

VEGETABLE CROPS HOTLINE

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

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From the Editor's Desk

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

Welcome to the Vegetable Crops Hotline (VCH), Purdue Extension's exclusive newsletter for people in the business of growing vegetables.

Our outstanding contributing authors have outdone themselves once again. Spring is almost upon us; before we know it, we will be seeding and planting vegetables outdoors. This issue is packed with great information. Information that will help you to plan better for the upcoming growing season. And we have a new look! It was time to freshen up the appearance of the newsletter.

Frequently we include links to websites or publications that are

available online. If you can't access these resources, don't hesitate to contact your local Extension office or us to request a hard copy of the information.

Remember that all previous articles published in the VCH newsletter are available on the [VCH website](#).

Request to complete a quick survey

I want to ensure we cover your most important issues in our newsletter. Therefore, I included a very short survey, which takes less than 30 seconds to complete. The survey will help us to plan better and include appropriate reading material in the newsletter.

Click here for the survey. Or scan the QR Code. **Please complete this survey by March 30, 2023.**



Enjoy reading this issue. Do not hesitate to contact me, Petrus Langenhoven, at plangenh@purdue.edu if you have any questions or suggestions to improve the newsletter.

Anthracnose Management in Peppers – the Old and the New

(Dan Egel, egel@purdue.edu, (812) 886-0198)

A new strain of the disease anthracnose of pepper has been detected in South Carolina and Ontario, Canada. Although this disease has not been found in Indiana, the article reprinted below will help growers to be aware of this potential problem. Pay close attention to the description of the disease and the photo. Don't hesitate to contact me with questions or comments. Thanks to Katie Goldenhar and Amanda Tracey of the Ontario Ministry of Agriculture, Food and Rural Affairs for letting us adapt this article for the Vegetable Crops Hotline. The original article can be found [here](#). I have modified the fungicide information from the original article to fit fungicide labeling in the U.S.

Anthracnose in Ontario field peppers has been historically caused

by the fungal pathogens *Colletotrichum coccodes* and *C. dematium*. These are endemic to Ontario and mainly infect ripe fruit. The disease has typically been controllable through fungicides applied on a 14-day interval starting after fruit set. In 2020, a severe anthracnose outbreak occurred in one processing pepper field. Samples were taken from the field, sent for diagnosis, and subsequently identified as *Colletotrichum scovillei*, a new species to Ontario. In 2021, anthracnose in peppers was seen in late July in multiple pepper fields. The disease spread quickly and was extremely aggressive, with more than 80% of fruit (immature and mature) infected with at least one lesion by late August.

Colletotrichum scovillei has been reported in South Carolina, Brazil, China, Indonesia, Japan, Malaysia, South Korea, Taiwan, and Thailand. *Colletotrichum scovillei* is part of the *C. acutatum* species complex, which can cause symptoms on immature fruit. *Colletotrichum scovillei* hosts are primarily within the *Capsicum* (pepper) family.

Biology and Spread

Colletotrichum species may overwinter on infected pepper fruit left in the field or on infected plant material at the end of the production season. Additionally, if crop debris remains on equipment, this may serve as an overwintering source for the disease. Pepper anthracnose usually starts out as a ‘hot spot’ in the field and then fans out directionally with the prevailing wind and driving rain. The spores of *Colletotrichum* species are spread through splashing water, rain or irrigation, driving winds, and equipment/people. Hot weather, along with afternoon and evening showers, are ideal conditions for anthracnose development.



Figure 1. Anthracnose of a banana pepper caused by a new strain of the anthracnose fungus. This disease has not been found in Indiana, but growers should be vigilant. Photo by K. Goldenhar.

Symptoms

Colletotrichum species are known to have latent infection periods, where they infect flowers or developing fruit and do not show

symptoms until weeks after. *Colletotrichum scovillei* can cause lesions on small, immature fruit as well as mature fruit. Samples of asymptomatic fruit were collected and fruit without any visible lesions (between 1-5 cm) was found to be already infected. Infected fruit can have one or more soft, sunken lesions covered with salmon-colored spore masses (Figure 1).

Management

Cultural controls for anthracnose should include starting with clean transplants. Scout regularly and remove infected plants, including plants surrounding the diseased one, as soon as symptoms are seen. Rotating away from peppers, ideally a 3-year rotation or more, can help reduce inoculum pressure. Avoiding the use of overhead irrigation can help reduce the leaf wetness period needed for infection. The remaining plant debris should be mulched/mowed and then incorporated into the soil as soon as harvest is finished to allow for the soil microorganisms to break down the residue. Clean and disinfect equipment, including irrigation hoses, baskets, tractors, trucks, wagons, etc., before storage.

Fungicide applications targeting anthracnose should start at flowering and continue on a 7-to-10-day interval until harvest. Make sure the sprayer is well calibrated and the fruit is receiving adequate coverage. Fungicides that should be effective include products with FRAC group 11 active ingredients such as Quadris® and Quadris Top®; Aprovia Top®; contact fungicides with the active ingredient chlorothalonil (e.g., Bravo®, Echo®, Equus®, Initiate®) and mancozeb (e.g., Dithane®, Manzate®, Penncozeb®). See the [Midwest Vegetable Guide for 2023](#) and the fungicide label.

Other management strategies could include host resistance. Based on a report from South Carolina, Table 1 outlines some cultivars that showed reduced disease development. None of these cultivars are suitable for Ontario production. However, it does demonstrate that there may be some genetic resistance in commercial cultivars that could be incorporated into northern cultivars.

Table 1. Cultivars tested in South Carolina against *Colletotrichum scovillei*

Resistant (0% incidence)	Tolerant (2-5% incidence)	Susceptible (>10% incidence)
Roulette	Mexican Sunset	Cornito Giallo
Red Ember	Mexican Sunrise	Escamillo
Aiji Rico	Chili Pie	
	Just Sweet	

Pepper growers should keep anthracnose at the top of their minds as planning continues for the 2023 field season. Contact me if you think you may have this disease in your fields or have questions.

References

- A.P. Keinath, S.H. Zardus, and V.B. Dubose, and G. Rennberger. (2021) Evaluation of All-America Selections peppers, 2020. *Plant Disease Management Reports* 15: V040.
- Farr, D.F., & Rossman, A.Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved March 2, 2022, from <https://nt.ars-grin.gov/fungaldatabases/>
- Toporek, S. M., & Keinath, A. P. (2021). First Report of *Colletotrichum scovillei* Causing Anthracnose Fruit Rot on Pepper in South Carolina, United States. *Plant Disease*, 105(4), 1222-1222. <https://apsjournals.apsnet.org/doi/full/10.1094/PDIS-08-20-1656-PDN>



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For Young Consumers, Farm-to-Fork Is Not Organic

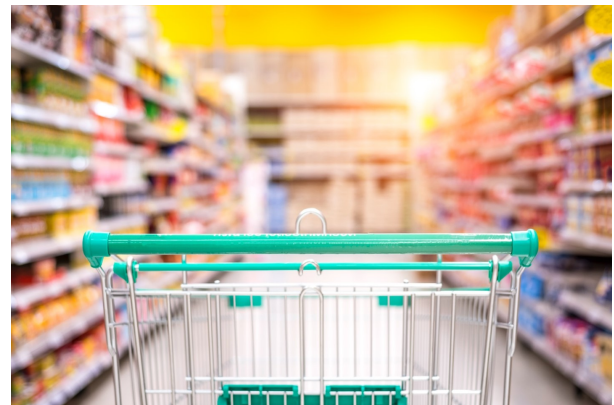
(Ariana Torres, torres2@purdue.edu)

Millennials and Gen Z are predicted to shape emerging food trends in America. Millennials, the largest living generation, are spending more food dollars in restaurants and convenient meal prepping than previous generations. Millennials are usually described as progressive, open to trying new foods, and willing to value sustainable food attributes. Gen Z, those born between 1997 and 2008, are characterized by their health consciousness and social media connectivity. As the newest and most ethnically diverse generation, Gen Z consumers have been introduced to healthy lifestyle choices and sustainable living at an earlier age than previous generations. Together, these two generations comprise the most consumption-oriented consumers of all time, with access to abundant information on foods.

This study investigated how young consumers' personal values towards foods from organic, local, sustainable, and small-family systems can be used to create market segments. Market segmentation can help industry marketers to generate appropriate targeting, communication, and encouraging messages to help consumers make sustainable purchases. By understanding how these young consumers value different environmental and social attributes, market segmentation can allow food marketers to make attribute claims more relevant. Supplying foods with attributes that align with values can help marketers develop trust relationships with these two generations, which can result in long-term loyalties for products and businesses. Developing correct messages that appeal to their clientele can assist growers and retailers in enhancing the positioning of their food products in a competitive environment.

