

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)

Dear Valued VCH Readers,

Welcome to issue 750, the third edition of the 2025 Vegetable Crops Hotline newsletter!

Indiana has undoubtedly experienced a stormy couple of weeks. I hope you all are doing well. Purdue Extension has a great resource to help you prepare for extreme events <https://www.purdue.edu/engineering/ABE/INPREPared/>.

Next week, temperatures across the state might drop into the 20s overnight. Be prepared to protect your crops. We might experience some hard freezes.

Here are some great resources you should consider reading:

Effects of Cold Weather on Horticultural Plants in Indiana. <https://www.extension.purdue.edu/extmedia/HO/HO-203-W.pdf>

Strawberry Frost Protection. <https://vegcropshotline.org/article/prepare-for-strawberry-frost-protection/>

Applying Row Covers for Winter Protection in Plasticulture Strawberry Production.

<https://vegcropshotline.org/article/applying-row-covers-for-winter-protection-in-plasticulture-strawberry-production/>

Slitted and Floating Row Covers.

<https://nevegetable.org/cultural-practices/slitted-and-floating-row-covers>

Growers and Purdue Extension Educators

Your input and expertise make this newsletter a truly useful resource. If you have hot topics you'd like us to cover, success stories to share, or questions for our Extension specialists, please get in touch with us at plangenh@purdue.edu or contact the specialist directly. We also welcome high-quality photos of pest issues, unusual symptoms, or innovative production practices you've implemented on your farm.

Website Links in Newsletter Articles

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

Midwest Vegetable Production Guide

The 2025 Midwest Vegetable Production guide is now available for growers to visit online at mwveguide.org, or you can download and print a guide from your computer at mwveguide.org/guide. The guide can also be purchased for \$15 per copy. Contact your Extension Office or Stephen Meyers (slmeyer@purdue.edu) directly to buy a copy.

Midwest Vegetable Trial Reports

Are you still considering purchasing vegetable seeds? The [Midwest Vegetable Trial Reports](#) feature many articles to help you make an informed decision. The resource also hosts production-related research results.

Best regards,

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Plasticulture Strawberry Update from Southern Indiana

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

Crop Status

Plug plants set on black plastic mulch in late summer and early fall are approaching full bloom. Some early blooms may have been damaged by recent low temperatures. Moving forward, growers should remain vigilant in protecting these crops from potential frost injury (Figure 1). Bare-root plants that were planted on white plastic during the summer and covered with straw are growing new leaves. Flower buds have not yet been observed on the main-season cultivars (Figure 2).



Figure 1. *Neopestalotiopsis* was confirmed in the field last fall, and some plants did not survive the winter (Photo by Wenjing Guan).

About *Neopestalotiopsis*

Plug plants infested with *Neopestalotiopsis* were found in Indiana. The infected plants exhibited stunted growth last fall, and some of the smaller plants did not survive the winter (Figure 3).

The current questions are: Are the surviving plants, especially those that appear healthy, worth saving? And what fungicide program can be used to protect adjacent, unaffected plants?

Over the winter, I've been consulting with plant pathologists to learn more. The pathogen appears to spread and can persist in the field for extended periods. Fungicides including Switch, Thiram, and products in FRAC Group 3 have shown effectiveness.

For more information on managing *Neopestalotiopsis*,

please check the following resources:

Natalia Peres, University of Florida, Strawberry disease season roundup: [Neopestalotiopsis, of course, but that is not all!](#)

Nicole Gauthier, University of Kentucky, [Neopestalotiopsis disease in Kentucky strawberry](#)



Figure 2. These plants were covered with straws in the winter. Straw with removed around March 10. The plants are growing new leaves (Photo by Wenjing Guan).



Figure 3. The plants are approaching bloom in southern Indiana (Photo by Wenjing Guan).

I have some good news: several cultivars with improved tolerance to *Neopestalotiopsis* will become available in the coming season. They are from Florida and California breeding programs. However, I don't yet have information on how they would perform under conditions in our region.

Preparing Vegetable Transplants for Indiana Field Conditions

([Petrus Langenhoven](mailto:plangenh@purdue.edu), plangenh@purdue.edu, (765) 496-7955) & ([Liz Maynard](mailto:emaynard@purdue.edu), emaynard@purdue.edu, (219) 548-3674)

3As Indiana enters the prime transplanting window for warm-season crops, vegetable producers must prepare transplants for successful field establishment. With variable spring weather conditions across the state, proper hardening and planting techniques are essential for minimizing losses and ensuring quick establishment. This article outlines critical management practices

for growers preparing vegetable transplants for field conditions.

(<https://mrcc.purdue.edu/freeze/freezedatetool>) before planting frost-sensitive crops

Hardening Transplants: Essential for Field Success

Why Hardening Matters

Properly hardened transplants show significantly higher survival rates and faster establishment in field conditions. The hardening process builds carbohydrate reserves, promotes root development, and thickens cell walls—all of which are critical for transplants to withstand field stresses. For growers, even a slight percentage improvement in transplant success can translate to substantial yield increases.

