field and should occur 1-4 weeks prior to planting. Soak equal amounts of untreated corn and wheat seed in water for 24 hours and then bury in a hole in the field 6 inches deep by 4 inches wide. Soaking the seed encourages germination and attracts the

wireworms. Cover the bait with soil, and if possible secure black plastic over the bait to increase the soil temperature. Come back one week later and dig up the bait, look for wireworms. If present, you may want to change your planting plans and choose a crop that is less susceptible to this pest. Preplant disking or summer plowing can physically injure the insects or bring them to the soil surface where they can desiccate or be eaten. Once the field has been planted, there are no control methods available to treat cucurbits in infested fields.



Figure 1. Seedcorn Maggot in cucurbit stem. Photo credit John Obermeyer.



Figure 2. Wireworm tunneling in a cucurbit stem. Photo credit John Obermeyer.

## Low Temperature Caused Watermelon Establishment Failure

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In the past week, we have observed a few cases where newly planted watermelon seedlings were severely damaged or dead (Figure 1). In some fields, we observed rotted roots and lower stems caused by fungal pathogens. However, such diseases were in response to the cold soils and would not normally cause problems in warm soils. Most of the dead plants had intact stems, although growers did report seedcorn maggot and wireworm in the stems of a few dead plants. The same thing happened in May 2016. Coincidentally, rain, cloudy days, and lower than normal temperatures were observed in the same period in both years.



Figure 1. Wilted watermelon seedlings that were planted in cold soils.

Since early May, We have had consecutive days with the lowest temperatures in the 40s°F. There was no risk of frost damage, however, this temperature was low enough to cause chilling injury on young cucurbit plants. This article '[Protect Early Planted Warm-Season Vegetables from Low Temperature](#)' I wrote earlier this year explains the difference between frost damage and chilling injury.

*What situation should be avoided in terms of planting watermelons?*

Always check soil temperature and weather forecast before planting watermelons! Check soil temperatures in the early morning, as this is the lowest point during the day. If soil temperatures are below 60°F, or if the predicted lowest air temperatures are below 50°F in the next few days, there is a high risk of watermelon establishment failure. Remember, soil temperatures above 70°F are the ideal temperatures for cucurbit growth. Under low temperatures, plant roots lose the ability to take up water and nutrients; plants wilt initially. If the low temperature lasts a few days, or plants are suddenly exposed to very sunny days, the injured roots cannot keep up plant water needs, and may die.

*If growers have to take the risk, what should be considered?*

We understand waiting for warmer days may not always be possible for larger-scale growers, considering available labor, machinery, space, markets, etc. If growers have to take the risk of planting watermelons on cold days. Here are some considerations that may help reduce the risk.

1. Plant watermelon seedlings that have developed a solid root ball.

The two plants shown in Figure 2 have similar above-ground plant size. However, the plant on the right has developed a solid root ball. In this case, the right plant is more likely to withstand stress conditions compared to the plant on the left.



Figure 2. Watermelon transplant on the left has a loose root ball compared to transplant on the right. Note the above ground plants are in similar sizes.

2. Plant watermelon seedlings that have been well hardened.

During hardening, plants accumulate carbohydrates, thicken cell walls, and root development is triggered. All of these factors help plants better withstand harsh environmental conditions after transplanting. Plants that have been hardened for more than a week in the outdoor conditions are better able to tolerate low temperatures compared to plants that were recently shipped, or just moved out of greenhouses.

3. Plant grafted watermelons if they are available.

There is a growing interest among growers to use grafted watermelon plants. The main benefits are to improve yield and control Fusarium wilt. Less commonly realized is that grafted watermelons with squash rootstocks can better tolerate low soil temperatures. We saw pronounced advantages of improving transplant survival rates by using grafted cucumbers under sub-optimal temperature conditions. Grafted cucumbers with squash rootstocks can tolerate soil temperatures in the 40s°F, while the majority of normal cucumber seedlings died under the same conditions. The same principle applies to watermelons.

Considering grafted plants could be more than five times more expensive compared to normal watermelon plants, growers may be reluctant to plant grafted watermelons with a fear of losing those plants. Don't risk planting expensive grafted plants when there is a danger of frost that may kill the plants regardless of grafted or not. However, if frost is unlikely grafted plants have a higher chance to survive and establish faster than normal watermelon seedlings under low temperatures.

There are several other cultural strategies that help plants survive the adverse conditions, such as planting rye strips for every bed of watermelons; using low tunnels; plant field with the lightest soil first, etc. More information about these strategies were discussed in the article '[Protect Early Planted Warm-Season Vegetables from Low Temperature](#)'.