The Importance of Consumers' Values and Attitudes Towards Foods

Researchers have reported a strong connection between messages that convey how foods are produced and marketed and consumers' values and attitudes. Among all food attributes, environmental (i.e., organic and sustainable) and social (i.e., local and small-family farms) features seem to be gaining attention among Americans. The interest in local foods from consumers, producers, and policymakers seems to be growing, reflected by increases in the number of farmers' markets and food sales through local markets. These values and attitudes are strongly correlated with buying behavior, suggesting that young consumers adopt sustainable consumption patterns as a way to impact food systems with their dollar spending.



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Main Characteristics of Young Consumers

- Data for this study comes from a 2017 web-based survey of 1,351 Millennials and Gen Z consumers. They were asked about the importance they place on fresh produce attributes such as organic (*ORGANIC*), local (*LOCAL*), sustainable (*SUSTAINABLE*), and small-family farms (*SMALL*).
- Most young consumers value foods coming from sustainable agriculture (79%), followed by local (73%) and small-family farms (71%). Interestingly, organic agriculture was the least important for young consumers, as they placed an average importance of 56%.
- Most young consumers (97%) in the sample buy fruits and vegetables from grocery stores, 44% buy from farmers'

markets, and only 2% of young consumers are involved with growing some produce.

What Are the Market Segments of Young Consumers?

Young consumers can be clustered into 4 distinct market segments: *Committed*, *Farm-to-Fork*, *Unattached*, and *Skeptic*.

The first market segment, the largest segment, represents 33% of the sample (426 consumers). Cluster 1 (labeled **committed**) strongly valued all four attributes as important, as evidenced by the highest average values across all attributes (within column). The **committed** segment was comprised of a higher share of Millennials and Gen Z consumers purchasing in farmers markets (53%), being female (69%), seeking opportunities for campus/community involvement (59%), being out-of-state or international students, and living in on-campus housing.



Microsoft stock image

The second market segment consisted of 27% of consumers. Consumers in the second cluster, labeled **farm-to-fork**, had a high preference for attributes commonly related to local food systems, such as local, sustainable, and small-family farming, but not with organic farming. The **farm-to-fork** is comprised of individuals with an agricultural background (47%), coming from Midwestern states (74%), and enrolled in an agricultural major (28%). While the **committed** and **farm-to-fork** segments are different, Millennials and Gen Z consumers in the **farm-to-fork** cluster shared some demographic similarities with consumers in cluster 1. For example, they reported similar shopping behavior, as well as their proportion of female, involvement in campus/community events, and on-campus housing.

The third market segment consists of 26% of the sample (333 consumers). Consumers in the third cluster (labeled **unattached**) had moderate expectations for all features and did not show high preferences for any of the attributes. This group had a mean score intermediate between cluster 2 and cluster 4 for most variables. For example, 39% of consumers in this group purchased at farmers' markets, 53% were female, and 56% were from the Midwest. These unattached consumers were characterized by actively seeking campus/community involvement activities, being international, and living in on-campus housing.

The fourth market segment, labeled **skeptic**, consists of 14% of the sample (178 consumers). The **skeptic** segment was the

smallest group and was comprised of consumers who did not express high expectations in general. Consumers in this group scored the lowest on purchasing in farmers' markets, lacked an agricultural background and reported being international or from out of the Midwest.

Take Home Message

- The findings suggest a lack of trust of the organic label by an important segment of young consumers. Food safety recalls, along with distrust of big corporations entering the organic industry, are likely to lead young consumers to prefer food products that convey sustainability, localness, and small farming.
- For food retailers to build long-term trusting relationships with young consumers, they should use figures and messages that convey transparency about how the product was produced.
- Other labels can communicate the impact of the product in local and farming communities. One option may be to propose the coexistence of organic labels with labels that convey localness, sustainability, and impact on small-family farming systems. Another option may be for labels and logos to convey potential benefits to the environment and local communities, such as information on carbon footprint, use of pesticides, or protection of pollinators.

Literature cited

Torres, A., 2020. For young consumers farm-to-fork is not organic: A cluster analysis of university students. *HortScience*, 55(9), pp.1475-1481.

Update on Proposed Changes to Subpart E of the Produce Safety Rule

(Scott Monroe, jmonroe@purdue.edu, (812) 888-7401), (Amanda J Deering, adeering@purdue.edu) & (Tari Gary)

Water is an essential component of crop production. However, water may also contain or transmit human pathogens. As a result, management of any food safety risks presented by water is critical. As part of the [Produce Safety Rule \(PSR\) \(21 CFR 112\)](#), Subpart E deals with the management of both production and postharvest water on covered farms.

On December 2, 2021, the FDA released [proposed revisions](#) to the parts of Subpart E dealing with water used for the production of produce on covered farms (those held to the PSR). The proposed revisions, if finalized as written, would move growers from using water testing as the primary means of understanding water quality and uses to an assessment-based system. Growers would be required annually to do a complete assessment of their water systems. The assessment would include:

1. **Ag Water Systems** – Growers would assess water sources, distribution system, and degree of protection from possible contamination.
2. **Ag Water Practices** – The method of application and

time interval between the last water application and harvest would need to be assessed.

3. **Crop Characteristics** – Growers covered by the PSR will need to consider crops grown and their susceptibility to surface adhesion or internalization of bacteria.
4. **Environmental Conditions** – Frequency and intensity of rain events, as well as air temperature and sun exposure during the growing season, would need to be considered.
5. **Other Factors** – Factors, such as water testing, that are not considered in other parts of the assessment.

As of the time of this writing, FDA has not released a final rule. Once a final rule is released, farms will have 9 months to be in compliance. Small farms (those with \$250,000-\$500,000 in annual food sales) and very small farms (\$25,000-\$250,000 annually) would get 1 and 2 extra years, respectively, to be in compliance. Growers who are covered by the PSR should plan to adhere to current standards found in Subpart E until the final rule is released. While waiting for the release of the final rule, growers should:

1. Continue adherence to current Subpart E requirements if your farm is covered by the PSR.
2. Regardless of legal obligations, use Good Agricultural Practices (GAPs) to reduce risk of crop contamination from production or postharvest water.
3. As part of GAPs, assess water systems annually, looking for areas where there may be a risk of contamination.
4. Even if not required to do so legally, test water sources for generic *coli* at least annually.

Growers with food safety questions are encouraged to contact any member of the [Safe Produce Indiana team](#). Our group is available to assist with grower training, On-Farm Readiness Reviews, GAPs implementation, worker training, food safety plan writing, mock third-party audits, or whatever your food safety needs may be.

Are You Thinking of Applying Compost to Your Soils?

(Nathan Shoaf, nshoaf@purdue.edu) & (Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

Recent price increases and supply chain shortages for fertilizers, chemicals, and energy have impacted farm profitability and viability. As a result, many Indiana farmers are interested in alternative and more sustainable approaches to maintaining crop productivity and building soil health, such as applying composts to their soils.

Applying compost to the soil is common in many farming systems. Composting involves the controlled biological decomposition of organic materials into nutrient-rich soil amendments or mulches. These materials (feedstocks) may be rich in nitrogen, such as manures and legume plant residue, or rich in carbon sources, such as leaves or straw. An ideal carbon-to-nitrogen ratio for composting is 30:1. Lower ratios can result in excess nitrogen loss

as ammonia gas and carbon loss. Nitrogen is insufficient for microbial decomposition at higher C:N ratios, which slows the composting process.

Composting requires moisture, aeration, time, and the proper carbon and nitrogen feedstock mixture to optimize soil fertility. When properly managed, compost applications can build soil health by increasing soil organic matter, increasing microbial diversity, suppressing soil pathogens, and reducing nutrient leaching into groundwater. Generating compost on-site and applying it enhances on-farm sustainability by reducing the contribution of organic feedstocks to landfills that lead to elevated greenhouse gases in our environment.

Not all composts are created equal

It is essential to know what is in your compost by analyzing it or requesting that information from suppliers. Test results will help guide how much and when to apply compost to build soil health. Organic amendments like compost do not supply plants with readily available nutrients (apart from inorganic N, which is immediately available) because they are released slowly through microbial decomposition. It may take several years to break down and release nutrients for plant uptake. The decomposition rate is affected by environmental conditions such as soil moisture and temperature. It is important to consider differences in compost decomposition rates for soils in high tunnels compared to open fields. To maximize plant nutrient uptake, apply compost in the Spring. As soil temperatures increase, mineralization will release nutrients during the growing season. Summer compost applications can be beneficial for hay and pasture areas. However, fall application typically increases nutrient loss unless soil temperatures are low enough to immobilize soil nutrients until the following Spring.