Practical Hardening Steps

1. **Begin 4-8 days before field planting**

- **Day 1-2:** Place transplants outdoors in 50% shade for 3-4 hours when temperatures are at least 50°F
- **Day 3-4:** Move to 20% shade, increasing outdoor exposure by 1-2 hours daily
- **Day 5-6:** Transition to full sun exposure during daytime hours
- **Day 7-8:** Leave plants outdoors permanently if nighttime temperatures remain above 50°F

2. **Irrigation management during hardening**

While reducing irrigation is part of the hardening process, operations should use careful monitoring:

- Gradually decrease irrigation frequency but maintain adequate moisture
- Use soil moisture sensors or weight-based monitoring for consistency
- Ensure complete saturation of the growing medium when irrigating
- Never allow plants to reach wilting point

Simple Hardening Methods

For those without specialized equipment:

- Use a shade tree to provide filtered light
- Move plants to a cart or wagon that can be easily relocated
- Cold frames work well for smaller operations

Timing Your Transplanting

Minimum Temperature Requirements

- **Cool season crops:** 40°F air / 50°F soil
- **Warm season crops:** 50°F air / 60°F soil

Check Indiana-Specific Resources

- Use the Indiana Mesonet (campbellcloud.io/stations.php) for current soil temperatures
- Consult [Purdue's frost probability maps](#)

Ideal Conditions for Transplanting

- Humid, overcast, and calm days
- Adequate soil moisture
- Morning or evening hours rather than midday

Managing Delayed Transplanting

When weather or other events don't allow planting at the desired growth stage.

Holding Transplants Successfully

- Prevent plants from overgrowing while keeping them healthy
- Use the same irrigation and fertility approach as during conditioning
- Monitor for nutrient stresses and add fertility as needed
- Hold transplants preferably in a well-ventilated shade house

This "holding" technique helps when spring storms, equipment breakdowns, or labor shortages delay your transplanting schedule. The key is preventing transplants from becoming rootbound or stressed while maintaining their hardened condition.

Starter Fertilizer: Worth the Investment

Starter fertilizer provides readily available nutrients right at the root zone, especially important in:

- Cool spring soils with limited phosphorus availability
- Systems relying on organic nitrogen, where some available nitrogen may be helpful in cool soils

Application Options

- Apply to seedlings while still in flats shortly before transplanting
- Include in the transplant water
- Mix into the transplant hole at planting time

Transplanting Best Practices

Before Heading to the Field

- Water transplants thoroughly before taking them to the field
- Bring extra water to keep trays moist while working

Proper Planting Technique

- Handle seedlings by the root ball or leaves, not the stem
- Plant at the correct depth:
 - Always cover root ball and growing medium completely
 - Tomatoes: can be buried up to first true leaf
 - Peppers: can be buried up to first true leaf

- Cucurbits: plant up to but not over the cotyledons
- For grafted plants: keep graft union above ground
- Ensure good soil contact with the root ball
- Water in immediately with 8 oz. of starter solution or plain water per plant

Plastic Mulch Considerations

- Make sure the seedling stem doesn't rub against the mulch hole edges
- Risk of stem damage increases in windy conditions or high temperatures with black plastic

After Transplanting: First Critical Days

- Check plants within a few days of transplanting
- Scout for pests, especially cutworms
- Replace failed plants within one week to maintain uniform harvest
- Provide protection from strong winds and frost if needed
- Be prepared to irrigate if dry conditions persist

The Bottom Line: 10 Keys to Success

1. Harden off transplants properly (4-8 days)
2. Use starter fertilizer
3. Time planting according to soil and air temperatures
4. Water well before taking plants to the field
5. Handle seedlings carefully
6. Plant at the correct depth
7. Water in thoroughly after planting
8. Protect from environmental stresses as needed
9. Check plants within a few days and replace failures promptly
10. Manage plant stress during the first 1-2 weeks after transplanting

Consider Reading the Following Literature

[Setting Your Transplants Up for Success](#) in VCH issue 717

[Start Your Season off Right with Pest-free Transplants](#) in VCH issue 715

[A Look at the Freeze Date Tool from Midwestern Regional Climate Center](#) in VCH Issue 713

[Protect Early Planted Warm Season Vegetables](#) in VCH Issue 672

[Indiana Mesonet](#)

Tracking Tornadoes Over Time

(Beth Hall, hall556@purdue.edu)

Indiana has already experienced several tornadoes this year, with more certainly to come. Of course, this is not unusual since Indiana is often considered on the far northeastern edge of "Tornado Alley". Tornadoes get their energy from the battle between the cooler, drier Canadian air moving southeastward and

the warmer, more humid air coming north from the Gulf region. The greater the contrast in both temperature and humidity, the more likely winds and energy will be generated to develop those nasty weather events. This is why tornadoes are most common in our spring, and in recent years, autumn tornadoes have occurred with greater frequency.

The Midwestern Regional Climate Center (MRCC) provides a Tornado Tracks Tool (<https://mrcc.purdue.edu/gismaps/cntyrtorn>) where users can view the estimated tracks of tornadoes from 1950 through 2023 (Figure 1). Official tornado data from the federal Storm Prediction Center (SPC) is released annually, and 2024 data should be released soon. The tool allows filtering by tornado magnitude, year range, months, and whether there were any documented injuries and/or fatalities. Clicking on a tornado provides further information. Do you remember a tornado from your past that you still tell stories about? Use that tool to explore what official records have to say about it!

