In This Issue

From The Editor's Desk

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

This issue is packed with information. We are featuring several articles on weeds, including weed management in vegetable systems, how insects benefit from winter weeds, and a weed spotlight article on Common Chickweed. The insect spotlight article highlights Lacewing's, and we examine insect preferences for cucumber varieties. This issue also includes an article about vegetable grafting, weather impacts from the eclipse event, several educational opportunities during the summer and fall, and a price update from the Clearspring Produce Auction.

Timeless Articles

This issue features articles published about seed and root maggots. At this time of year, many growers are transplanting early-season crops such as onions, cole crops, radishes, turnips, and rutabagas. Other crops affected by this pest include cucumbers, melons, and watermelons. Now-retired Dr. Rick Foster wrote many of the articles listed. Please refer all queries to Laura Ingwell at lingwell@purdue.edu. For the most recent regional recommendations, refer to the Midwest Vegetable Production Guide.

Insect Spotlight: Seedcorn Maggot. Issue 732. https://vegcropshotline.org/article/insect-spotlight-seedcorn-maggot/

Seedling Damage by Maggot Pests. Issue 673. https://vegcropshotline.org/article/seedling-damage-by-maggot-pests/

Seedcorn Maggots and Wireworms in Cucurbits. Issue 658. https://vegcropshotline.org/article/seed-corn-maggots-and-wireworms-in-cucurbits/

Seed and Root Maggots. Issue 625. https://vegcropshotline.org/article/seed-and-root-maggots-3/

Root and Seed Maggot. Issue 596. https://vegcropshotline.org/article/root-and-seed-maggots/

Seed and Root Maggots. Issue 594. https://vegcropshotline.org/article/seed-and-root-maggots/

Website Links

Frequently, we include links to websites or publications 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.

Midwest Vegetable Production Guide

The Midwest Vegetable Production guide is now available for growers to visit online at **mwveguide.org**. You can also download a free copy of the guide from your computer at **mwveguide.org/guide**. You may also purchase a hard copy for $12 from Stephen Meyers, slmeyers@purdue.edu.

Do not hesitate to contact me at plangenh@purdue.edu if you have any questions or suggestions for improving the newsletter. Let me know if there are specific topics you would like to see more of in the newsletter. Also, let us know if things are not working for you. We want to improve the newsletter, and your input is valuable.

We hope you enjoy the newsletter. Happy reading!

Weed Management Strategies for Vegetable Farms

(Stephen Meyers, slmeyers@purdue.edu, (765) 496-6540) & (Jeanine Arana, jcordone@purdue.edu, (765) 588-7787)

Weeds can quickly take over vegetable farms, reducing yield and interfering with harvest. Effective weed management is vital for keeping farms efficient and productive. Because every farm is unique, there is no universal weed management solution. Prior to implementing a weed control strategy, you should properly identify the problematic weeds on your farm and establish your individual threshold, or level of tolerance, for weeds. While some farms practice a strict zero-tolerance policy for weeds, others embrace the presence of some weeds as a sign of biodiversity. In this guide, we compiled common weed management practices for vegetable production, organizing them into four categories: cultural, mechanical, biological, and chemical. Most farms will benefit from implementing combinations of these control measures into a broader Integrated Weed Management (IWM) program.

Cultural

Sanitation

Weeds can be transported in many different ways—for example, with water, wind, or attached to animal fur. Weeds can also be moved within and between fields on tools, equipment, machinery, and clothes. When moving from weed-infested fields to “clean” ones, remove soil and plant parts from boots, tools, tractor tires, and implements to avoid spreading problematic weeds.

Exclusion

Limit the risk of introducing weeds to your farm by using only inspected/tested seeds to ensure they lack noxious weeds and contain minimal other weed seeds. This is especially important for cover crop seeds (Figure 1). Weed seed can also be introduced onto a farm from contaminated straw or hay used as mulch and from field edges and fence rows.

Figure 1. Cover crop seed contaminated with foxtail seeds (Photo by S.L. Meyers).

Crop Rotation

Rotating crops can disrupt weed life cycles and reduce their population over time. The idea behind crop rotation for weed management is to alternate crops that are more vulnerable to weed infestations or have fewer weed management options with those that are more competitive or have more management options. For example, vegetables can be rotated with agronomic crops such as soybeans, corn, or winter wheat.

Cover Crops

Cover crops compete with weeds for light, water, and nutrients-much the same way weeds compete with crops (Figure 2). Some cover crops, like cereal rye, also release allelopathic compounds that can inhibit weed growth. Terminated cover crop residue provides a physical barrier to weed growth, which can prevent weed seed germination and/or emergence.

Figure 2. Marestail grows in a strip of land that was not planted with fall-seeded cover crops (center), while no marestail is present in the portion of the field planted with rapeseed (left) or cereal rye (right) (Photo by S.L. Meyers).

Plant Spacing

Planting crops at appropriate distances can reduce the time it takes to form a full crop canopy, thus shading out weeds more quickly (Figure 3).