Protecting your investment in soil fertility

Farmers must consider long-term seasonal conditions and short-term weather events before compost applications. Many farmers we spoke with are concerned that heavy precipitation can increase the runoff of composts and other fertilizer amendments, leading to nutrients flowing off-site. One way to mitigate this is by applying mulches to rows or beds to ensure those nutrients remain near plant roots for uptake. Incorporating compost with shallow cultivation might be necessary to ensure the compost is present in the root zone. Keep in mind that it is easier to incorporate compost in light-textured soil.

What happens if I overapply compost?

When significant, affordable quantities are available, it may be tempting to overapply composts in depleted, compacted, or nutrient-deficient soils. However, over-applying compost, especially manure-based compost, can result in nitrate leaching into groundwater, excessive phosphorus soil concentrations, and high soil salinity. Typically, soils have more phosphorus than crops need when composts have been over-applied for several years, but nitrogen may be lacking. The high phosphorus concentration can reduce the crop's micronutrient uptake ability

(particularly iron and zinc) and reduce yield. Manure-based composts typically have a pH greater than 7, so monitoring pH in heavily composted soils is essential because elevated pH can reduce crop yields. In addition to the cost of making, transporting, and applying compost, these concerns have led many farmers to search for additional sustainable farming practices to maintain crop productivity and build soil health.

Is cover cropping an alternative?

There is an increased interest among vegetable farmers to incorporate cover crops into crop rotations in addition, or as an alternative, to applying compost. Using fast-growing annual cover crops such as different types of grasses, mustard, sunn hemp, clovers, vetches, rye, and radishes, to mention a few, can also build soil health by increasing water holding capacity, increasing organic matter and trapping excess nitrogen. Cover crops tend to increase phosphorus availability without leading to excessive soil concentrations. However, farmers may perceive the timing of planting, determining optimal application rates, time spent planting and killing the crop, and costs as potential barriers to using cover crops. Farmers have commented that it can be challenging to determine optimal application rates for cover crops when considering both nutrients already present in the soil and the nutrient needs of crops that will be planted. Some farmers may need to learn how to amend soil fertility after terminating the cover crop. Small-scale farming operations may not be willing to incorporate cover crops into their management plan if they are concerned that it could reduce yield, and farmers on short-term leases may be concerned that they won't reap the rewards associated with the long-term benefits of building soil health. It may not be profitable for small-scale farmers to use cover crops and take land out of production for an entire season because this can lead to a loss of income.

Is it worth testing your soil's health?

We noticed an increased interest in building and maintaining soil health in conservation circles and farm press but limited research on farmer perspectives. Still, farmers want to better understand the potential benefits and outcomes before investing time and money in resources like composts and cover crops. Farmers who use soil fertility tests to manage their crops and soil health have asked us whether soil health tests are worth the additional expense. Soil health tests offer farmers a comprehensive evaluation, or "score," based on soil health indicators such as microbial soil respiration, water-soluble organic carbon and nitrogen, and their ratio. Many soil health tests are available at commercial testing labs, but the costs can be expensive compared to traditional soil fertility tests. We asked ourselves: How effective are soil health scores in determining variety selection and soil health management strategies? Will soil health test results give them additional insights and opportunities for management strategies beyond soil fertility tests? We hypothesized that applying composts and using cover crops would yield better soil health scores and reduce inputs over time, leading to more conservation-based, sustainable approaches to

soil health management.

The Soil to Market research

We initiated research in 2021 at three locations in Indiana, one in the north (Wanatah), central (Lafayette) (Figure 1), and the south (Vincennes). Climatic conditions and soil type differ at these locations. Treatments included organic or conventional fertilizer sources, manure or plant-based compost sources, summer cover crops (mustard, sorghum Sudan grass, and sunn hemp) in year 1, and a mix of cereal rye and hairy vetch cover crops in the fall/winter. Some treatments received no additional biomass during the experiment, except for pepper crop residue, some received a lot with the summer cover crop in year 1, and some continue to receive more with the fall/winter cover crop. We conduct soil tests every Spring and Fall and use crop removal estimates to determine application rates. We aimed to manage fertility with similar soil nutrient levels in each treatment. That requires using conventional and/or organic fertilizer in compost and cover crop treatments. We experienced several issues during 2021. We aimed to implement the research by prioritizing sustainable and organic farming practices. So, we decided not to use plastic mulch on the raised beds, and we did not use any herbicides. We soon ran into weed issues. Grass took over the research plots, and we could not keep up with weeding activities. The weeds scavenged nutrients intended for the crop, and we lost nutrients due to runoff and leaching (Figure 2 & 3). Due to a lack of rain, we could not establish a mustard cover crop at the Lafayette location.



Figure 1. Layout of field trial at Lafayette (Throckmorton/Meigs Horticulture Farm. Photo by Ashley Adair.



Figure 2. In 2021, weeds were flail-mowed between rows and pulled by hand in the planting row.

Encouraging results from Lafayette research location

In 2022, we had to amend the production protocol. Instead of the mustard treatments, we applied a manure-based compost at 109 and 218 yr^3/A . Plastic mulch was used on the raised beds, and we applied a pre-emergent grass herbicide two weeks before transplanting. The mulch resulted in much better weed control, reduced fertility losses, and increased yields (Figure 4).



Figure 3. Plant-based compost treatment (front) and a mixed organic and conventional fertilizer treatment (back) in 2021. Photo by Petrus Langenhoven.



Figure 4. Improvement in weed control and fertility management in 2022. Photo by Petrus Langenhoven.

We have seen some encouraging initial results. Between the Spring of 2021 and the fall of 2022, we increased the soil health score by more than 100% in most treatments (Fig. 5). In most treatments, we have seen increases in soil respiration (Solvita® $\text{CO}_2\text{-C}$ burst test), water-extractable organic carbon, total available P_2O_5 , and K_2O . Mineralized organic phosphorus also increased in plots that received compost and cover crop treatments during this period. However, phosphorus concentrations in compost treatments were consistently higher than in cover crop treatments. The phosphorus concentrations increased drastically in these treatments (levels much higher than what plants will use, $\geq 500 \text{ lb } \text{P}_2\text{O}_5/\text{A}$), whereas some cover crop treatments showed a moderate increase. Cover crop treatments had similar P_2O_5 levels compared to the conventional and organic fertilizer treatments (300-350 versus 300-320 $\text{lb } \text{P}_2\text{O}_5/\text{A}$). The increase in phosphorus concentrations in the compost treatments is concerning and will require adaptive management strategies in the future. We have completed two years of the four-year study. The trends mentioned are preliminary, but we are excited about future results. More information about the [Soil to Market project](https://ag.purdue.edu/departments/agecon/extension/soilmarket.html) objectives is available at:

<https://ag.purdue.edu/departments/agecon/extension/soilmarket.html>.

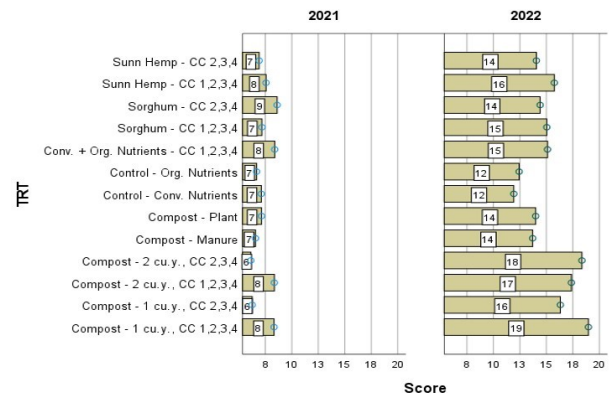


Figure 5. Comparison of soil health scores in 2021 and 2022.

This research is part of a USDA AFRI project, *Taking the next step as a small and medium-sized farm: Understanding the integration of production, food safety, and profitability*, award # 2021-68006-33893

A Large Grain for the Small Farm?

(Ashley Adair, holmes9@purdue.edu)

A diversified farm plans its crop rotation around producing various perishable products that sell well, like tomatoes, peppers, and leafy greens. As the farm builds market opportunities, it might consider adding new or unusual crops to the crop plan. Storage crops can be part of that plan, extending the sale season for growers and additional value for customers. Storage crops might include winter squash, onions, and pumpkins. Another storage crop to consider is grain: flint corn, popcorn, wheat, or even dry edible beans, which are the focus of this article.