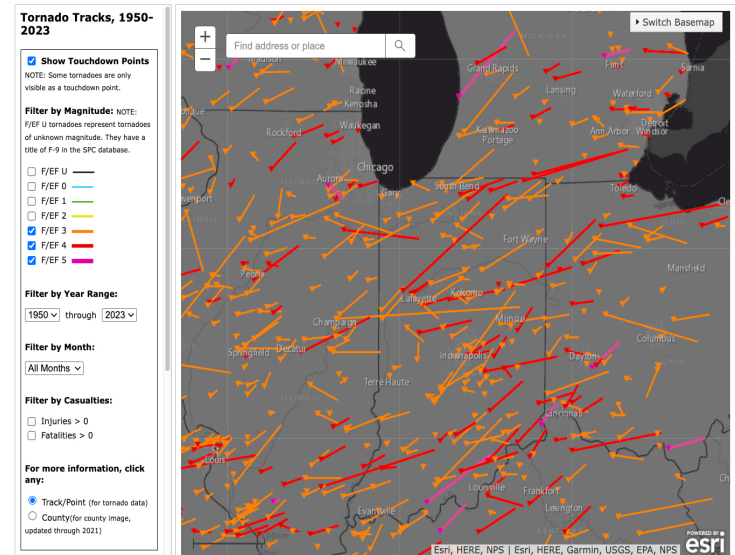


Figure 1. Snapshot of the MRCC's Tornado Tracks tool depicting tornadoes greater than or equal to an EF3 on the enhanced Fujita scale from 1950 through 2023.

The National Weather Service provides a nice tool for looking at the climatology of a broader range of events (e.g., tornadoes, hail, wind)

(<https://experience.arcgis.com/experience/170541dee33b48b7b88514b8f65e601f>). Similar to the MRCC tool, this tool only has data through 2023.

For more recent storm reports, the Southern Regional Climate Center (SRCC) provides an interactive tool similar to the MRCC Tornado Tracks tool but includes recent storm report data from the SPC (Figure 2). This tool includes a much broader range of storm types, such as drought, flood, fire, hail, hurricanes, thunderstorms, and tornadoes. Users can select a period, zoom into their area of interest, and select which types of storm events to view. A table below the map provides additional information about each event.

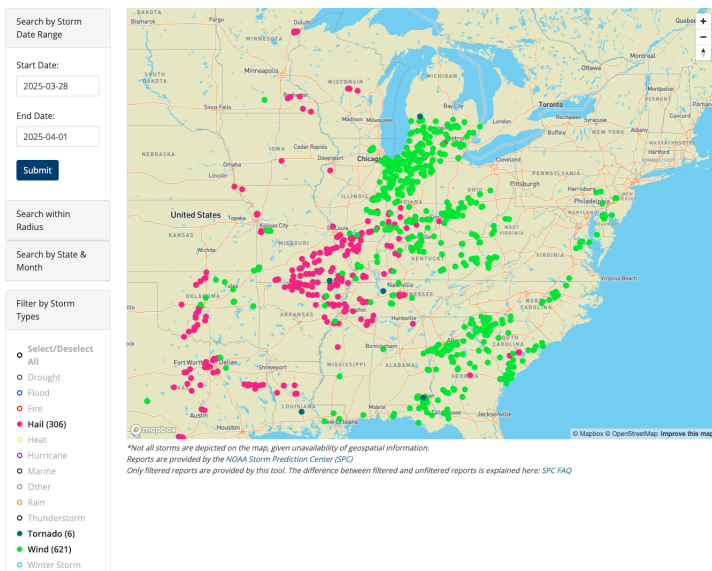


Figure 2. Snapshot of the SRCC storm reports tool showing hail (red), tornado (blue), and strong wind (green) reports from March 28 through April 1, 2025.

Extreme weather events are nothing to take lightly, and safety should always be the priority during the event. However, once the event has passed and can be shared as a memory or anecdote, using these tools can be a fun way to see how your event stacks up to other events nearby.

Lessons Learned: Nitrogen Fertilizer Management in Indiana Watermelon Production

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

5An average-yielding watermelon crop in an acre accumulates approximately 150 pounds of both nitrogen and potassium in the vegetative tissue and fruit. These nutrients are supplied by the soil's existing nutrient pool and through supplemental fertilizer applications. Soil testing is a valuable tool for assessing what nutrients are present in soils and the amount of supplemental fertilizers needed. However, estimating nitrogen availability in the soil is more complex, and standard soil tests do not directly measure plant-available nitrogen. Instead, soil organic matter is used as an indicator of a soil's nitrogen-supplying potential. Since most soils used to grow watermelons in Indiana have less than 2% organic matter, it is generally assumed that soil organic matter contributes minimally to the crop's nitrogen needs. As a result, a recommendation of 150 pounds of nitrogen per acre has become a standard guideline in watermelon production.