Cultivar Selection

Choose varieties that grow well in your region or on your farm. Vigorous plants are more competitive with weeds (Figure 3). Crop canopies can vary among cultivars. Choosing cultivars that are quick to canopy or have dense shoot growth can shade weeds. Cultivars with vigorous root systems outcompete weeds by using soil nutrients and moisture more efficiently.

Figure 3. Weeds at the Purdue Student Farm were outcompeted more effectively by 'Flamingo' spinach (left), which had a higher rate of germination and more upright growth than 'Woodpecker' spinach (right) (Photo by S.L. Meyers).

Mechanical/Physical

Tillage

In soils with a heavy presence of seeds on the upper soil surface, inversion tillage with a traditional plow can be used to deeply bury these seeds and prevent them from germinating. Avoid routine plowing, which will bring the buried seeds right back to the soil surface.

Cultivation

Cultivation implements come in many shapes and sizes but serve a similar function—to uproot small weed seedlings (Figure 4). Regular cultivation may be necessary if this is your primary method of weed control. Unfortunately, cultivation can increase the spread of perennial weeds like yellow nutsedge and Canada thistle because they spread vegetatively. Cultivation should target small weeds. It will be less effective against larger weeds and in wet soil conditions.

Figure 4. A tractor-mounted S-tine cultivator removes small weeds from row middles of plasticulture watermelon (Photo by J. Arana).

Hand-weeding/hand-hoeing

These practices are labor-intensive but can be an effective way to remove weeds that escape other control tactics (Figure 5), for example, herbicide-resistant weeds.

Figure 5. Hoeing weeds that escaped a preemergence herbicide application in the row middles of plasticulture summer squash (Photo by J. Arana).

Flame Weeding

Burning weeds with propane torches or flame weeders (Figure 6) is particularly effective for young, annual, broadleaf weeds. However, it only provides temporary control of perennial weeds.

Figure 6. Flaming weeds emerged on the planting row before planting (left) and scorched weeds after one pass of the flame weeder (right) (Photo by J. Arana).

Mulches

Applying synthetic or organic mulches can smother weeds and prevent sunlight from reaching weed seeds. The lack of sunlight prevents some weed seeds from germinating and keeps others that do germinate from photosynthesizing. Synthetic mulches include plastic mulch (Figure 5) and woven landscape fabric. Organic mulches are derived from plant materials and include wheat straw (Figure 7) and tree bark.

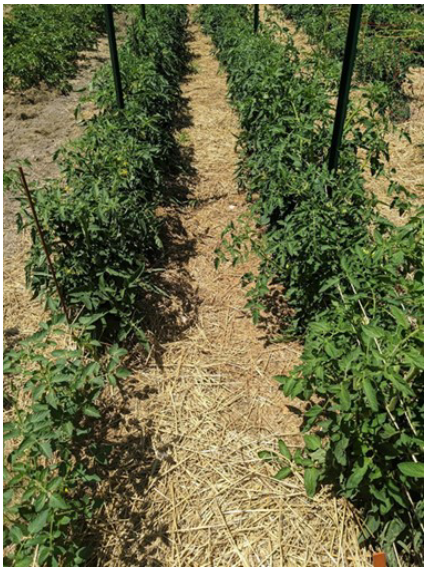

Figure 7. On this small farm, wheat straw is used as an organic (plant-based) mulch to suppress weeds between rows of staked tomatoes (Photo by S.L. Meyers).

Tarps

Plastic tarps can be used to create a stale seedbed or provide early-season weed control in slow-to-emerge crops like potatoes. Although different types of tarps can be used, silage tarps are most commonly used for this purpose. Silage tarps are thicker than plastic mulch and opaque, meaning that weeds that germinate beneath them do not receive sunlight and die. During the growing season, tarps are placed on planting beds for approximately 3 weeks and then removed immediately prior to planting/transplanting the crop (Figure 8).

Figure 8. Silage tarps (left) and clear tarps (right) are placed onto prepared planting beds to create a stale seedbed prior to transplanting onions (Photo by J. Cerritos).

Electrocution

Applying controlled electrical pulses directly to the weeds disrupts their cellular structure and kills them. Electrocution works best on upright, broadleaf weeds with a central leader and is less effective on grasses and perennial weeds. For example, tubers of electrocuted yellow nutsedge plants remained viable after electrocution treatments. Currently, most weed electrocution implements require larger tractors with greater horsepower to transfer enough electricity to the weeds (Figure 9).

Figure 9. A weed zapper mounted to the front of a large tractor (Photo by S.L. Meyers).

Biological

Living Mulches

Living mulches are grown in tandem with a cash crop (Figure 10). These living mulches act as a natural barrier, reducing detrimental weed establishment and growth by competing for sunlight, water, and nutrients. This is most commonly used in row middles between plasticulture-grown vegetables. Other examples include clover planted between established corn. Another option is to allow neutral weed communities to establish alongside cash crops. Neutral weeds, by definition, do not compete with the cash crop for resources and do not have a negative impact on cash crop yield or quality.