Stepping into the world of grain might seem daunting at first. The

farmer might assume they need a lot of land, a combine harvester, large tractors, and complex planting equipment to ensure success. This project aims to dispel preconceived notions about grain production on a smaller scale and explore ways to make small-scale grain production viable for the small grower. This project also seeks to discover which heirloom dry bean varieties are suitable for production in Indiana.

What are dry edible beans?

Dry edible beans, or simply dry beans, are a food-grade storage grain crop. Dry edible beans are the same species as fresh edible beans (i.e., green beans or fresh shell beans), *Phaseolus vulgaris*. Many bean varieties are available; some can be grown for fresh or dry use. They are most commonly grown as a food-grade crop and provide many nutritional benefits to those who consume them. They can be incorporated into animal feed but are more lucrative in the food-grade market, selling for as much as \$36 per bushel (\$60 per hundredweight (cwt)) in the organic marketplace. Compare this to certified organic soybeans, which sold for \$35-40 per bushel in 2022 and require an additional 20 days to mature.

Dry beans are a shorter-season crop, usually taking 80-90 days from planting to harvest. They prefer well-drained soil and are generally poor competitors with weeds. In organic management, dry beans require vigilance and much attention focused on mechanical weed control. Foxtails and other grasses are public enemy number one for this crop, but any weed will be problematic for growing these successfully. On the other hand, dry beans are a legume and can provide for much of their own nitrogen needs, even in soils that have relatively low organic matter, like the sandy soils where they prefer to grow. Dry beans are most commonly grown in the north-central states of the US, as well as Ontario, Canada. North Dakota is the number one producer of dry beans in the US, followed by Michigan, Nebraska, and Idaho. While these states differ in climate and weather patterns, they share some combination of suitable soil types, rainfall amounts, grain handling infrastructure, and shortened growing seasons that make growing dry beans (versus soybeans) a viable option for the commercial grain grower.

Many commercially available dry beans at the grocery store are limited to a handful of specific types. Commonly available to consumers are pinto beans, the most popular bean in the US market, black beans, great northern beans, and kidney beans. However, many dry bean varieties not readily found at grocery stores are available to small-scale growers and market gardeners. These varieties often are locally adapted to where they were bred rather than bred for adaptability to a large geographic area or mechanized harvest. In addition to local adaptability, each dry bean has specific flavor profiles, culinary characteristics, and cultural history that can help enrich the farmer's and consumer's kitchens while providing essential nutrients, such as fiber, protein, and several minerals, to the human diet.

Project description and design

We conducted variety trials at the Purdue Student Farm (West Lafayette, IN) and Pinney Purdue Agricultural Center (Wanatah,

IN). For more details about the design of this trial, please visit the "Project" section of the [Purdue Organic Agriculture website](#).

The research was not conducted on certified organic land, but the land has been managed organically for over six years at each site. The major difference between sites is soil type – Pinney features a well-drained sandy loam, and the Purdue Student Farm features a poorly drained silty clay loam.

The following varieties were evaluated:

- Black Coco – a type of black bean (determinate bush-type)
- Calypso – a type of black bean (determinate bush-type)
- Jacob's Cattle – a type of kidney bean (determinate bush-type)
- Tiger's Eye – a type of cranberry bean (indeterminate upright-type)

We selected varieties based on several characteristics, including time to maturity, cultural relevance to the Midwest, common cooking preparations, and growth habit.

We used an Earthway seeder fitted with a pea plate to plant each variety in a double row, each with about 18 inches between row centers (Figure 1). Drip irrigation was set up for each trial. At the Student Farm, shaped beds were used to help improve drainage. Both trials were planted in early-mid June and harvested by mid-September. Harvest can take place as soon as bean pods are about 85% yellow and 15% brown or when beans split in two when hit with a hammer.



Figure 1. Dry edible beans 21 days after planting at the Purdue Student Farm, West Lafayette, IN.

To prepare dry beans for sale must be threshed and winnowed. We used two threshing methods to develop recommendations and materials for future demonstrations. 1. Manual threshing was completed by flailing bean plants against the inside of a 55-gallon food-grade plastic drum (Figure 2). 2. Mechanical threshing was done using a Swanson Machine Co. portable gas-powered plot thresher (Figure 3).



Figure 2. Manually threshing whole dry bean biomass using a 55-gallon drum.



Figure 3. Swanson Machine Co. portable plot thresher fed with whole dry bean biomass.

Each method presented advantages and disadvantages.

1. Time commitment - hand threshing took as much as ten times longer, especially with only one person.
2. Expenses devoted to purchasing and maintaining a machine - threshing machines can cost upwards of a few thousand dollars.

Whether threshed mechanically or manually, all dry beans still needed to be winnowed. Winnowing can be done using mesh screens or moving air to separate dry biomass from the beans. In this case, moving air (garage fan) was used to help simulate conditions and equipment available to a small-scale grower. Video footage was procured from this process further to instruct prospective growers (available upon request). Part of the process is shown below.

Preliminary Results

Dry beans were weighed by replicate in grams after complete threshing and winnowing (Figure 4).

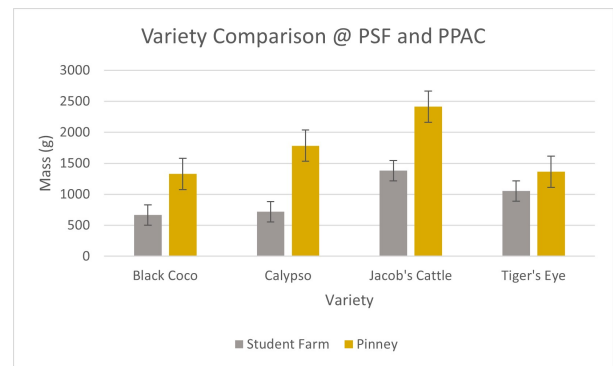


Figure 4. Comparison of average mass (g) produced by each variety in each replicate at PSF (gray) and PPAC (gold).

This preliminary data provides insight for future years. One of the significant differences in performance between the two field sites was the yield of Calypso. Calypso performed poorly at the Purdue Student Farm. The increased production at Pinney may signal a strong response to well-drained soil conditions at Pinney versus poorly drained conditions and weed pressure at the Purdue Student Farm. The only other insight worth discussing is the strong performance of Jacob's Cattle at both locations.

Thank you to [North Central SARE](#) for the financial support of this project!

Community Supported Agriculture (CSA): Top six recommendations for your farm market

(Christopher Adair, ctadair@purdue.edu)

Running a CSA can be a long journey throughout the season, requiring one to stay on top of many weekly tasks and decisions. Some are more important to think about than others. Here is a list of what the [Purdue Student Farm](#) sees as some of the most essential tasks in the decision-making process and how we use these to help guide us through our program before and during the production season.

Communication

Communication, even over-communication, is essential. We contact customers weekly before pickup and provide folks with photos of what will be provided in the CSA box that week. When adding new or novel produce during the season, we include a recipe for folks needing to learn how to prepare that item. Another way to limit surprises for customers is to provide a season road map that gives a rough idea of when different produce will be available during the season. The last and potentially most important part of communication is recognizing and staying on top of problems that can arise quickly.

Staple crops

There is much to think about when filling out your box from week to week. When planning for the season, we like to look at what our staple or core crops will be for the box. The goal is to provide a consistent supply of items like onion, tomato, pepper, herbs,

eggplant, or root crops that the customer can count on weekly. These staple crops will hopefully cut a trip to the grocery store each week. Be careful, though, as over-harvesting one week can leave you short the following week and overburden customers with too much of a good thing.

Diversity

Along with your staple crops, you need variety within the box. This includes an assortment of crops each week, but also make sure to add diversity within a crop group. A great example would be adjusting your greens production, so you do not oversaturate customers with the same kind of green week after week. Switching each week between flat-leaf kale, curly kale, Swiss chard, collards, lettuce, baby kale, or a bundled mix can keep customers interested in new items and prevent you from over-harvesting any single crop. Another great crop you can vary is peppers, as they are diverse in shape, size, color, flavor, and heat while also providing good bulk. This can allow you to increase the variety of peppers grown and used in each box as the different categories of sweet, green, mild (poblano), and hot peppers (jalapeño, habaño) have their uniqueness in cooking and provide a variety without overwhelming the customer.