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## Insecticides Kill Insects

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I know this may not come as a surprise to most of you, but it is rare that we get to observe the effectiveness of insecticides in such a dramatic way as we encountered when visiting a melon grower in southern IN recently. And in this case, the decision to apply an insecticide at transplant was a good one. In the photo below (Figure 1), one can see an accumulation of dead striped cucumber beetles that have fed upon a cantaloupe seedling that was treated with an imidacloprid soil drench (Trade names include: Admire Pro®, Macho®, Midashe Forte®, Montana®) at transplant 14 days prior to the photo being taken. The beetles are dead because they fed upon the cantaloupe plant and ingested the imidacloprid. Therefore, the plants were protected from defoliation by the beetles, but what about bacterial wilt? Did the act of feeding, however brief, cause bacterial wilt to be transmitted?



Figure 1: Striped cucumber beetles can be found dead after feeding on a cantaloupe plant that has been treated with an imidacloprid product.

The pathogen, *Erwinia tracheiphila*, which causes bacterial wilt in cucurbits is transmitted by cucumber beetles, primarily striped but also spotted. The bacteria need an opening to enter the plant and can do this through a feeding wound. It also needs a moist substrate to live in until it enters the plant. In the case of the insect vectors, this is their frass (aka insect poop). The bacteria reside in the gut of the beetles and when the beetles defecate on the plant, this is the source of inoculum that starts infection. In this field, the beetles died before any visible frass was deposited on the leaves, so these plants are most likely protected. That is, the beetles fed on the plant and died before defecating. The result was that the bacterium that causes bacterial wilt was not transmitted.

Imidacloprid is one compound from the neonicotinoid group of insecticides. They are water soluble and therefore move quickly into the plant from the soil drench and into the xylem tissues. As

soon as the plant ‘takes a drink’ it is carried into the vascular tissues. One study measured lethal amounts of imidacloprid in floral tissues of buckwheat within one day of application killing parasitoid wasps that feed on flowers (Krischik, Landmark and Heimpel 2007, *Environmental Entomology*). Because of its solubility in water, we can expect older leaf parts and shoots of the plant to be better protected through this application while we find less residues in storage organs, roots and fruits (Sur and Stork 2003, *Bulletin of Insectology*).

Take heed, though, because some of our own work at Purdue has shown that these chemicals linger in the plant through bloom and are present in concentrations that are deleterious to honey bees. Regardless of application rate (low vs. high label) soil drenches of imidacloprid and thiamethoxam (such as Admire Pro® and Platinum®) can be detrimental to the pollinators that we rely on in these systems.

The take-home message? If you grow cantaloupe in a region with high pest pressures early in the season, it may be beneficial to apply an insecticide to protect young seedlings from feeding and disease. Choose a compound like acetamiprid (Assail®) or a pyrethroid at transplant to protect young seedlings and prevent bacterial wilt while minimizing risks posed to pollinators.

### References

Vera A. Krischik, Alyson L. Landmark, George E. Heimpel, Soil-Applied Imidacloprid Is Translocated to Nectar and Kills Nectar-Feeding *Anagyrus pseudococci* (Girault) (Hymenoptera: Encyrtidae), *Environmental Entomology*, Volume 36, Issue 5, 1 October 2007, Pages 1238-1245, [https://doi.org/10.1603/0046-225X\(2007\)36\[1238:SIIT TN\]2.0.CO;2](https://doi.org/10.1603/0046-225X(2007)36[1238:SIIT TN]2.0.CO;2)

Robin Sur and Andreas Stork, Uptake, translocation and metabolism of imidacloprid in plants, *Bulletin of Insectology*, Volume 56, Issue 1, January 2003.

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## Spring Planted Day-neutral Strawberry Update

(Wenjing Guan, [guan40@purdue.edu](mailto:guan40@purdue.edu), (812) 886-0198)

With the support of the Purdue Extension AgSeed Program, we are currently evaluating different production systems for growing strawberries in an open-field with plastic cultural systems for our area at Southwest Purdue Agricultural Center in Vincennes, IN.

A day-neutral strawberry cultivar evaluation trial was established in the Spring of 2019. The evaluated cultivars include Portola, Evie-2, Mara Des Bois, Albion, Seascape, San Andreas, Monterey, and Tribute. Bare-root plants purchased from [Nourse Farm](#) and [Indiana Berry](#) were planted on black plastic mulch on Mar. 22. Cultivar Portola was planted on Apr. 10 due to back-order. Each of the eight cultivars were grown either with a [retractable low tunnel system](#) or without it (Figure 1).



Figure 1. Spring planted day-neutral strawberries with and without a retractable low tunnel system.