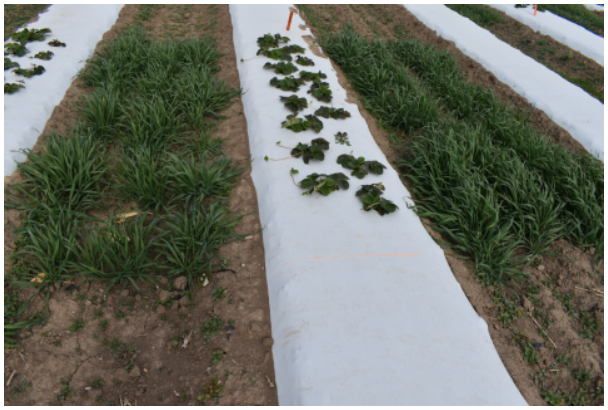

Figure 10. Oats planted within the row middles (walkways) of plasticulture strawberry production act as a living mulch (Photo by J. Arana).

Seed predation

Seed predation involves the consumption of weed seeds by natural predators, such as insects, birds, or rodents. By eating or biting weed seeds before they germinate, seed predators help to reduce the weed seed bank and seed viability in agricultural fields, ultimately decreasing weed pressure and population densities.

Livestock

Livestock, such as cattle, goats, sheep, or geese, can selectively consume certain weed species while grazing, decreasing weed biomass and seed production. Integrating livestock into crop rotations or grazing them in fallow fields can help control weeds.

Bioherbicides

Bioherbicides are naturally occurring substances derived from plants, microbes, or other organisms that suppress weed growth. One notable example is vinegar, a common household item that can effectively suppress weeds when applied in higher concentrations than those used for human consumption.

Chemical (Herbicides)

Herbicides can be broadly categorized in many ways. Most function by disrupting the function of enzymes in susceptible plants. To learn more about what herbicides are registered for use in your crops, consult the Midwest Vegetable Production Guide (mwveguide.org).

Pre-emergence vs Post-emergence

Pre-emergence herbicides (also known as soil-applied or residual herbicides) are called "pre-emergence" herbicides because they are applied before weed seeds emerge. Most must be absorbed by weed seeds as they germinate. For this reason, pre-emergence herbicides must be "activated" by rainfall or overhead irrigation to move them into the top inch or so of soil where weed seeds actively germinate. Larger-seeded weeds can germinate from deeper in the soil profile and may not be controlled as effectively by pre-emergence herbicides (Figure 11). *Post-emergence* herbicides are applied to emerged weeds and can be either contact or system in their function.

Figure 11. Morningglory seedlings emerging in a field treated with pre-emergence herbicides. Note the white portion of the seedling stem (or hypocotyl) on the left morningglory indicating this plant emerged from several inches deep and below the treated portion of the soil profile (Photo by S.L. Meyers).

Contact vs. Systemic Herbicides

Contact herbicides act upon direct contact with plant tissue, causing rapid desiccation or destruction. Although they may be taken into the leaves of a sprayed plant, they are not moved far throughout the plant. They are effective for rapid weed control of small, emerged weeds but may not provide long-lasting results, especially for perennial weeds. Systemic herbicides are absorbed by plants and moved throughout the vascular system, reaching and affecting areas beyond the point of application. These are more effective against larger and perennial weeds and provide longer-lasting control.

Selective or Non-Selective

Selective herbicides control some weeds and not others. For example, grass-selective herbicides, like clethodim, do not provide control of broadleaf weeds. Similarly, broadleaf herbicides like 2,4-D will not control grassy weeds. Non-selective (also known as broad-spectrum) herbicides are less picky about the weeds they control. These herbicides are often applied as a pre-plant burndown or row middle application with caution to avoid contacting the crop and include herbicides such as paraquat, glyphosate, and glufosinate.

Weed Spotlight: Common Chickweed

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Common names

Common chickweed, chickweed, starwort, starweed, bindweed, chicken-weeds, winter weed, satin flower, tongue grass, chickwhirtles, cluckenweed, mischievous Jack, skirt buttons, cyrillo, and white bird's eye.

Fun fact

Did you notice how many common names refer to chickens? It turns out that this weed was used as a go-to in chicken and bird diets!

Latin name

Stellaria media.

- *"Stellaria"* is derived from the Latin "*Stella",* which means "star", referencing the star-shaped flower.
- *"media",* also derived from Latin, means "mid-sized", probably referring to the plant size within its genus.

Family

Caryophyllaceae (Pink family- the same family as carnations)

Life cycle

Common chickweed is an annual that can emerge in all seasons but mainly in spring and fall due to the high moisture and moderate temperatures (Figure 1). It emerges and reaches the seed production stage within approximately eight weeks,

completing up to three generations annually.

Figure 1. A common chickweed seedling growing in February 2023 in Lafayette, IN (Photo by Jeanine Arana).