Food safety and quality

One of the more critical things to focus on and to stay on top of is food safety and the quality of the produce. Food safety is a make-or-break element for your CSA program. One incident could cause folks to mistrust your produce, leading to lasting repercussions in future seasons and decreased participation in your program. Ensure to wash and store produce correctly and avoid mixing washed produce with dirty produce. Besides food safety, produce quality is a significant factor in retaining customers. Maintaining a high level of produce quality can cause folks to yearn for your level of flavor and freshness that may not be provided by just going to the grocery store. An easy way to check quality and freshness is to taste-test everything yourself. If it tastes terrible, it will also taste bad to your customer. Always look for off-flavors that may result from high-stress conditions in the field or prior to storage. High heat can significantly change the taste of leafy greens, making them bitter or extremely spicy. Not only is taste important, but looks can also impact perceived quality. Storage temperatures can change the look and flavor of your produce over time. Tomatoes stored at low temperatures can lose some sweetness and flavor, while eggplant can show pock marking on the fruit from cold burn.

Recordkeeping

Consistent recordkeeping is a great way to check your progress for the season compared to last season and an easy way to help plan and make changes for the following season. Keeping information about the composition of each weekly box is essential, especially information about weights, counts, and bundles of different crops and how you used them each week. This information can also help you tell a story or show when something goes wrong. A great example would be providing many

beet greens instead of beets, as voles ate the roots badly enough to make them unmarketable. Not only can this help keep track of what went wrong in the past but help prepare for those issues in the future. Keeping weekly records can also show how productive a crop was for that season and allow for comparison across multiple seasons. Different crops can do better or worse depending on seasonal weather conditions.

Flexibility

The last but potentially most important advice that can help you in your CSA is flexibility. The communication you send the day before box pickup is always a *guide*, not the end-all-be-all. Allow yourself to drop items from the box if you are unhappy with them (taste, quality issues), even if it is the day of packing. This can cause supply and box value issues, so it is helpful to over-produce some crops that store well, allowing you to adjust as problems arise. Some examples include carrots, kohlrabi, turnips, beets, or radish, all of which can make up for a potentially bad crop that week. We also provide some wiggle room in box pick-up times. The Purdue Student Farm has a relatively narrow pick-up window of 2 hours on Fridays. Most customers can make it every week, but we are flexible for folks who may have forgotten to pick it up or need to pick it up earlier in the day as they are heading out of town for the weekend. These situations can sometimes throw a wrench into your plans, but we always try to adjust and help our customers, as that provides an excellent foundation of trust for our CSA program.

For more information about the [Purdue Student Farm](#) or our CSA program, reach out to [Chris Adair](#) at ctadair@purdue.edu

Planning on Growing Summer Squash this Summer?

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

I conducted a summer squash (zucchini) variety trial at the Throckmorton Purdue Agriculture Center/Meigs Horticulture Facility, Lafayette, IN, a few years ago (Figures 1 & 2).



Figure 1. Zucchini trial 3 weeks after transplanting



Figure 2. Zucchini trial 5 weeks after transplanting

We evaluated ten varieties with cylindrical fruit shape characteristics. (Table 1). Unfortunately, one variety, Felix, is no longer available. Standard zucchini production protocol was followed. Diseases and pests were managed by scouting and using recommendations from the [Midwest Vegetable Production Guide](#). The yield was assessed three times a week between June 18 and July 18. Fruits were harvested when they reached 6 to 8 inches in length. For each plot, the marketable and unmarketable number of fruits was recorded. Fruit that was more than 8 inches long was classified as unmarketable.

Cultivar	Days to Maturity	Mature Color	Plant Characteristics
Paycheck	42	Medium green	Open, upright plant with reduced spines
Golden Rod	51	Golden yellow	Open plant; reduced incidence of green ends on fruit
Gold Rush	49	Deep gold	Open compact upright plant
Green Machine	44	Medium green	Strong semi-open plant; fruit with light flecking
Partenon	48	Dark green	Open plant, short spines; Set fruit without pollination
Sebring	43	Golden yellow	Open upright plant; relatively free of green tips
Desert	50	Dark green	Open compact plant; drought stress tolerance
Golden Glory	50	Golden yellow	Open, upright, semi-spineless plant with dark green foliage
Spineless Perfection	44	Medium green	Strong open, upright plant; spineless leaves and petioles

Table 1. Zucchini varieties evaluated

The number of marketable fruit and yield per acre and fruit weight differences among entries were significant. Golden Rod produced the highest number of fruits per acre, 89,704 (Figure 3). However, the number of fruits per acre produced by Partenon, Spineless Perfection, Gold Rush, Golden Glory, Green Machine, and Paycheck was not significantly lower than Golden Rod and varied between 42,700 and 78,255. Sebring, Partenon, Green Machine, Gold Rush, and Golden Rod produced between 23,595 and 31,491 lb/A and were not significantly lower than the highest producer, Paycheck (32,822). Spineless Perfection produced the lowest number of fruit and yield per plant (Figure 4).

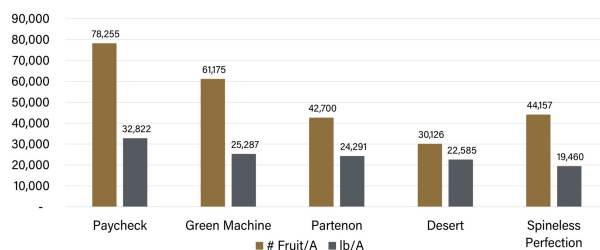


Figure 3. Marketable yield (per acre) of green zucchini varieties

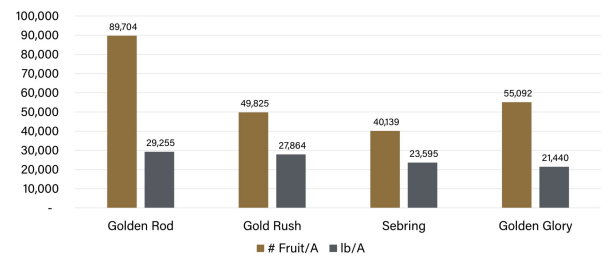


Figure 4. Marketable yield (per acre) of yellow zucchini varieties

The fruit weight of all entries varied between 5.3 and 6.8 oz (Figures 5 & 6). Spineless Perfection (6.7 oz), Green Machine (6.8 oz), and Paycheck (6.8 oz) produced the heaviest fruit. However, the fruit weight of all other entries, except Golden Rod, was not significantly lower than the heaviest fruit-producing entries. The presence of disease and insects were very low and did not impact yield.

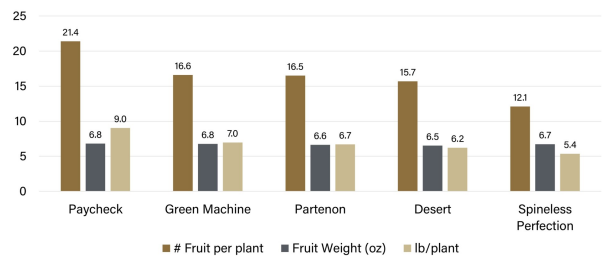


Figure 5. Marketable yield (per plant) of green zucchini varieties

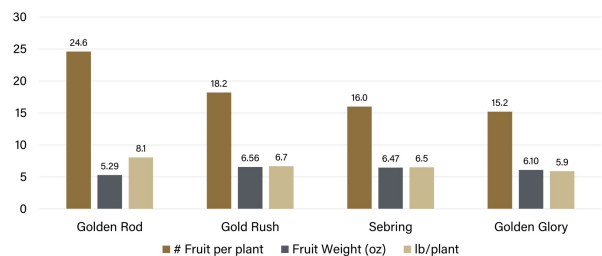


Figure 6. Marketable yield (per plant) of yellow zucchini varieties

Unmarketable yield differences between entries were significant. Partenon produced the highest unmarketable yield, significantly higher than Golden Rod Green Machine, Sebring, Desert, and Golden Glory. The unmarketable yield of Paycheck, Gold Rush, and Spineless Perfection was not significantly lower than Green Machine. Besides the fruit being oversized, these entries were very strong producers. Marketable yields could have improved if these entries were harvested more frequently.

In summary

1. The best-performing green zucchini squash entries were Paycheck (Figure 7), Green Machine, and Partenon.
2. Golden Rod (Figure 8) and Gold Rush were the best-performing yellow zucchini entries.
3. Be ready for a lot of fruit in a four-week period.
 - I recommend walking the field every day if you are harvesting a specific fruit size.
 - The fruit grows very fast, and what is not ready in the morning might be ready in the afternoon or the following day.

2. If you do not have a market for large fruit, then cut them off the plant. Keeping the fruit attached will divert resources and result in less new fruit.