Despite this general recommendation, there is no standardized approach to nitrogen fertilizer application among Indiana watermelon growers. Instead, a variety of methods are used—each considered “best” by different growers based on their experience. To better understand the impacts of these differing methods and provide research-based recommendations—or advise against certain practices—we conducted a series of field trials over the past few years. I want to share what we have learned from this process.

Does band nitrogen fertilizer application perform better than broadcast application?
Some believe applying granular fertilizers only under plastic mulch-covered beds is more effective than broadcasting fertilizers across the entire field. The reasoning behind this is to improve fertilizer use efficiency as plastic mulch prevents nutrient leaching.

To better understand fertilizer distribution, we measured nitrogen content in soils under plastic mulch and bare soil between rows in a field where fertilizers were broadcast applied. We found that, at the beginning of the season, nitrogen content in the beds was about three times higher than in the areas between the beds. This suggests that most of the fertilizer had been moved into the beds during the bedding process, even though fertilizers were broadcast applied. In this case, we used 4-foot-wide plastic mulch on beds approximately 3 inches tall, with 8-foot center-to-center bed spacing. Clearly, factors like different bed widths, heights, and spacing would influence the fertilizer distribution.

When using banded fertilizer application, an important question arises: how much fertilizer should be applied? Unfortunately, there are no clear-cut recommendations. One thing we do know is that applying all the needed fertilizers in a banded application increases the risk of salt accumulation in the young plants' root zone. This can potentially delay plant growth or even damage the plants. We'll discuss this issue in more detail below.

Does fertigation work better than applying all fertilizers preplant in watermelon production?
We explored this question through three separate field trials to compare fertigation with applying all fertilizers preplant. In two of the trials, the fertigation treatments received 20% of total nitrogen before planting, followed by weekly in-season fertigation using a complete liquid fertilizer. In the third trial, at preplant, the fertigation treatment also received 20% of total nitrogen, in addition to all other nutrients, followed by weekly fertigation using liquid nitrogen.

We did not find a total yield difference among the treatments in the three trials. However, early yields were consistently higher in the fertigation treatments, with statistically significant differences observed in one of the three trials. Soil nitrogen levels under the beds remained lower in the fertigation treatments throughout the season. Leaf nitrogen concentrations were above the sufficiency range early in the season across all treatments, but the excess was less pronounced with fertigation. These findings suggest that applying all nitrogen fertilizers preplant may delay early plant growth and flower initiation, ultimately leading to a delayed harvest.

Notably, in our trials, fertigation treatments received 20–40% less total nitrogen compared to the other treatment because fertigation was skipped in some weeks when the soil was wet. Despite the lower total nitrogen input, yields were similar. This result indicates that fertigation improved nitrogen use efficiency in the production system. The excessive nitrogen might be lost through leaching, runoff, denitrification, or left unutilized in the

beds, depending on irrigation and natural rainfalls of the season.

Can granular nitrogen fertilizers be applied in the season?

It has become clear that applying all required fertilizers at once is not the most effective approach. While fertigation has shown promising results, it is not feasible for all situations, as a significant portion of watermelon acreage in Indiana is either not irrigated or irrigated using center pivot systems. In these situations, questions about the effectiveness of in-season granular fertilizer application have arisen.

To explore this, we tested in-season urea application over two years. In both years, leaf burn was consistently observed following application. In one year, plant tissue analysis near the end of the season indicated a more balanced nutrient profile in the split nitrogen treatment compared to the preplant-only treatment, even though both received the same amounts of nitrogen and other nutrients. The split nitrogen treatment produced numerically higher yields, but the difference was not statistically significant. In the second year, however, the opposite trend was observed—plants that received split nitrogen yielded less. The application occurred later in the season, followed by heavy rainfall, which likely caused fertilizer runoff.

In-season application of urea is not ideal, as it can cause leaf burn, and may not reliably increase soil nitrogen availability or plant uptake when not incorporated into the soil. Its effectiveness is highly dependent on weather conditions following application and carries a significant risk of nitrogen loss to the environment. When other methods of fertilizer application are not feasible and additional nitrogen is needed, a better approach is to apply split nitrogen at the watermelon layby. Incorporating the fertilizer into the soil through cultivation at that time helps improve nutrient uptake and reduce environmental loss.

Can foliar-applied liquid nitrogen fertilizer benefit watermelons?

The question about foliar fertilizers has come up frequently across different watermelon production systems. I agree that plants are more efficient at taking up nutrients through their roots than through their leaves. If complete nutrients are already supplied through fertigation, I don't believe plants gain additional benefits from foliar fertilizer applications.

However, I have observed improved crop performance in fields where liquid fertilizers that contain nitrogen were applied through overhead irrigation or spray tanks. These effects were most noticeable under dry conditions. In such conditions, watermelon plants develop extensive root systems that spread far beyond the plastic-covered beds. When nutrients reach the soil, they can be taken up efficiently along with water.

Although I observed these positive effects in growers' fields, our research trials did not show differences when different foliar fertilizers were used. Looking back, I suspect our trials did not replicate the same level of drought stress seen in grower fields. It's also possible that the lack of effect was related to the total

water volume we used to apply the fertilizers.