Identification

Seedlings

Seedlings of common chickweed have ovate seed leaves (cotyledons). Young leaves appear in pairs on either side of the stem (known as an opposite leaf arrangement), rounded at the base and pointy at the tip (Figure 2).

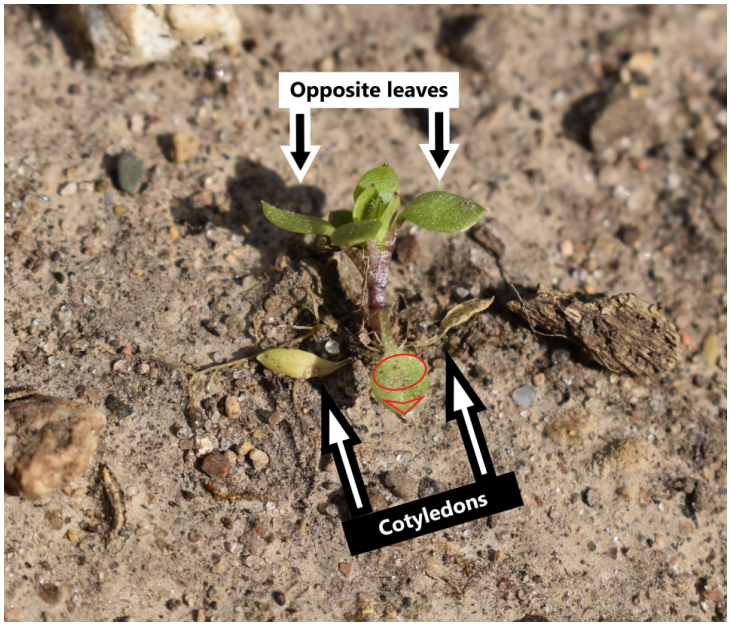

Figure 2. The cotyledons of a common chickweed seedling are ovate, and the leaves are opposite. The red circle and arrowhead delineate the leaf's round base and pointy tip (Photo by Jeanine Arana).

Mature Plants

Mature plants of common chickweed grow along the soil and have branching stems, leading to a mat-forming growth habit (Figure 3). The stems feature one or two rows of hairs (Figure 4). The leaves and stems are light green, making them stand out among darker-green plants (Figure 5). Common chickweed may be mistaken for mouse-ear chickweed (*Cerastium fontanum*), but mouse-ear chickweed is densely covered with hair at all growth stages.

Figure 3. Common chickweed's mat-forming growth habit (Photo by Jeanine Arana).

Figure 4. Common chickweed stem with a single row of hair (Photo by Jeanine Arana).

Figure 5. The patch of common chickweed is distinguished by its light-green color, which contrasts with the surrounding darker green vegetation (Photo by Jeanine Arana).

Flowering Plants

When in flower, common chickweed has white star-shaped flowers at the shoot tips. Each flower has five white petals that are deeply lobed, giving the appearance of having 10 petals (Figure 6). Mouseear chickweed's flower can be distinguished because the five white petals are not deeply lobed (Figure 7).

Figure 6. Chickweed's star-shaped flowers have five deep-lobed, white petals. The red star delineates the flower's shape (Photo by Jeanine Arana).

Figure 7. Mouse-ear chickweed star-shaped flowers have five shallowly-lobed, white petals (Photo by Jeanine Arana).

Reproduction

Common chickweed's flower production is independent of light duration. Its flowers self-pollinate, and plants typically produce between 500 and 3,000 seeds.

Integrated weed management strategy

Cultural and mechanical practices

- Scouting: Conduct monitoring year-round to identify common chickweed patches and plan control strategies accordingly.
- Cover crops: Utilize cover crops to outcompete common chickweed for resources and provide a physical barrier to its growth.
- Plastic mulch: Acting as a physical barrier, plastic mulch hinders germinating common chickweed seedlings from reaching the soil surface. Ensure that planting holes are sized to fit only your transplant. Huge planting holes can allow weeds to emerge next to the crop.
- Organic mulch: Apply mulches like straw or wood chips to suppress common chickweed's emergence and growth.
- Silage tarps: Silage tarps prevent germinating weeds from receiving sunlight. Tarps placed in the fall and removed in the spring will provide early control of common chickweeds.
- Hand-weeding, hoeing, and cultivation: Eliminate seedlings before seed production to prevent an increase in the weed seed bank.
- Flame weeding: Use flame weeding to control common chickweed in its early stages of growth.

Chemical control

- Pre-emergence (PRE) herbicides: If possible, apply PRE herbicides in the spring before common chickweeds germinate to inhibit seedling emergence.
- Post-emergence (POST) herbicides: If common chickweeds have already emerged, apply POST herbicides (combined with PRE herbicides when possible) to control them. Depending on your production system, this can be done instead of, or in addition to, spring tillage.
- Visit the Midwest Vegetable Production Guide (org) to learn which herbicides are labeled for the crops you intend to grow.