For more detailed information about production practices that were followed, data, and pictures of fruit, visit the [Midwest Vegetable Trial Report](#).

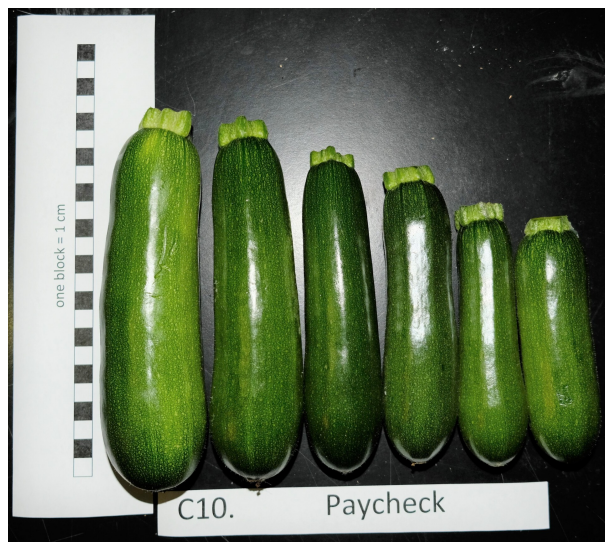


Figure 7. Paycheck



Figure 8. Golden Rod

Start Your Season off Right with Pest-free Transplants

(Laura Ingwell, lingwell@purdue.edu, (765) 494-6167)

In your propagation/seeding house, you are setting the stage for the remainder of your growing season, and there are a few key things I would like to remind you about to minimize pest issues at this crucial stage.

1. Cleanliness is key! Make sure you start with clean trays for any transplants you may be generating. If the materials are not new, be sure they are sterilized to prevent contamination of pests that may be lingering from their previous use.
2. Water and nutrient management are essential. Proper

moisture will promote germination and growth; too much or too little, and you are inviting pests and pathogens to the party.

3. Keep vegetables and flowers segregated, especially if starting your own tomato transplants. Thrips (Figures 1 & 2), a key insect pest in greenhouses, love to move between these two crops and often carry the notorious *Tomato spotted wilt virus* (TSWV) with them. This virus may not be apparent in your flowers, but if it gets into your tomato crop and you are growing a susceptible variety, you will not have plants that reach the flowering stage, let alone set fruit.
4. Monitor for early infestations of common greenhouse pests like thrips, aphids (Figure 3), whiteflies (Figure 4), and mites (Figure 5). These pests can kill young seedlings or spill over into the field if they are not managed in your transplant trays.
5. Don't waste your money on seed treatments if you are growing transplants. Neonicotinoid seed treatments protect direct-seeded crops that may come under attack from wireworms, cucumber beetles, or even seedcorn maggots. However, if you start your plants in the greenhouse and transplant them to the field, most of this protection will be gone by the time the plants reach the field. A better strategy for this type of systemic insecticide protection is to apply the products as a drench to the transplant trays just prior to planting in the field or as an in-field furrow application at transplant.



Figure 1. Thrips damage on a tomato leaf accompanied by an early instar of a tobacco hornworm. Photo by [L. Ingwell](#).



Figure 2. Thrips adult and nymph. Photo by J. Obermeyer.

What do you do if your preventative strategies fall down or fail and you notice pests on your transplants? Try to treat the problem before you take them out into the field. When the plants are concentrated in flats in the greenhouse, it is more effective to apply pesticides or biological agents for control and can lead to higher success. If you are experiencing issues with fungus gnats or thrips, using a soil-dwelling natural enemy can help reduce the population at the plant-soil interface. This would include applications of entomopathogenic nematodes (nematodes that eat insects, Figure 6) or the predatory mite *Hypoaspis miles* (also called *Stratiolaelaps scimitus*, Acarologists can't make up their minds!).



Figure 3. Aphids on the underside of lettuce leaves. Photo by J. Obermeyer.



Figure 4. Whitefly eggs and adults on the underside of a cucumber leaf. Photo by J. Obermeyer.



Figure 5. Twospotted spider mite adults and an egg on a cucumber leaf. Photo by J. Obermeyer.

This mite forages on the soil surface and feeds on small insects that inhabit this area, including the immature stages of thrips, fungus gnats, and springtails. You can release other natural enemies for the above-ground pests, depending on the target. This may include other predatory mite species, *Orius insidiosus* (Figure 7), parasitoid wasps, or the larval stages of lacewings (Figure 8).



Figure 6. Entomopathogenic nematodes in water under the magnification of a dissecting microscope. Photo by L. Ingwell.



Figure 7. *Orius insidiosus* nymph feeding on an aphid. Photo by J. Obermeyer.



Figure 8. Lacewing larva feeding on aphids. Photo by J. Obermeyer.

Another option includes using foliar insecticides, conventional or biorational. Be sure to check the label for use in a greenhouse and see the [Midwest Vegetable Production Guide](#) for assistance with calculating rates for small-scale applications ([mwveguide.org](#)). For an updated list of suppliers of predators and parasitoids, visit this publication from Virginia Cooperative Extension: [ENTO-480](#).

Starting with strong, pest-free transplants is the best strategy for heading into a productive 2023 growing season!

Strawberry Spring Frost Protection—Considerations in March

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

We are concerned about frost/freezing damage to the crops at this time of year. As I am writing this article, we had forecasted low temperatures in the lower 20s°F on March 14 and 18 in southern Indiana. How does this affect plasticulture strawberries? I want to share my thoughts in this article.

Before discussing whether the temperatures cause damage to strawberries, I want to update the cultivar ‘Chandler’ status at two fields at Southwest Purdue Ag Center. In one area, we occasionally saw tight buds. Flower clusters of the majority of the plants have not grown out of the crowns yet (Figure 1). In the second field, one or two open blooms appear on some plants (Figure 2), and more plants have popcorn-stage and tight buds compared to the first field.



Figure 1. Flower cluster has not grown out of the crown.



Figure 2. The strawberry plant has different stages of flowers.

Why did the two adjacent fields differ slightly in crop growth stages? While other factors could play a role, the date we removed the row covers that covered the plants for the winter might have contributed to this difference. The row cover was removed on Feb. 20 in the first field and Feb. 28 in the second field. Eight days may not seem significant, but a few of those days had temperatures above 60°F. Relatively warm temperatures in Feb. and coverage with row covers could have stimulated plant growth in the second field.

Let's review the temperature thresholds of cold damage in the different stages of flowering. Typically, open strawberry flowers can not tolerate temperatures lower than 32°F. Popcorn stage flowers and tight buds may take temperatures low to 26 and 22°F, respectively. Whether we should consider pulling row covers back to protect the crops? Without any protection, we would lose open flowers and maybe popcorn-stage flowers in the coming days with low temperatures down to lower 20°F. Tight buds and flower clusters still in the crown will survive. That said, I do not

think pulling row covers back in the first field is necessary.

Pulling row covers back in the second field might save the popcorn-stage flowers, even open flowers. But the question is whether saving the early flowers can compensate for the labor of pulling row covers back and forth. Another thought is that we are far away from frost-free dates. Even if the early blooms survived the current frosts, they might not develop into marketable fruit as there are still high chances of frosts in April. When they enter full bloom, hard frosts will be more detrimental to strawberry crops. Preventing plants from entering full bloom too early would reduce the risk, even though we cannot predict when and whether we will have hard frosts in April.

With that said, I don't think it is necessary to pull row covers back for frost protection now. If saving the early blooms is desirable, consider covering the crops on the coldest nights and uncovering the crops immediately after the temperature returns to above freezing. Do not cover the plants for an extended period; that may stimulate the growth and make plants enter full bloom too early, which might increase the risk of severe frost damage later in the season.

Below are a few articles I wrote on this topic. It might remind us of what happened in previous years.

2020: [Strawberry growers should be prepared for cold protection](#)
[Strawberry cold protection made a difference](#)

2021: [Strawberry frost protection](#)

Strawberry Chat Podcast — Strawberry Spring Diseases and Management

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

[Dr. Janna Beckerman](#), Professor and Extension Plant Pathologist in the Dept. of Botany and Plant Pathology joined our discussion to talk about Spring Diseases and Management. Our discussion focused on Anthracnose fruit rot and Botrytis fruit rot. Janna described the biology of the pathogens and provided cultural and fungicide recommendations for managing these diseases.

You can hear this discussion and previous chats on the [Strawberry Chat Podcast](#). [Wenjing Guan](#) and [Miranda Purcell](#) host the podcast.