Although strawberries were planted this spring, most cultivars started to bloom toward the end of April. Removing runners started in early May. During the week of May 13, harvest started on the early cultivars: Tribute, Mara Des Bois, then followed by Evie-2 and Albion. The majority of the harvested berries have high quality. Plants grown under retractable low tunnels in general developed more foliage, and started harvest about a week earlier than plants grown without the low tunnel (Figures 2 and 3).

What we have learned so far is that for the extended harvest of day-neutral strawberries, planting them as early as possible could lead to a decent spring harvest depending on the cultivar. Newly planted strawberry plants can stand below frost temperatures. Actually, as they were planted in March, there were a few nights temperatures were below 30°F, with the lowest recorded temperature at 26°F. No cold damage was observed on these plants. The only cultivar that was poorly established was Portola, and this was likely due to uneven irrigation when they were planted in April.

The retractable low tunnels enhanced strawberry growth and advanced the harvest time with accumulated heat. It worked well in the spring. Starting this week, we plan to open the low tunnels and close them when it rains. The idea now is to keep the plant canopy and berries as dry as possible in order to reduce disease pressure.

Looking forward, we estimate the spring harvest will end when temperatures exceed 85 to 90°F, as the high temperatures inhibit further flower bud formation and reduce fruit quality. The harvest should continue in the fall.

Locally grown strawberries are a popular produce in the local food market. Although growing day-neutral strawberries in the open-field condition may not be a profitable business for larger vegetable and fruit growers due to the extended but relatively small harvests. Growing day-neutral strawberries could be a potential opportunity for small and diversified farmers.

Please stay tuned for our update of this trial, as well as evaluations of more strawberry production systems in southern Indiana.



Figure 2: Eight day-neutral strawberry cultivars grown under retractable low tunnel systems (picture was taken on May 20)





Figure 3: Eight day-neutral strawberry cultivars grown in the open-field (picture was taken on May 20)

## Growing a Bountiful Zucchini Crop

(Petrus Langenhoven, [plangenh@purdue.edu](mailto:plangenh@purdue.edu), (765) 496-7955)

Finally the time has come to plant warm season crops. Zucchini is a popular summer squash grown throughout Indiana and the United States. It always delivers a bounty of fruit. Yes, technically zucchini is a fruit (botanically classified as a modified berry) but as per the USDA it is listed under the “Vegetables and Vegetable Products” food group. Zucchini have a multitude of fruit colors and flavors. Therefore, this makes a great vegetable to present to consumers.

**Characteristics of zucchini** – Typically, zucchini is non-vining and bushy but some varieties could have a creeping habit. Some varieties have prickly trichomes on both the stems and leaves. Male and female reproductive structures are produced on the same plant but in different flowers. The large yellow-orange unisexual flowers (a flower that possesses either stamens or carpels but not both) attracts bees, beetles and other insects to pollinate the flowers. The pollen is heavy and sticky and does not transfer without the intervention of insects or people. Some varieties might be parthenocarpic. Meaning these varieties have

the ability to set fruit without fertilization of the ovule. Producing parthenocarpic fruit have some advantages. The fruit is seedless, have a longer shelf life, and it requires less labor to process. In addition, parthenocarpic varieties are not affected by varying climatic conditions and therefore will produce yields that are more reliable. However, there are few parthenocarpic varieties available. The fruit can be dark or light green, or have a deep yellow or orange color.

### What to look for when choosing a zucchini variety? –

Zucchini is a fast-growing plant and can reach maturity within 40 and 55 days after seeding, dependent on the variety grown. The rule is, get the crop in and out fast. You might consider planting successive plantings throughout the season and not plant a vast area all at once. The plant is most productive for a two to three-week period and should be subsequently terminated after four weeks. For continuous supply, another planting should be harvested from week three. The structure of the plant is important, especially if you are in an area that is prone to strong wind gusts. Wind can twist and snap the plants off. During our 2018 variety evaluation one variety stood out above the rest. The variety ‘Green Machine’ did not twist under strong wind conditions. Choosing a compact or strong semi-open variety might be the right option for windy areas. Plants that have a strong upright structure will make it easier to reach in during fruit harvesting. Pay attention to comments about spines (trichomes). Some varieties have spineless petioles. Growing spineless varieties will allow you to harvest the fruit faster and have fruit that looks more appealing and have a longer shelf life. Be careful when using varieties with spines. Fruit could be punctured and scratched during harvest. Labor harvesting fruit need to wear long sleeve shirts and gloves to prevent their arms and hands from being scratched and becoming irritated. Choose from a variety of fruit colors. There are several shades of green and yellow and some varieties produce glossier fruit. The thickness of fruit can also vary. Some varieties produce longer thinner fruit and other shorter cylindrical fruit. Some yellow fruiting varieties are prone to green tips. Avoid these if your market does not accept green tip fruits.