Alternative methods

- Doing nothing: For some, no management is also an option. Common chickweed provides ground cover that helps maintain an ecological balance and provides a food source for pollinators. Some people allow its growth for potential harvest for culinary use, such as salads.
- Living mulch: Some organic growers view common chickweed as an ally rather than a foe. They intentionally foster common chickweed's reproduction, leveraging its

presence as a living mulch to suppress the growth of detrimental weeds (weeds with robust stems, deep roots, creeping habits, and those from the same family as our crop that may harbor crop-damaging pests).

Continue Learning

To find more common chickweed pictures for identification, visit the Weed Science Society of America (WSSA) Weed Identification tab.

References

Defelice M.S. 2004. Common chickweed, *Stellaria media* (L.) Vill. – "Mere chicken feed?". Weed Technology.

Hill E.C., Renner K.A., Sprague C.L. 2014. Henbit (*Lamium amplexicaule*), common chickweed (*Stellaria media*), shepherd's-purse (*Capsella bursa-pastoris*) and field pennycress (*Thlaspi arvense*): fecundity, seed dispersal, dormancy and emergence. Weed Science.

Sobey D.G. 1981. *Stellaria media* (L.) Vill. Journal of Ecology.

Selecting Your Ideal Cucumber Cultivar for High Tunnel Production

(Leslie Alejandra Aviles Lopez, lavilesl@purdue.edu) & *(Laura Ingwell, lingwell@purdue.edu, (765) 494-6167)*

Over the past two years, we've been testing various cucumber cultivars to see which ones are most vulnerable to pests in high tunnel systems.

We split the cucumbers into two groups based on fruit characteristics for a fair comparison.

The first group consists of pickle-type cucumbers, known for being small, blocky, and having thin skin. Examples of these include the Mini and Beit Alpha cultivars.

The second group includes slicer-type cucumbers, which are typically longer and have tougher skin. Cucumbers like Dutch greenhouse, Japanese, and American slicers belong to this category. You can find more detailed information about cucumber cultivar categories in this comprehensive guide: https://extension.entm.purdue.edu/publications/ID-521/ID-521-W.pdf.

Adding to the information presented on variety evaluations in the current guide, we evaluated 10 cultivars, 6 of which were not included in previous evaluations (Table 1). The objective of our study was to evaluate the susceptibility of these varieties to the main arthropod pests, which include twospotted spider mite (*Tetranychus urticae* Koch; TSSM) (Figure 2), melon aphids (*Aphis gossypii* Glover) (Figure 3), and striped cucumber beetle numbers (*Acalymma vittatum* Fabricius) (Figure 4). While we could count the absolute number of aphids and cucumber beetles, TSSM was evaluated using the Horsfall-Barratt symptom expression scale designed for plant disease evaluation.

Table 1. Cucumber cultivar details.

Cucumber Type	Cultivar	Pest Susceptibility Scores		
		TSSM	Aphids	StCB
Slicer	Corinto	High	Moderate	Moderate
Slicer	Socrates	High	Low	Moderate
Slicer	Itachi	Low	Moderate	High
Slicer	Tasty Jade	Low	Moderate	High
Slicer	Taurus	Low	Moderate	Moderate
Slicer	China Long	Low	Moderate	Moderate
Slicer	Poniente	High	High	Moderate
Pickle	Excelsior	High	Low	Moderate
Pickle	Quirk	High	Moderate	Low
Pickle	Adam Gherkin	High	Moderate	Moderate

Figure 1. Twospotted spider mite adults and egg (Photo by John Obermeyer).

Figure 2. Melon aphids on the underside of a cucumber leaf (Photo by John Obermeyer).

Figure 3. Striped cucumber beetle (Photo by Wenjing Guan).

Table 2. Pest susceptibility findings

Cucumber Type	Cultivar	Pest Susceptibility Scores		
		TSSM	Aphids	StCB
Slicer	Corinto	High	Moderate	Moderate
Slicer	Socrates	High	Low	Moderate
Slicer	Itachi	Low	Moderate	High
Slicer	Tasty Jade	Low	Moderate	High
Slicer	Taurus	Low	Moderate	Moderate
Slicer	China Long	Low	Moderate	Moderate
Slicer	Poniente	High	High	Moderate
Pickle	Excelsior	High	Low	Moderate
Pickle	Quirk	High	Moderate	Low
Pickle	Adam Gherkin	High	Moderate	Moderate

*High, moderate, and low classifications were determined according to statistical analyses that compared cumulative pest pressure relative to the cultivars being tested here.