Additional thoughts

After exploring various fertilizers and application methods, I'm more convinced than ever that improving soil health should be our top priority. The key message I share with growers is this: no fertilizer or application technique can substitute for the benefits of fertile, healthy soil. Moving forward, our research will focus on developing practical, science-based recommendations to help watermelon farmers build and restore soil fertility for sustained, productive yields.

Cleaning and Disinfesting Your Greenhouse Before Planting

(Cesar Escalante, escalac@purdue.edu)

Many of you are getting ready to start planting your seeds in the greenhouse, especially if you are planning to transplant. Regardless of the time you start or the type of crop you are planting, it is important to ensure that you have clean and disinfested areas in your greenhouse to prevent disease infections and spread. Preventing disease from the beginning (seedling stage) helps you have healthy material for transplanting. In many cases, seedlings are infected with disease in the greenhouse but are asymptomatic, and disease expression starts after transplanting in the field when conditions are suitable for disease development.

In this article, I discuss common practices to prevent pathogen infection and disease spread in your greenhouse. I recommend having a sanitation protocol that you can implement before planting, during the seedling growing season, and between crop cycles in the greenhouse. The success in keeping your greenhouse clean of pathogens depends on how well you follow the cleaning and sanitation practices at each of these stages. Furthermore, performing cleaning practices at each of these steps will make the entire process more effective and less time-consuming.

Before planting

A few days before planting, you should sanitize the equipment and areas where you will be placing your seedlings (i.e., benches, seedling trays, pots, planting tools, etc.). At this step, you can use sanitation products that are commercially available, such as sodium hypochlorite, hydrogen peroxide, hydrogen dioxide, quaternary ammonium, isopropyl alcohol, and trisodium phosphate (Table 1). All these products are intended to be used for the elimination of pathogenic microorganisms such as fungi, bacteria, and viruses. Please visit the selected references listed below to obtain more details about how to use each of these products. Be aware that the effectiveness of the sanitation products is higher when you have clean areas, meaning areas that are free of soil, debris, or any other type of organic matter. Usually, new tools or equipment don't need disinfection.

Table 1. Disinfectant products for greenhouse use and pathogen targets.

Active ingredient	Products	Target pathogens and other uses
Sodium hypochlorite (disinfecting bleach)	Clorox	Viruses and bacteria. Use to disinfect pots, benches and other flat surfaces. Corrosive and should be rinsed after application. Always use fresh solutions. Can be used as a disinfectant in greenhouse foot baths
Chlorine dioxide	Selectroside®	Viruses, bacteria, and fungi. Sanitizes all greenhouse surfaces
Ethanol (70%)	Various brands	Viruses and bacteria. Cleans tools and flat surfaces. Flammable solution. No rinse required
Hydrogen dioxide	Zerol® 2.0 and OxiDate® 2.0	Algae, viruses, bacteria, and fungi. Wide range of uses including benches, pots, tools, and any greenhouse surface. Both can be used as bactericides and fungicides; read the label carefully
Hydrogen peroxide	SaniDate® 5.0	Algae, viruses, bacteria, and fungi. Can be used as a disinfectant in greenhouse foot baths. Effective for soil/substrate treatment before planting
Quaternary ammonium	Green Shield®, Physan 20®, and KleenGrow™	Algae, viruses, bacteria, and fungi. Wide range of uses including benches, pots, tools, and any greenhouse surface. Can be used as a disinfectant in greenhouse foot baths
Trisodium phosphate (TSP) (tribasic sodium phosphate)	Trisodium phosphate	Effective against viruses. Use on greenhouse surfaces. Can cause skin and eye irritation. Corrosive and should be rinsed after application