### What we have learned from our 2018 zucchini variety evaluation –

Zucchini fruit grows really fast! Pollination to market maturity only takes about 3 to 4 days. Especially if there is enough moisture in the ground, accompanied by sunny weather and high temperatures. During our evaluation, we harvested Monday, Wednesday and Friday. Therefore, we had a two-day harvest interval during the week and three-day interval over the weekend. Any weather related delays would result in oversized fruit. We aimed to harvest fruit when they reached 6 to 8 inches in length. Fruit that was more than 8 inches long was not acceptable and classified as unmarketable. Our recommendation would be to harvest fruits every day. What we have seen with the two-day harvest interval is that fruit might not be at the required size on that day but will be the next day. It was too big by the time we harvested again. On Mondays, we had many oversized fruits due to the longer harvest interval. Vigorous varieties should be harvested every day. In our [evaluation](#), we have found that the

green zucchini varieties Paycheck and Felix produced the highest yield (Table 2). You can expect about 9 lb per plant from these varieties (Table 1). In addition to the marketable yield, Paycheck and Felix produced about 22,000 lb per acre of oversized fruit. If harvested at the appropriate time, the marketable yield of these varieties could have been much higher. The yellow variety 'Golden Rod' produced excellent yields of about 90,000 fruit and 30,000 lb per acre (Table 1 & 2). For more information regarding this variety evaluation, download the full report from the 2018 Midwest Variety Trial Report <https://ag.purdue.edu/hla/fruitveg/Pages/mvtr2018.aspx>.

**Table 1:** Cumulative yield of ten green and yellow zucchini varieties tested at West Lafayette, IN

| Cultivar             | Cumulative Yield (lb/plant) |      |      |      |      |
|----------------------|-----------------------------|------|------|------|------|
|                      | Days After Transplanting    |      |      |      |      |
|                      | 21                          | 28   | 35   | 42   | 49   |
| Golden Rod           | 1.10                        | 2.40 | 4.55 | 5.68 | 8.06 |
| Felix                | 0.98                        | 2.35 | 4.49 | 6.24 | 8.68 |
| Partenon             | 0.73                        | 2.12 | 3.44 | 5.30 | 6.69 |
| Desert               | 0.83                        | 2.18 | 3.33 | 4.67 | 6.22 |
| Golden Glory         | 0.61                        | 1.82 | 3.64 | 4.44 | 5.91 |
| Gold Rush            | 0.57                        | 2.02 | 3.84 | 5.52 | 6.68 |
| Sebring              | 0.67                        | 1.95 | 3.50 | 4.88 | 6.50 |
| Green Machine        | 0.89                        | 2.31 | 4.13 | 5.33 | 6.97 |
| Spineless Perfection | 0.55                        | 1.40 | 2.80 | 4.21 | 5.36 |
| Paycheck             | 0.77                        | 2.16 | 3.97 | 6.50 | 9.04 |

**Table 2:** Cumulative yield per acre of ten green and yellow zucchini varieties tested at West Lafayette, IN

| Cultivar             | Cumulative Yield (lb/acre) |       |        |        |        |
|----------------------|----------------------------|-------|--------|--------|--------|
|                      | Days After Transplanting   |       |        |        |        |
|                      | 21                         | 28    | 35     | 42     | 49     |
| Golden Rod           | 3,986                      | 8,720 | 16,525 | 20,630 | 29,255 |
| Felix                | 3,548                      | 8,534 | 16,291 | 22,651 | 31,491 |
| Partenon             | 2,646                      | 7,706 | 12,495 | 19,230 | 24,291 |
| Desert               | 3,011                      | 7,925 | 12,087 | 16,958 | 22,585 |
| Golden Glory         | 2,223                      | 6,622 | 13,230 | 16,122 | 21,440 |
| Gold Rush            | 2,073                      | 7,349 | 13,942 | 20,038 | 24,263 |
| Sebring              | 2,431                      | 7,085 | 12,722 | 17,724 | 23,595 |
| Green Machine        | 3,215                      | 8,384 | 14,989 | 19,337 | 25,287 |
| Spineless Perfection | 2,007                      | 5,091 | 10,169 | 15,297 | 19,460 |
| Paycheck             | 2,785                      | 7,855 | 14,427 | 23,601 | 32,822 |