In Table 2, we have summarized our pest susceptibility findings in the chart, categorizing each pest as either low, moderate, or high susceptibility. This is a relative measure of pest damage incurred throughout the growing season in contrast to the other cultivars being examined. For example, those with high TSSM ratings had significantly more mite damage than those with low TSSM ratings. When selecting cucumber varieties for your high tunnels, after choosing the fruit type that you desire, you should consider your pest pressures. We hope that this table can be useful for you in selecting varieties that are less susceptible to your most pressing issues. The best practice to manage StCB and the bacterial wilt they transmit is through the installation of exclusion netting on your tunnels. You will see that most varieties are moderately to highly susceptible to this pest. None of the varieties are resistant to bacterial wilt, so even with our category of low susceptibility, transmission of the disease is likely. The slicing varieties Itachi, Tasty Jade, Taurus, and China Long accumulated significantly less TSSM damage than the other varieties and would be recommended if mites are a persistent problem in your tunnels. If aphids are harder for you to manage, Socrates is the best slicer type, and Excelsior is the best pickle type. Regardless of your ultimate decision, we encourage you to try out something new; they are all delicious. And don't be afraid of the white cucumber, Itachi. They are tasty and hold up well to pest damage! The variety in shape and color of the fruits are shown in Figure 4.

Figure 4. A snapshot of the variety of cucumber cultivars evaluated in this trial (Photo by Leslie Aviles).

Winter Weeds as Refuge for Pest and Beneficial Invertebrates

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Background

High tunnels provide a hospitable environment for crops and insect pests, but little is known about the weed community present within them. From 1 December 2022 to 17 March 2023, we visited 14 farms monthly across Indiana and used a quadrat-style approach to measure weed pressure (0% to 100% weed coverage per quadrat) and identification (Figure 1).

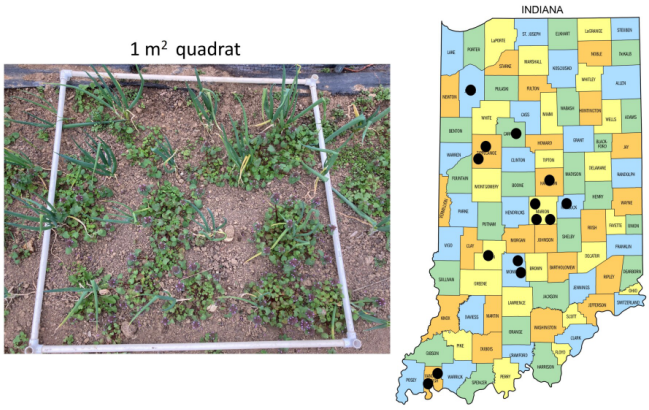

Figure 1. The quadrat used to estimate weed pressure at 14 high tunnel farms in Indiana (farms are indicated by the black dot on the map) (Photo by S. Willden).

Average weed coverage was about 19 % per 1 m^2 quadrat and varied by site. Generally, higher weed pressure was observed when no ground cover was present (i.e., landscape fabric, woodchips, hay, or plastic mulch). Dominant weeds identified were chickweed (*Stellaria media*), henbit (*Lamium amplexicaule*), purple deadnettle (*Lamium purpureum*), and mouse-ear chickweed (*Cerastium vulgatum*) (Figure 2). Chickweed and henbit are both winter annual weeds, while mouse-ear chickweed is considered a perennial but can grow similarly to a winter annual, depending on the climate.

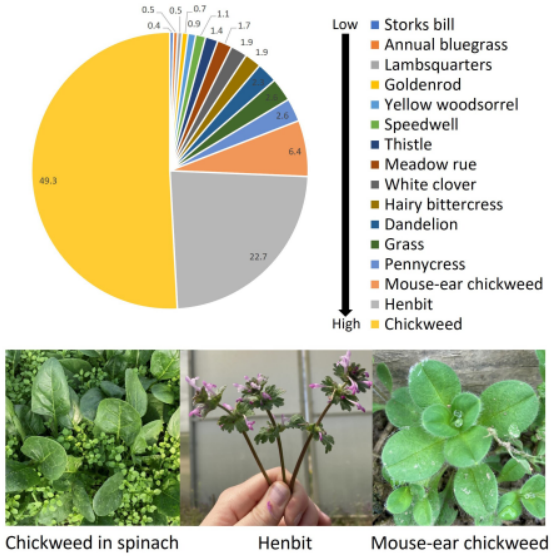

Figure 2. Relative percentage of weed specimens identified in high tunnels on farms from Dec 2022 – Mar 2023 (Photos by S. Willden).

Winter weeds and pests

The majority of insects identified on weeds under high tunnels were aphids (Figure 3). Fungus gnats, thrips, slugs, and pillbug pests were also observed but in low abundance. Densities of aphids were highest on sticky mouse-ear chickweed (*Cerastium glomeratum*), hairy bittercress (*Cardamine hirsuta*), henbit, and speedwell (*Veronica* spp.).