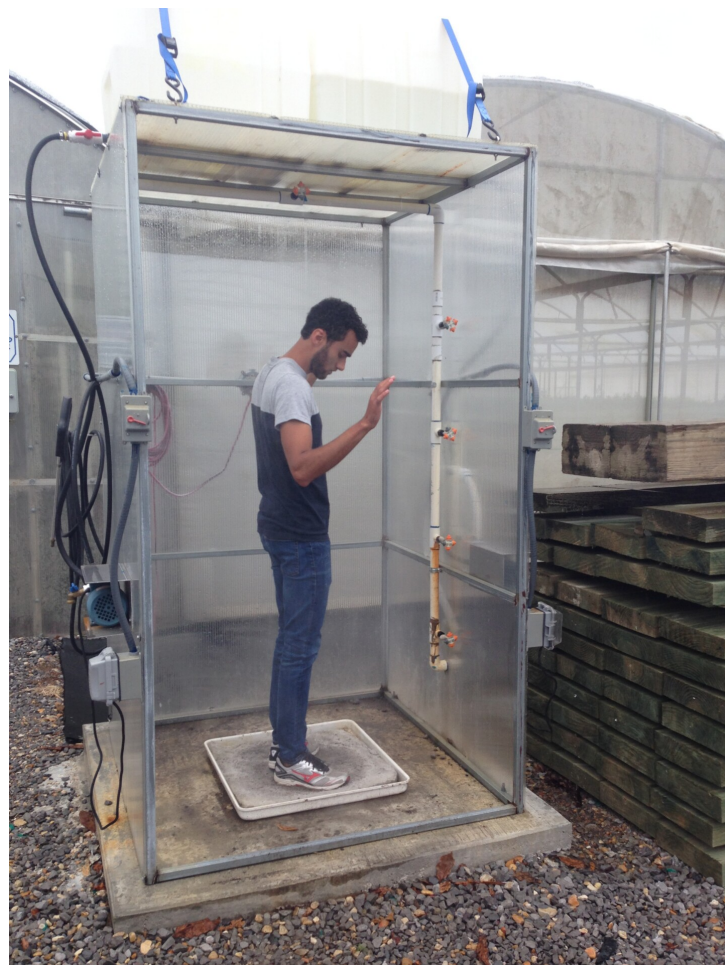


Figure 1. A disinfection bath with foot bath in a nursery greenhouse. Refer to Table 1 to see what products can be used as disinfectant solutions. (Photo by Cesar Escalante).

Seedling growing season in the greenhouse

Restrict personnel entrance and establish protocols that enforce the use of clean shoes and clothing. Restrict entrance to the greenhouse to personnel who have been performing any activities in the field. Pathogens can be easily moved from the field to the greenhouse on shoes and clothing surfaces. A strict protocol with two basic steps can be established before entering the greenhouse. First, shoes should be cleaned with water and soap, and second, the person should step in a foot bath containing a disinfectant solution to eliminate potential pathogens that could be spread in the greenhouse (Figure 1). Remove any diseased or infected tissue from the greenhouse, regularly clean floors and benches, and always keep the surroundings of the greenhouse free of weeds as they can host plant pathogens that can be easily carried inside the greenhouse. In some cases, inorganic mulches (i.e., stone, gravel, or plastic) are used as weed barriers outside or inside the structure (Figure 2).



Figure 2. Inorganic mulch (plastic) is used in nursery greenhouses to prevent weed growth in the surrounding areas. (Photo by Cesar Escalante).

Between crop cycles

Remove all plant debris from the greenhouse and prepare for the next season by cleaning benches, tools, and other utensils. Remove potting mix, soil, and any organic matter residue on greenhouse surfaces right after the planting season ends. Waiting

until the next planting season will make it harder to remove the organic matter, and therefore, any disinfection procedure will not be effective. At this point, you can decide to use disinfectant products or wait to do this task near the start of the planting season (see “Before planting” section).

Remember, producing “clean” plants in the greenhouse is crucial to having healthy crops in the field. Protecting the plants during the early stages of development is important because, in many cases, plants don’t recover if they get infected by an aggressive pathogen.

Selected references

Kleczewski and Egel. 2011. Sanitation for disease and pest management. Purdue Extension publication HO-250-W.

<https://edustore.purdue.edu/ho-250-w.html>

Vegetables by Bayer. 2023. Greenhouse sanitation. Publication No. 5010_290550.

<https://www.vegetables.bayer.com/us/en-us/resources/growing-tips-and-innovation-articles/cultivation-insights/greenhouse-sanitation.html>

Ensuring Food Safety in Produce Drying: Best Practices for Handling, Preparation, and Dehydration

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Drying produce can be an attractive technique for adding value to your crop, reducing waste, and diversifying the products offered to consumers. The process of dehydrating produce extends shelf life by reducing water content and limiting the growth of microorganisms that can cause spoilage. **Remain aware, though, that most dehydration processes are not kill steps — that is, they do not adequately kill foodborne illness-causing microorganisms.** Some foodborne illness-causing organisms — for example, *Salmonella* — can survive in low-moisture environments for extended periods of time. Thus, safe food handling practices must be maintained throughout the produce drying process. This article discusses key steps you can take to avoid introducing foodborne pathogens during the produce handling and drying process.

Post-harvest produce handling

Sorting tables, storage bins, washing tubs and other post-harvest facilities can introduce contamination if pathogens are present on the surfaces or if post-harvest water is contaminated. Here are ways to prevent contamination during post-harvest handling:

- For rinsing, washing, and cooling produce, use water with no detectable generic *coli* per 100 mL, or use water from a municipal water source (tap water).
- Ensure that washing bins, sorting tables, and other food contact surfaces are cleaned and sanitized regularly to prevent growth of biofilms, a robust formation of microorganisms on surfaces that can be very difficult to

remove.

- First, the surfaces should be cleaned to remove any organic matter (including dirt, leaves, and stems). This step ensures that the sanitizer works effectively.
- Second, the surfaces should be sanitized with a chemical that has been determined safe for food contact surfaces. This step helps kill vegetative microorganisms that can cause foodborne illness. Be sure to follow manufacturers’ instructions for appropriate use of the sanitizer.

Preparing produce

Some produce is cut, sliced, or ground into smaller pieces for drying. Any tools used to prepare produce **should be cleaned and sanitized in between batches. Such tools may include, but are not limited to, cutting knives, cutting boards, and holding containers.** Produce should be dehydrated immediately after it is prepared or immediately refrigerated to 40°F (4°C) or lower until you are ready to begin drying.

Slicing produce thinly ensures adequate dehydration. While each type of produce is different, we recommend cutting slices evenly to enable adequate and uniform drying throughout each piece of produce.