**Production** – Using black plastic mulch will help to control weeds and reduce leaching of fertilizer. A nitrogen side dressing is usually not needed with the use of plastic mulch, but can be applied if needed through the irrigation system. Zucchini has a moderate rooting depth (18-24 inches) and like many Cucurbits does not like to grow in soil that is poorly drained. Raised bed spacing at 6 feet center-to-center with in-row spacing at 18 or 24 inches is ideal. Plant one to two seeds 1 inch deep. Make sure that the soil pH is close to 6.5. The availability of both major and minor nutrients is maximized when soil pH is adequate. Money spent on N, P and K fertilizers will be maximized when the soil pH is optimal. A soil test will be money well spent towards designing a fertility program for your crop. About 75 – 100 lb/acre N is recommended for zucchini. It prefers nitrate nitrogen but can also uptake ammonium nitrogen. A soil test will reveal the levels of phosphorus and potassium and adjustments could be made

accordingly. Use guides such as the [Midwest Vegetable Production Guide for Commercial Growers](#), the [Nutrient recommendation for Vegetable Crops in Michigan](#), and the [Nutrient Management for Commercial Fruit & Vegetable Crops in Minnesota](#) to help you plan and manage your fertility program. The Midwest Vegetable Production Guide is also a valuable source of information for pest and disease management planning. Contact the [Purdue Plant and Pest Diagnostic Laboratory \(PPDL\)](#) if you need assistance with the identification of nutrient deficiencies, pests or diseases.

**Harvest** – Harvest the immature fruit while the skin is still glossy. Fruit should be ready for harvest 3 to 4 days after the flowers have fully opened. At the time of harvest the fruit weight should be between 0.25 to 0.5 lb. Zucchini pickers should use plastic buckets or solid bottom crates and wear soft gloves to avoid bruises, scratches and fingernail punctures. Cut the zucchini from the plant, leaving about ½ to 1 inch of stem attached to the fruit. To maintain plant vigor, always remove oversized fruit from the plant. Zucchini is usually sold in ½-bushel (21 lb) waxed cardboard cartons on the fresh or wholesale market. Each carton should have uniform and clean fruit, according to the buyers count, length and weight requirements. Ideally, zucchini should be marketed quickly after harvest. Zucchini could be stored for short periods. It is among the most susceptible vegetables to chilling or freezing injury. Pitting is a very common injury symptom. Optimum postharvest storage conditions for zucchini are temperatures between 40 to 45°F and a relative humidity of 95%.

**USDA standards** – The quality of zucchini and summer squash is often judged largely by appearance and size. The [USDA standards for grades](#) of summer squash consist of two criterion. The first (U.S. No. 1) is that stems or portions of the stems be attached to the fruit. The fruit should be fairly young and fairly tender. As defined by the USDA, this means the fruit has reached a desirable stage of maturity, indicated by fairly tender skin and fairly tender undeveloped seeds, and firm, moist seed cavity tissue. The fruit should be fairly well formed, firm, and free from decay or bruises and discolorations. The second (U.S. No. 2) criteria as established by the USDA states that the fruit must be firm, not old and tough, and free from decay or breakdown.

## Indiana Climate and Weather Report

(Austin Pearson, [pearsona@purdue.edu](mailto:pearsona@purdue.edu), (765) 675-1177)

So far for the month of May, temperatures across the state vary by nearly 2°F above normal in the southeast and almost 3°F below normal in the extreme northwest. Similarly, the same trends can be seen in the Modified Growing Degree Days as they are based on temperature (Figure 1).