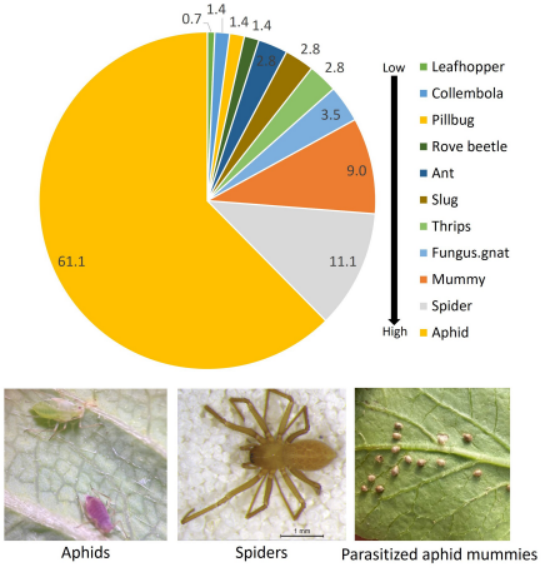

Figure 3. Relative percentage of invertebrate specimens identified on weeds in high tunnels on farms from Dec 2022 – Mar 2023 (Photos by S. Willden).

Winter weeds and natural enemies

Spiders and aphid parasitoids (determined by the presence of aphid mummies) were the most common natural enemies present on weeds in high tunnels. Among the weeds, the highest ratio of natural enemies to pests was observed on pennycress (Thlaspi arvense), mouse-ear chickweed, wintercress (Barbarea spp.), dandelion (Taraxacum officinale), yellow wood sorrel (Oxalis stricta), and white clover (Trifolium repens). No pollinators were observed on weeds during winter.

Conclusion

Our study indicates that some weeds may be important bridges between cropping seasons under high tunnels, while others may provide refuge or supplemental food sources for predators and parasitoids, like companion plants. Before confirming which species are important pest bridges, aphid species identification is needed and is currently underway. This will decipher whether the species on the weeds are the same as those infesting the cash crop. If not, they have the potential to serve as a reservoir for natural enemies, serving much like a banker plant system implemented in greenhouse production for pest management.

We recommend using the following guide (https://weedid.missouri.edu/) or the iNaturalist seek app (https://www.inaturalist.org/pages/seek_app) for weed identification.

See the articles below for management recommendations for dominant weeds identified under high tunnels.

- Common chickweed: https://turf.purdue.edu/common-chickweed/
- Henbit: https://vegcropshotline.org/article/weed-spotlight-henbit/
- Mouse-ear chickweed: https://turf.purdue.edu/mouse-ear-chickweed/

Insect Spotlight: Lacewing (Chrysoperla carnea)

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Lacewings are a group of insects commonly found in Indiana and throughout the world. There are several species, but the most common that you will see in Indiana include the green lacewing and the brown lacewing. They belong to a unique order of insects, Neuroptera, and are commonly referred to as aphid lions. The life cycle of lacewings consists of four stages. First is the egg stage; they are oval-shaped with a pale green color and are deposited atop a silk stalk (Figure 1). This is to protect them from predators and eating one another when they hatch!

Figure 1. Lacewing eggs deposited on silk stalk (Photo by Samantha Willden).

The larvae emerge around five days after the egg is laid. The larvae are recognizable by their grey to brown long segmented body and large pincer-like mouthparts (Figure 2). The larval stage lasts two to three weeks, during which time they look the same but get progressively larger. The larvae then form a silken cocoon in which they stay for 10-14 days while resting and transforming into an adult. The adults are easily recognizable by their big lacey wings (transparent or brown), long antennae, and 12-20 mm long soft body (Figure 3).

Figure 2. Lacewing larval specimen (Photo by Cristhian Ochoa).

Figure 3. Lacewing adult (Photo by John Obermeyer).

Figure 4. Lacewing predating an aphid (Photo by Cristhian Ochoa).

Four Fast Facts about Vegetable Grafting in the U.S.

(Matthew Kleinhenz, kleinhenz.1@osu.edu)

Grafted plant use is increasing rapidly but is still far below its estimated potential

Grafting makes one plant out of two, the root system coming from the rootstock and the above-ground fruiting portion from the scion. Grafted planting stock is the norm in many areas of the world, and although it is less common in the U.S., grafted plant use is rising rapidly in the U.S. Grafted plants are usually prepared using young seedlings. In 2012, few, if any, grafted plants were produced on a commercial scale in the U.S.; however, U.S. propagators now supply more than eight million plants annually, and many growers are preparing their own grafted plants, learning through programs and resources (e.g.,

https://u.osu.edu/vegprolab/grafting-guide/ and http://www.vegetablegrafting.org/resources/grafting-manual/). Still, that production is thought to be less than 1% of the potential market for or eventual use of grafted plants in the U.S. Demand for grafted plants by vegetable growers managing greenhouse, high tunnel, and open field plantings of different scales and approaches (e.g., organic, conventional) continues to increase sharply.