Here are some slicing preparation examples:

- Apple slices should range from 1/8 to 1/2 inch
- Brussels sprouts should be cut in half
- Prunes should be pitted and cut in half
- Blueberries can be dried whole

Pre-treatment

Pre-treatments can be applied to produce before the drying process begins. These treatments, which can be used as a coat or a soak, can consist of sulfur, acids, pectin, sugar, and/ or honey. Blanching is a pre-treatment in which the produce is immersed in boiling water or steamed briefly, without cooking it, and then immediately cooled by quickly submerging the produce in ice water. These pre-treatment processes not only improve the color and texture of certain commodities, but also can reduce the microbial load on the outside of the produce. **However, a pre-treatment process that is not validated as a kill step may not necessarily eliminate microorganisms that are known to cause foodborne illnesses.**

Here are some pre-treatment examples:

- For fruits such as sliced apples or pears, soak in equal parts of lemon juice and water for 10 minutes immediately before dehydrating.
- For most vegetables, blanch in a mixture of 1/4 teaspoon of citric acid per quart of water.

Drying process

Dehydrating at 140°F (60°C) or lower is recommended. Higher temperatures can cause a hardening effect on the outside of the

produce, leading to inadequate internal dehydration and mold development over time.

Here is an apple drying process example:

- Dry at 145°F (63°C) for one hour.
- Reduce temperature to 135–140°F (57–60°C) for the rest of the drying time, allowing for approximately 6–12 hours of drying.
- Test for doneness by pressing the dried apple slices between your thumb and pointer finger. The apple slice should be dry with no droplets of water forming under pressure.

Are you interested in learning more about commodity-specific produce drying processes?

Visit the Produce Drying Food Safety website:

<https://extension.purdue.edu/food-safety-for-produce-drying/index.html>.

Click the “Food Safety Resources” tab to access a list of produce drying resources organized by commodity. If you have any additional questions, tap the “Ask an Expert” tab.

Additional Resources

Dried Fruit Food Processing Toolkit.

<https://openknowledge.fao.org/server/api/core/bitstreams/ef8602df-edcd-49e2-8ad7-5bda59589228/content>

Clean THEN Sanitize: A One-Two Punch to Stop Foodborne Illness in the Kitchen. https://www.usda.gov/media/blog/2019/08/27/clean-then-sanitize-one-two-punch-stop-foodborne-illness-kitchen?_ga=2.221203472.922201511.1730358767-1928516413.1730223466

Selected EPA-Registered Disinfectants. <https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants>

Requirements for Harvest and Post-Harvest Agricultural Water in Subpart E for Covered Produce Other than Sprouts. <https://www.fda.gov/food/food-safety-modernization-act-fsma/requirements-harvest-and-post-harvest-agricultural-water-subpart-e-covered-produce-other-sprouts>

Cleaning and Sanitizing Food-Contact Surfaces. https://www.fightbac.org/wp-content/uploads/2022/02/Cleaning_and_Sanitizing_Food-Contact_Surfaces.pdf

Let’s Preserve: Drying Fruits and Vegetables (Dehydration). <https://extension.psu.edu/lets-preserve-drying-fruit-and-vegetables-dehydration>

Dehydrating or Drying Fruits, Vegetables, and Herbs. https://cottonwood.k-state.edu/health-nutrition/dehydrating_foods.html#:~:text=Dehydrating%20or%20Drying%20Fruits%2C%20Vegetables%2C%20and%20Herbs&text=Drying%20remove%20the%20moisture%20from,does%20not%20effectively%20destroy%20them

Dried Apples. <https://extension.psu.edu/dried-apples>

Drying Fruits and

Vegetables. https://ucanr.edu/sites/camasterfoodpreservers/files/341229.pdf?_ga=2.236735945.932963221.1731971965-9068984.1731971965

Purdue Small farm Education Field Day, July 24

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



SMALL FARM EDUCATION FIELD DAY

Join us at Indiana's premier event dedicated to small and medium-sized farms where participants can:

- Experience cutting-edge sustainable agricultural research at the Purdue Student Farm
- See expert-run trials on variety performance, pest management, soil health, and more.
- Watch live demonstrations of innovative farming techniques.
- Connect with fellow growers, exhibitors, students, and Purdue Extension Specialists.

ENHANCE YOUR FARMING KNOWLEDGE AND GROW YOUR AGRICULTURAL NETWORK!

FOURTH WEEK OF JULY

PURDUE STUDENT FARM
1491 CHERRY LANE, WEST LAFAYETTE, IN 47906



For more information and to register, visit purdue.ag/small-farm-field-day

Questions?

Contact Lori Jolly-Brown at ljollybr@purdue.edu or 765-494-1296



Hariculture and Landscape Architecture
An Equal Access/Equal Opportunity University

USDA Reminds Agricultural Producers to Enroll in Key Safety Net Programs by April 15

Agricultural producers who have not yet enrolled in the Agriculture Risk Coverage (ARC) or Price Loss Coverage (PLC) programs for the 2025 crop year have until April 15, 2025, to revise elections and sign contracts. Both safety net programs, delivered by USDA’s Farm Service Agency (FSA), provide vital income support to eligible farmers who experience substantial declines in crop prices or revenues for the 2025 crop year.