MGDD Departure, 4/1/2019 to 5/19/2019

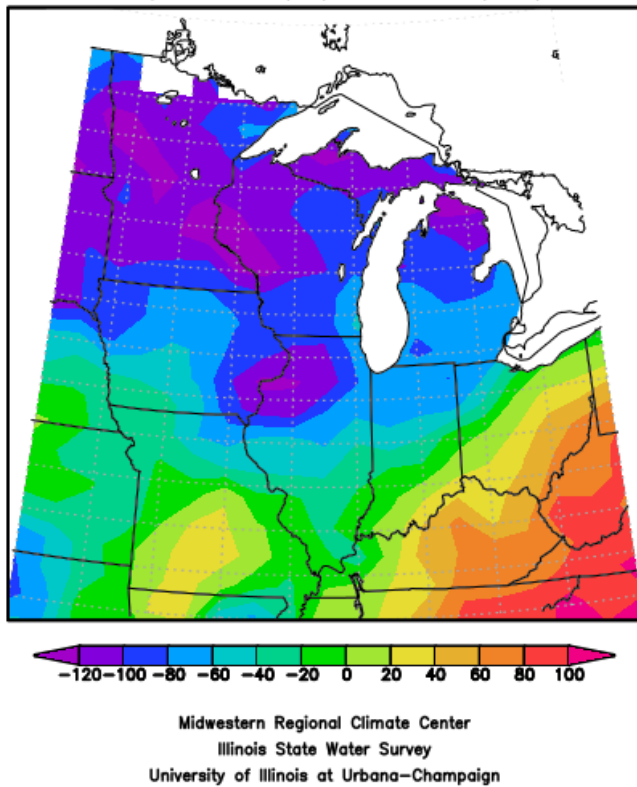


Figure 1. Modified Growing Degree Days

Accumulated Precipitation (in): Departure from Mean  
May 1, 2019 to May 20, 2019

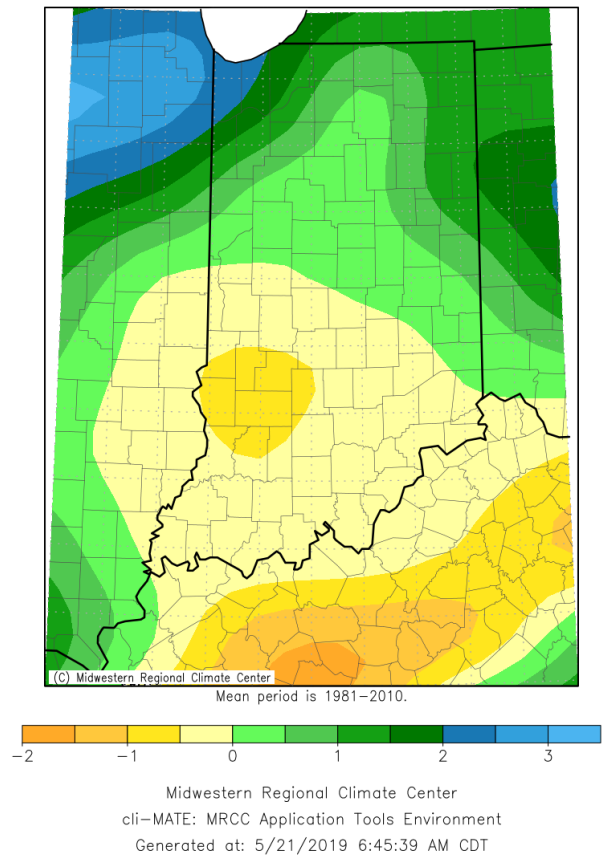


Figure 2. May Precipitation Deviation from Normal

The main story continues to be the precipitation for most of the state. Since January 1, precipitation is between 3 to 9 inches above normal in spots. Adding observed near normal to slightly above normal precipitation for the month in some areas is really delaying folks in the agriculture industry (Figure 2). Looking at the short term outlook from the Climate Prediction Center (Figures 3 & 4), much of the state has above normal chances for seeing above normal temperatures and precipitation over the 6 to 10 day and 8 to 14 day outlooks. Our active weather pattern doesn't look to change at least within the next couple of weeks. One good thing is that temperatures look to rebound to the 70s and 80s which may help with the drying process. Any windows that do open for agricultural activity appear to be limited in the short term.