Sustainable Agriculture Research and Education News

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955) & (Lais McCartney, lmccarthy@purdue.edu)

The 2023 cover crop survey is underway

Adopted from NCR SARE news release, "[Farmers: Share Your Thoughts on Cover Crops in the National Cover Crop Survey!](#)", March 1, 2023

Farmers are invited to share their thoughts on cover crops in an [online survey](#). Why do you plant cover crops...or why don't you? What do you want to know? Your insight will help guide research, communications, seed development, and more.

This National Cover Crop Survey is the seventh since 2012 conducted by the USDA-NIFA Sustainable Agriculture Research and Education (SARE) program, Conservation Technology Information Center (CTIC) and the American Seed Trade Association (ASTA), with the help of Informa/Farm Progress.

"Since 2012, the National Cover Crop Survey has been extremely valuable in helping guide research priorities, direct communications and education efforts, provide data to researchers, and illustrate the effects of policy on cover crop use and adoption," says Dr. Rob Myers, regional director of extension programs for North Central SARE and director of the University of Missouri Center for Regenerative Agriculture. "Data from previous surveys have been used in scientific papers, business planning, extension efforts, media coverage of cover crops, and even included in testimony to Congress."

NCR-SARE launch a new story-sharing video series

Adopted from a NCR SARE news release, "[Farming Matters](#)" Video Series Showcases Grantees, February 28, 2023

Farming Matters with NCR-SARE

NCR-SARE has launched a new storytelling video series, "Farming Matters," featuring grantees. Join NCR-SARE staff members Erin Schneider and Marie Flanagan as they learn more about what inspires and motivates farmers, researchers, and educators. You'll leave each video with a better understanding of the innovative ways SARE grantees approach challenges.

With this project-sharing series, as with all our outreach efforts, NCR-SARE is working to broaden the narrative about farmers and their communities by sharing stories from various perspectives.

Episodes of "Farming Matters" are released on YouTube twice per month and will be announced on NCR-SARE's Facebook, Twitter, and Instagram accounts. Subscribe today and never miss an episode.

The "[Farming Matters](#)" YouTube video series features farmers, ranchers, educators, and researchers sharing the stories of their sustainable agriculture research. Watch to learn more about what inspires and motivates the folks who have received SARE grants in the North Central Region. You'll leave each video with a better understanding of the innovative solutions SARE grantees use to address today's challenges.

Below are a few of the videos that are currently featured in the playlist.

Farming Matters: No-Till and Organic Vegetables with Andrew Adamski

Andrew Adamski joins us from Full Circle Farm, his family's farm in Wisconsin. With his SARE grant, he is working to incorporate

no-till methods in his vegetable system. He talks about using a power harrow and deep shank system in his high-rotation vegetable beds of higher-value crops like lettuce, beets, and carrots. [Learn about this SARE project.](#)

Farming Matters: Soul Food Project's Urban CSA with Danielle Guerin

Danielle Guerin takes us to Indianapolis' Soul Food Project. With support from a SARE grant, Soul Food Project explored direct marketing and runs a successful community-based veggie box program. A follow-up SARE grant bolsters their Youth Grow Indy program and urban farming experience for youth ages 9-18. Learn about these SARE projects - [Soul Food Project - Youth Grow Indy programming](#)

Farming Matters: Growing and Selling Mushrooms with Lauren McCalister

Lauren McCalister and her partner, Brett, run a 25-acre Three Flock Farm in Ellettsville, IN. They have been working with a network of farmers, brewers, coffee vendors, and consumers who are reducing by-product waste through the production and marketing of mushrooms. They partner with the [People's Cooperative Market](#) for community-building and market opportunities. Her SARE project "No Waste Mushroom Cultivation: Viability Comparison of Spent Grain and Coffee Grounds for Small-scale and Urban farmers" was created in pursuit of a circular economy that would build community and test the potential to use a waste stream (brewery grains and coffee grounds) to grow mycelium, all while keeping the small farmer in mind. In preparation for her project, McCalister read about other mushroom projects on the [SARE project database](#), but she didn't like the amount of plastic often used in growing mushrooms. She simplified the materials and ingredients she used to make her own coffee and researched more environmentally friendly substrate and inoculum options to make her method easy to reproduce by others. She used the SARE project from [Soul Fire Farms](#) as a manual to help her focus her research and answer the most pressing questions. This video features Lauren talking about her mushroom cultivation project and her motivations behind it. [Learn about this SARE project.](#)

Book resource

Adopted from SARE webpage

Building Soils for Better Crops - Ecological Management for Healthy Soils

Fred Magdoff, Harold van Es | 2021 | 410 pages

The 4th edition of *Building Soils for Better Crops* is a one-of-a-kind, practical guide to ecological soil management. It provides step-by-step information on soil-improving practices as well as in-depth background—from what soil is to the importance of organic matter. It will show you how different physical, chemical and biological factors of the soil interconnect, and how management

practices impact them to make your soil healthy and resilient or unhealthy and vulnerable to degradation.

Case studies of farmers from across the country provide inspiring examples of how soil—and whole farms—have been renewed through these techniques. A must-read for farmers, educators and students alike. [A free download is available, or it's available in hardcopy at SARE](#)

NRCS Environmental Quality Incentives Program (EQIP) Financial Assistance

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

The EQIP program is a great program that helps growers to get access to finance and technical assistance.

I reached out to Sarah Vaughn, District Conservationist at the Lafayette NRCS Service Center, and she had the following comments. "Applications for EQIP financial assistance are accepted throughout the year. Indiana's EQIP deadline is typically mid-December. Producers and landowners should apply by the program-specific ranking date to be considered for the current funding cycle. Applications received after the ranking date will automatically be considered during the next funding cycle."

More information about the EQIP program is available [here](#)

Additional information about the High Tunnel Initiative is available [here](#)

How do I apply? The best way to learn if EQIP is a good fit for you is by contacting your [local NRCS office](#)

USDA's Simplified Direct Loan Application is Now Available for all Producers

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

Adopted from a Farmers.gov [bulletin](#), March 7, 2023

A new, simplified direct loan application is now available for all producers seeking a [direct farm loan from the Farm Service Agency \(FSA\)](#). The new application, reduced from 29 to 13 pages, provides improved customer experience for producers applying for loans and enables them to complete a more streamlined application.

Producers now also have the option to complete an electronic fillable form or prepare a traditional paper application for submission to their local FSA farm loan office.

Coupled with the Loan Assistance Tool released in October 2022, the simplified application will provide all loan applicants access to information regarding the application process and assist them with gathering the correct documents before they begin the process. This will help farmers and ranchers submit complete applications and reduce the number of incomplete, rejected, or withdrawn applications.

The simplified direct loan application and Loan Assistance Tool

are the first of multiple farm loan process improvements that will be available to USDA customers on farmers.gov in the future. Other improvements that are anticipated to launch in 2023 include:

- An interactive online direct loan application that gives customers a paperless and electronic signature option, along with the ability to attach supporting documents such as tax returns.
- An online direct loan repayment feature that relieves borrowers from the necessity of calling, mailing, or visiting a local Service Center to pay a loan installment.

Producers can explore all available options on all FSA loan options at fsa.usda.gov or by contacting their [local USDA Service Center](#).

Webinar Series – Scaling up Your Small and Medium-sized Farm

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955) & (Autumn Stoll, stoll6@purdue.edu)

[Dr. Betty Feng's lab](#) within the Department of Food Science at Purdue University is hosting a series of webinars this March and April. The webinars are free to anyone who wishes to participate and will cover various topics, including on-farm food safety and agriculture soil management.

Food Safety Plan (accumulative series of webinars)

March 21 – Hazard Identification

March 23 – Developing Hazard Analysis Plan

March 28 – Preventive Controls

March 30 – Verification, Validation, Record-Keeping and Recall plan

Agricultural Soil Management

April 4 – Interpreting Soil Analysis reports

April 4 – Developing a Soil Fertility Management Plan

April 6 – Are All Composts Equal?

April 6 – Using Cover Crops to Enhance Soil fertility and Quality

Good Agricultural Practice

April 11 – The Importance of Produce safety, Agricultural Water, Soil Amendments

April 13 – Wildlife and Domesticated Animals, Worker Health, Hygiene, and Training, Putting it all together

Interested in attending?