Agriculture Risk Coverage or Price Loss Coverage programs provide excellent risk protection for market declines at no cost to the producer. If you haven’t made your program election or signed a contract, please contact your local FSA county office as soon as possible to set an appointment so you don’t miss the April 15 deadline.

Producers can elect coverage and enroll in ARC-County or PLC, which provide crop-by-crop protection, or ARC-Individual, which protects the entire farm. Although election changes for 2025 are optional, producers must enroll, with a signed contract, each year. If a producer has a multi-year contract on the farm, the contract will continue for 2025 unless an election change is made.

If producers do not submit their election revision by the April 15, 2025, deadline, the election remains the same as their 2024 election for eligible commodities on the farm. Also, producers who do not complete enrollment and sign their contract by the deadline will not be enrolled in ARC or PLC for the 2025 year and will not receive a payment if one is triggered. Farm owners can only enroll in these programs if they have a share interest in the commodity.

Producers are eligible to enroll farms with base acres for the following commodities: barley, canola, large and small chickpeas, corn, crambe, flaxseed, grain sorghum, lentils, mustard seed, oats, peanuts, dry peas, rapeseed, long grain rice, medium and short grain rice, safflower seed, seed cotton, sesame, soybeans, sunflower seed and wheat.

Web-Based Decision Tools

Many universities offer web-based decision tools to help producers make informed, educated decisions using crop data specific to their respective farming operations. Producers are encouraged to use the tool of their choice to support their ARC and PLC elections.

Crop Insurance Considerations

Producers are reminded that enrolling in ARC or PLC programs can impact eligibility for some crop insurance products offered by USDA's Risk Management Agency (RMA). Producers who elect and enroll in PLC also have the option of purchasing Supplemental Coverage Option (SCO) through their Approved Insurance Provider, but producers of covered commodities who elect ARC are ineligible for SCO on their planted acres.

Unlike SCO, RMA's Enhanced Coverage Option (ECO) is unaffected by participating in ARC for the same crop, on the same acres. Producers may elect ECO regardless of their farm program election.

Upland cotton farmers who enroll seed cotton base acres in ARC or PLC are ineligible for the stacked income protection plan, or STAX, on their planted cotton acres.

Optimizing FSA Office Visits

Agricultural producers visiting FSA to complete ARC/PLC elections and enrollment are encouraged to also conduct other FSA program business during their scheduled appointment including completing farm loan applications and applying for the recently announced [Emergency Commodity Assistance Program \(ECAP\)](#).

Sign up for ECAP began on March 19, 2025. ECAP, authorized by the *American Relief Act, 2025*, provides up to \$10 billion to agricultural producers for the 2024 crop year. Administered by FSA, ECAP will help agricultural producers mitigate the impacts of increased input costs and falling commodity prices. Congress gave USDA 90 days to implement the program, and that deadline

was met. Producers of eligible commodities must submit ECAP applications to their local [FSA county office](#) by Aug. 15, 2025. Only one application is required for all ECAP eligible commodities nationwide. ECAP applications can be submitted to FSA in-person, electronically using [Box and One-Span](#), by fax or by applying online at fsa.usda.gov/ecap utilizing a secure login.gov account. For more information, please visit the [ECAP website](#) or review the [ECAP Fact Sheet](#).

For more information, visit [fsa.usda.gov](https://www.fsa.usda.gov) or <https://www.fsa.usda.gov/resources/programs/arc-plc>

Southwest Purdue Ag Center Field Day, June 26

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

A complete list of presentation topics for the field day will be announced shortly.

Download the flyer here: [Flyer SWPAC Field Day 2025](#)



SOUTHWEST PURDUE AGRICULTURAL CENTER FIELD DAY

Join the Southwest Purdue Agriculture Center for a public field day for commodity producers, crop advisers to learn about crop production farm management, equipment, land use and more!

Private Applicator Recertification Program (PARP) credits and Continuing Certification Hours (CCH) are available.

JUNE 26, 2025

Learn more at: purdue.ag/swpac

Agenda

Registration: 8:30 ET

Program: 9:00 am -1:00 pm ET

(lunch included)

For special dietary needs contact Barb Joyner at 812-886-0198 by June 20, 2025.

To register, visit:

<https://tinyurl.com/2025SWPACFieldDay>



SPECIAL THANK YOU TO OUR SPONSORS

For more information contact:

Barb Joyner
joynerb@purdue.edu or
812-886-0198

If you are in need of accommodations to attend this program, please contact Barb Joyner prior to the meeting at 812-886-0198 and joynerb@purdue.edu by June 20, 2025.

If you need an interpreter or translator, please contact Barb Joyner prior to the meeting at 812-886-0198 and joynerb@purdue.edu by June 20, 2025.

Purdue University is an Equal Opportunity/Equal Access University.

Pumpkin Field Day at Southwest Purdue Agriculture Center, September 17

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

Join us for an exciting opportunity to explore a diverse selection of pumpkin cultivars, gain insights into integrated pest management (IPM) strategies for pumpkins, and tour ongoing research led by Purdue specialists. Stay tuned—more details about this event will be shared soon!



SAVE THE DATE!

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

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