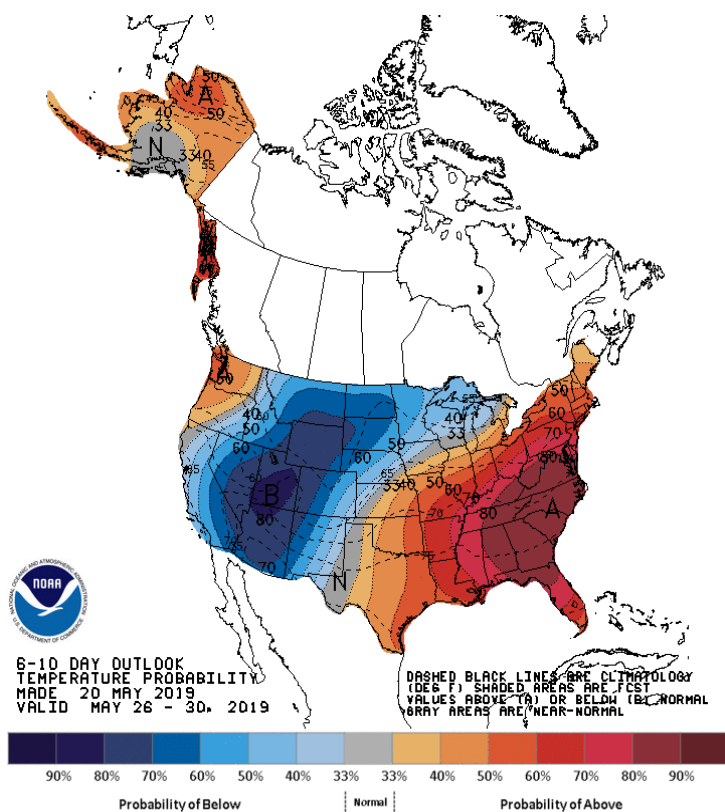


Figure 3. 6-10 Day Temperature Outlook <https://www.cpc.ncep.noaa.gov/>

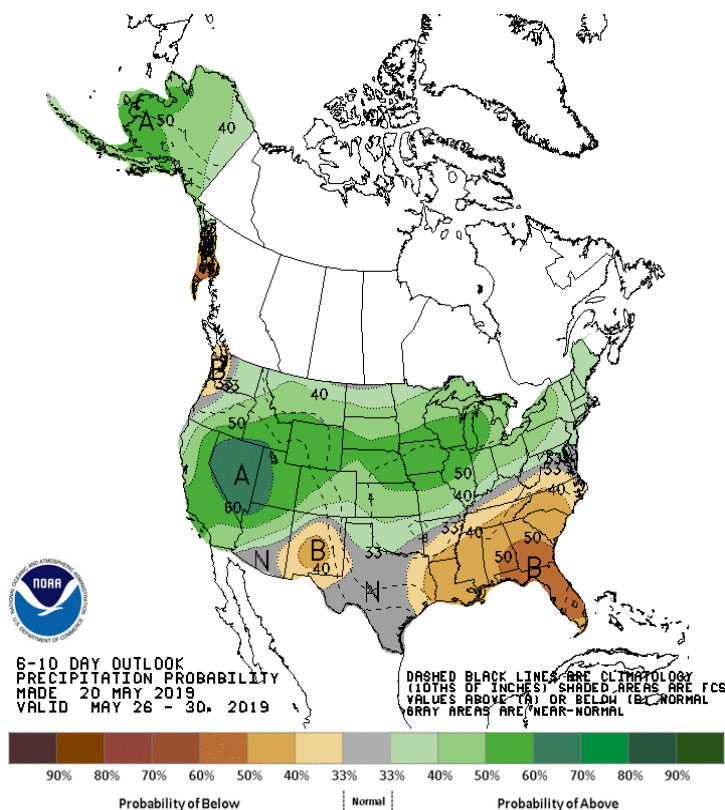


Figure 4. 6-10 Day Precipitation Outlook <https://www.cpc.ncep.noaa.gov/>

## Upcoming Events

### Southwest Purdue Agricultural Center Field Day

**Date:** June 27, 2019. Registration begins at 8:30 am.

**Location:** Southwest Purdue Agricultural Center, 4669 N. Purdue Road in Vincennes, IN 47591

Topics related to vegetable production include:

- **Organic Tomato Production:** Dan Egel will discuss the Tomato Organic Management and Improvement Project — including foliar disease management of tomatoes.
- **High Tunnel Grafted Cucumber & Specialty Melon Production:** Wenjing Guan and Petrus Langenhoven will discuss cucumber and melon production in high tunnels.
- **Applying IPM Principles across Cropping Systems to Increase Insect Pollination and Profitability:** Laura Ingwell will discuss best management practices for watermelon production by quantifying pest pressures, pollinator health, and crop yields.
- **Annual Strawberry Production:** Wenjing Guan will discuss annual plastic culture for strawberry production in southern Indiana.

Other topics include:

- **Termites to the Rescue:** In this presentation, Rick Meilan will discuss the use of enzymes derived from termites to control invasive woody species.
- **Removing Invasive and Cultivating Natives:** Join Will Drews to see SWPAC's work to remove invasive plants around the property and create a native pollinator habitat.
- **Growing Hemp in Indiana:** Chuck Mansfield and Valerie Clingerman will offer an update on the use of this versatile plant — grown for its fiber, seed, or oil — across the state.
- **Eyes in the Sky...Decisions on the Ground:** Bob Nielsen discusses the benefit of aerial "reconnaissance" via unmanned aerial drones to scout crop problems or augment data.