Register here

https://purdue.ca1.qualtrics.com/jfe/form/SV_6rn6bs82DoHJQPQ

Or email the webinar coordinator Autumn Stoll at

stoll6@purdue.edu

Small Farm Education Field Day – July 27, 2023

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

The 2022 [Purdue Small Farm Education Field Day](#) was a big success. Nearly 72% of attendees reported that they learned something new. Nearly half indicated they plan to adopt recommended practices for diversified farming systems, and over a third (36.0%) plan to adopt recommended practices for creating, improving, or strengthening their business. Half (52.0%) indicated they plan to adopt practices for horticulture and the environment or practices that reduce negative environmental impact due to horticultural operations. Nearly half plan to adopt practices/technologies for the conservation of resources (48.0%) or increased efficiencies (44.0%).

Attendees commented

- 'Diversity of information presented.
- Great field day. Jam-packed with information and experts. Lots of opportunities to question the experts.
- Great people and resources!
- I believe the diversity accurately represented many aspects of Indiana agriculture for large and small-scale operations.
- I recently got into the urban farming industry in Fort Wayne, Indiana, and this program has helped me get the wheels in my head turning.
- I think it was a great event to learn about small farms and different practices or crops. It was also a great networking event.
- I think it was a very informative event. Lots of good resources and networking as well as practices. Very educational.
- I thought the field day was well organized.
- New information presented in an understandable format by very competent professionals.
- The event was educational, local, had very knowledgeable presenters, helpful exhibitors, good handouts, and I got a free frozen treat.
- Up-to-date practices, evidence-based knowledge, concrete
- Very informative to see a high-volume production set up, including plant training systems and watering/fertigation systems, applied to a wide variety of crops.'

The event was held at the Purdue Student Farm located in West Lafayette, Indiana. The field day featured an array of "demonstration stations" on the farm where participants learned about a variety of topics:

- Student farm packhouse tour and overview of good agriculture practices (GAPs)
- Weed identification and understanding of thresholds
- Summer cover crops for weed suppression
- Infield soil diagnostics and soil health
- Vegetable disease, prevention, identification, and management
- Scouting for mites in high tunnel crops

- Black soldier fly composting
- Caterpillar tunnels
- Beans, onion, sweet pepper, eggplant, and tomato varieties in various production

Save the date for the next field day – July 27, 2023

Educational topics for the 2023 field day will be available in May. To learn more about the field day, visit our [webpage](https://www.purdue.edu/hla/sites/studentfarm/events/) at www.purdue.edu/hla/sites/studentfarm/events/ or contact [Lori Jolly-Brown](#) or [Petrus Langenhoven](#).



Purdue Fruit and Vegetable Field Day – July 20, 2023

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

Purdue Extension presented its first Fruit, Vegetable and Hemp Field Day post-pandemic at the Meigs Ag Center in July 2022. Extension Specialists and Graduate Students presented specialty crop research to 45 attendees. Attendees had only good things to say about the event. "Great information and research." "Great variety of experiences and knowledge." "I felt welcomed and it was in an educational environment with like-minded people." "It was such a great informative event to learn about Purdue's current research." "Quality and variety of information." "The speakers seemed to give good context to their subjects." Below are some of the production topics presented at the field day and we expect to have a similar lineup for the 2023 field day.

- Cold Hardy Grape Varieties for Indiana
- Apple Disease Management and IR4 Trial
- Management of Dwarf Apple Trees
- Managing Caterpillars with Homeowner Products on Swiss Chard and Collard Green Varieties
- Planting Vegetables into Cover Crops
- Vegetable Weed Management Research
- Row Covers for Insect Management on Leafy Greens
- Sweetcorn Insect Management
- Mite Management in High Tunnel Cucumbers
- Two-system Approach to Vegetable Farming
- Cannabinoid Hemp Variety Trial / Hemp Propagation Study

We are happy to announce that Purdue

Extension is presenting its annual Fruit and Vegetable Field Day on July 20, 2023, at the Throckmorton/Meigs Horticulture Farm, Lafayette, IN.

More information about the upcoming field day will be available in May 2023.

Contact [Lori Jolly-Brown](#) or [Petrus Langenhoven](#) if you have any questions.



Fifth Warmest February on Record, Windy, and Drought Recovery

(Austin Pearson, pearsona@purdue.edu, (765) 675-1177)

It's official, Indiana had the fifth warmest February on record with an average temperature of 38.3°F (6.9°F above normal) and 3°F behind the all-time record set in 2017 (41.3°F) (Figure 1). Accompanied with the warm temperatures, February was an exceptionally windy month. The state contended with several storm events causing the windy conditions. Indianapolis recorded 17 days where wind gusts were greater than or equal to 30 mph, 6 days greater than or equal to 40 mph, and two days with winds in excess of 50 mph. February 9th had a 54-mph wind gust and February 27 observed a 56-mph wind gust.

February precipitation has continued to chip away at precipitation deficits as the state average precipitation was 3.18", which was 0.9 inches above normal. Since March 1, Indiana precipitation averaged 2.46", which is 179 percent of normal (Figure 2). Improvements to river stream flows, soil moisture, and drought indices allowed for removal of all US Drought Monitor Categories on March 9th, which is the first time being drought category free since May 17, 2022.

March 1-13th temperatures have continued to run above normal as the state average was 4.6°F above the 1991-2020 normal (Figure 2). Tied to this, temperatures have been in the sweet spot for chilling hours to accumulate this winter and are running above normal across most of the state (Figure 3). This means that many of our perennial crops have reached the number of hours exposed to temperatures within an ideal range during dormancy. Given some bud-break in southern Indiana, freeze potential still lingers and may result in crop damage.

Minimum temperature forecasts are projecting low to mid 20s for

much of the state over the coming week. The Climate Prediction Center has higher confidence in below-normal temperatures through March 23 returning to near normal for the final week of the month. If you missed Hans Schmitz’s [spring outlook](#) last week, be sure to check it out.

**Ranked Listing of State & Climate Division Data
Temperature
Indiana Statewide
February values listed in decreasing order (129 years, 1895 to 2023).**

Rank	Year *	Avg.	Normal	Dep.
1	2017	41.3	31.4	9.9
2	1998	39.4	31.4	8.0
3	1930	38.9	31.4	7.5
4	1954	38.5	31.4	7.1
5	2023 *	38.3	31.4	6.9
6	1976	37.5	31.4	6.1
7	1938	37.3	31.4	5.9
7	1932	37.3	31.4	5.9
9	1992	37.0	31.4	5.6
9	1927	37.0	31.4	5.6
11	2000	36.7	31.4	5.3

Figure 1. Top 11 ranked Indiana temperatures over the past 29 years.

Climate Division Data by State between Two Dates
From Midwestern Regional Climate Center

Indiana							
3/ 1/2023 to 3/13/2023							
cd	Temperature			Precipitation			percent
	temp	norm	dev	prcp	norm	dev	
1	38.5	35.4	3.2	1.76	1.25	0.51	141
2	38.1	34.7	3.4	1.93	1.14	0.79	169
3	38.0	34.1	3.8	1.87	1.09	0.78	172
4	41.9	37.5	4.4	2.44	1.42	1.01	171
5	42.4	37.0	5.4	2.43	1.35	1.08	180
6	41.8	36.1	5.7	2.45	1.28	1.18	192
7	46.6	41.9	4.7	3.23	1.58	1.65	205
8	46.9	41.5	5.5	3.12	1.62	1.50	192
9	45.7	40.3	5.4	2.81	1.59	1.22	177
State	42.3	37.7	4.6	2.46	1.37	1.09	179

Figure 2. Indiana climate division and state temperature, normal temperature, temperature departure from normal, precipitation, normal precipitation, precipitation departure from normal, and percent of mean precipitation for March 2023.

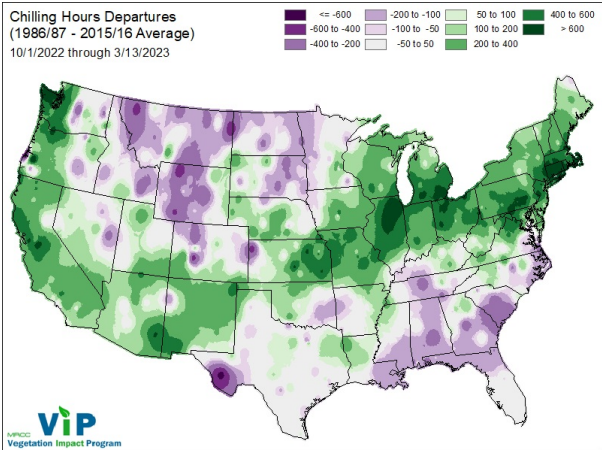


Figure 3. Accumulated chilling hours for October 1, 2022 through March 13, 2023 represented as the departure from the mean chilling hours accumulated between 1986/87-2015/16.

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