A meal will be included, and PARP classes also will be available after lunch. To register, email [joynerb@purdue.edu](mailto:joynerb@purdue.edu), call (812) 886-0198, or go online at [https://purdue.ca1.qualtrics.com/jfe/form/SV\\_8pnF8z1CwyglrGI](https://purdue.ca1.qualtrics.com/jfe/form/SV_8pnF8z1CwyglrGI) by **Monday, June 17.**



### Meigs High Tunnel Field Day

**Date:** July 18, 2019

**Location:** Purdue Meigs Farm, 9101 S 100E, Lafayette, IN 47909

The field day will focus on high tunnel production of cucurbit crops. It will feature tours of conventional and hydroponic high



tunnel cucumber and melon production. The use of insect-exclusion screens to control cucumber beetles and bacterial wilt will be on display in the conventional high tunnel systems. Vegetable grafting and future research in tomato systems will be presented. Attendees will also have an opportunity to discuss current challenges and future directions of research areas for high tunnel production systems. Please contact Lori Jolly-Brown [ljollybr@purdue.edu](mailto:ljollybr@purdue.edu) for more information.



The field day at Meigs Horticulture Farm, presented by the Horticulture and Landscape Architecture Department and the Department of Entomology, will focus on aspects of high tunnel cantaloupe, cucumber, and tomato crop production. It will feature tours of conventional and hydroponic high tunnel production research. Eighteen high quality specialty melon varieties will be on display, grown vertically or the conventional way. Research have shown that the yield of personal sized melons grown in high tunnels are about three times higher than conventionally grown melons. Past research with insect exclusion netting have shown to exclude cucumber beetles effectively from the high tunnel environment. This year, we are working on implementing new technology to detect bacterial infection in the plants, prior to visual wilting symptoms, in order to improve management. The sensors we are using for early detection will be available and on display. New research are looking at the known risks involved when growing tomatoes without crop rotation in high tunnels. We are comparing the impact of mono cropped tomato vs. a more diverse rotation on soil microbial communities, crop resistance to insect pests and pathogens and yield. In addition, we are grafting heirloom tomato scions onto wild tomato rootstock to determine whether grafting provides greater resiliency in buffering high tunnel tomatoes against yield decline in monoculture over time. Attendees will also have an opportunity to discuss current challenges and future directions of research areas for high tunnel production systems.

#### **Presentations and Tours**

1. Production of Specialty melons in High Tunnels
2. Early Detection of Bacterial Wilt
3. Impact of Crop Rotation and Rootstock on the Resilience of High Tunnel Tomatoes

Lunch and Refreshments are provided.

Registration is free, but required.

Register here [https://purdue.ca1.qualtrics.com/jfe/form/SV\\_0H0XwDiuR0nWAB](https://purdue.ca1.qualtrics.com/jfe/form/SV_0H0XwDiuR0nWAB)  
For questions please contact Lori Jolly-Brown at [ljollybr@purdue.edu](mailto:ljollybr@purdue.edu) or 765-476-1276



## **Small Farm Education Field Day at Purdue Student Farm**

**Date:** August 1, 2019

**Location:** Purdue Student Farm, West Lafayette, IN 47907

The Purdue Student Farm is proud to announce its second annual Small Farm Education Field Day. The event is packed with educational sessions during the morning, followed by a tour and

hands-on experiences on the farm. Topics of discussion throughout the day include basic planning tools for a sustainable small farm operation, testing and restoring soils in urban and peri-urban systems, scheduling crops in high tunnels, using different cover crops to build your soil, calculating profits and return on investment using enterprise budgets and food safety plans for small growers and gardeners. During the afternoon there will be a rototiller versus power harrow, high tunnel tomato and sweet pepper production, leaf mold composting, vegetable wash station design, and solar dryer demonstrations.

Registration fee is \$20.

Register here

[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_3qQf05iryF3COp](https://purdue.ca1.qualtrics.com/jfe/form/SV_3qQf05iryF3COp)

Registration closes July 29, 2019.



Join us for

## **Purdue Small Farm Education Field Day**

**August 1, 2019**

### **EDUCATIONAL SESSIONS**

- Basic planning tools for increasing the sustainability of your farm
- Testing and restoring soils in urban and peri-urban systems
- Scheduling crops in high tunnels
- Dynamic tools to calculate your profits and return on investment
- Food safety plans and certification process for gardeners
- Rototiller versus power harrow and seeder demonstration
- High tunnel tomato and bell pepper production
- Practical applications of leaf mold composting
- Vegetable wash station design
- Solar dryers for postharvest processing of fruits and vegetables

Lunch catered by *Juniper Spoon*

#### **More information:**

Lori Jolly-Brown;  
[ljollybr@purdue.edu](mailto:ljollybr@purdue.edu)  
[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_3qQf05iryF3COp](https://purdue.ca1.qualtrics.com/jfe/form/SV_3qQf05iryF3COp)

Registration fee: \$20

Additional attendees: \$10

Purdue Daniel Turf Center  
1340 Cherry Lane  
West Lafayette, IN 47907



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