Industry-University-USDA teams are working to increase access to and success with grafted plants throughout the industry

Grafted vegetable plants are now more available and important to some U.S. growers than ever before, but much more is required to maximize their value throughout the industry. Experts in plant breeding, plant propagation, engineering, crop management, economics, and other fields – including at Purdue University — are testing ways of improving people's experiences with grafted plants. They focus on improving grafting and grafted plant distribution methods and increasing access to grafted plants, including reducing their cost and increasing their availability to all growers, regardless of where or how they farm. Research and extension personnel also help growers unlock the full economic potential of grafted plants through adjusting cultural, nutrient, irrigation, harvesting, and other aspects of management, as needed. The overall goal of this collaborative work is to raise the value of grafted plants to those who prepare and/or use them. Globally, the technical literature includes more than two thousand articles and reports describing industry-focused efforts to advance the use of grafted plants as products and production tools, including in the U.S. See and download a database listing these resources at http://www.vegetablegrafting.org/resources/reference-database/. Similarly, consider utilizing the "vegetable grafting decision support tool" at http://graftingtool.ifas.ufl.edu/ to assess your potential experience. Growers of tomato and watermelon have been the first to gain from using grafted plants, and growers of pepper, eggplant, cucumber, and specialty melon have also been benefitting.

Rootstock (RS) traits, availability, and selection remain key

All farming outcomes result from the specific combination of crop genetics and nearby environments involved. Success requires selecting crops and varieties ideally suited for growing conditions they are likely to experience and then ensuring those above- and below-ground conditions are ideal as often as possible. Using grafted plants vastly increases the arsenal of traits available to most vegetable growers that could be useful in that process. Including all traits that may be important (e.g., vigor, soilborne disease resistances, tolerances to abiotic stresses) in all varieties has been impossible and is likely to remain so for many years. Grafting eliminates the need for compromises required when using single-variety nongrafted plants. 'Physical hybrids' created through grafting allow root and shoot traits to be included in separate varieties that are later combined through grafting. This is why RS varieties should interest many vegetable growers. RS varieties available in the U.S. are listed and described in tables available at http://www.vegetablegrafting.org/resources/rootstock-tables/.

From the tables, we can learn:

(a) sixty-two Solanaceous RS varieties can be used with tomato, thirty-two with eggplant, and sixteen with pepper, but only one can be used with all three crops.

(b) Solanaceous RS varieties carry reported resistances for various combinations of sixteen diseases and root-knot nematode.

(c) forty-one Cucurbit RS varieties can be used with watermelon, thirty-one with specialty melons, nineteen with cucumber, and seven can be used on all three crops.

(d) Cucurbit varieties carry reported resistances for various combinations of thirteen diseases, root-knot nematode, and tolerance to cold, heat, and/or drought stress.

A word about RS-scion (fruiting variety) compatibility: it is important. Rules of thumb apply. For example:

(a) company recommendations (e.g., reports of a RS being best for one or more crops) should be taken seriously.
(b) if a RS is listed as compatible with 'tomato' or 'watermelon', it will graft well to all scion varieties of those crops but its influence on them may differ. Therefore, RSs should be selected based on quality information and more than disease resistance, if possible.

Careful, deliberate on-farm testing is useful and help is available now

Experience from focused research and on-farm testing each season continues to reinforce the idea that getting the most from grafted plants often requires managing them differently, perhaps beginning before planting and continuing through harvest. The biology of some rootstocks and rootstock-scion combinations can require growers to alter various standard practices to gain fully from using grafted plants. Those practices are typically developed through years of experience with nongrafted plants, so it can be difficult to give them up. Getting the most from grafted plants may require reducing preplant or after-planting fertilizer rates and/or plant populations (using wider spacing) and/or altering irrigation programs or harvest schedules, since grafted plants can be more vigorous and efficient with nutrients and water. Reducing plant numbers and inputs can help offset the cost of grafted plants. Regardless, growers looking to maximize their returns on investments in grafted plants are encouraged to connect with experienced grafted plant users and testers, consult reports (e.g., https://u.osu.edu/vegnetnews/2021/08/21/grafted-watermelon-plants-under-what-conditions-and-practices-does-using-them-offer-the-best-return-on-investment/) and experiment carefully.

Growers rely heavily on traits available in their planting stock. Delivering all the traits growers require in single-variety nongrafted plants has been impossible and is likely to remain so for many years. Grafting speeds the delivery of traits to farms and, in combinations, often unavailable in nongrafted plants.

Teams are working to overcome the challenges associated with relying on grafted planting stock much more heavily.

Clearspring Produce Auction Price Update

(Jeff Burbrink, jburbrink@purdue.edu)

The Clearspring Produce Auction is located just 2 miles south of US 20 in Clearspring Township in the Heart of the LaGrange-Elkhart Amish Settlement. It is within easy driving distance of the towns of Shipshewana, Topeka, Emma, and LaGrange.

Produce is sold 3 days a week throughout most of the growing season (Tuesday, Thursday, Friday), with a hay sale on Saturdays. Office hours are Monday and Wednesday, 1 to 4 pm, and Tuesday, Thursday, and Friday, 8 am to 4 pm. An auction report can be heard by calling (260) 463-4131. Besides the produce and hay auctions, Clearspring has an equipment and supply business operating onsite for growers.

Are you curious about vegetable pricing?

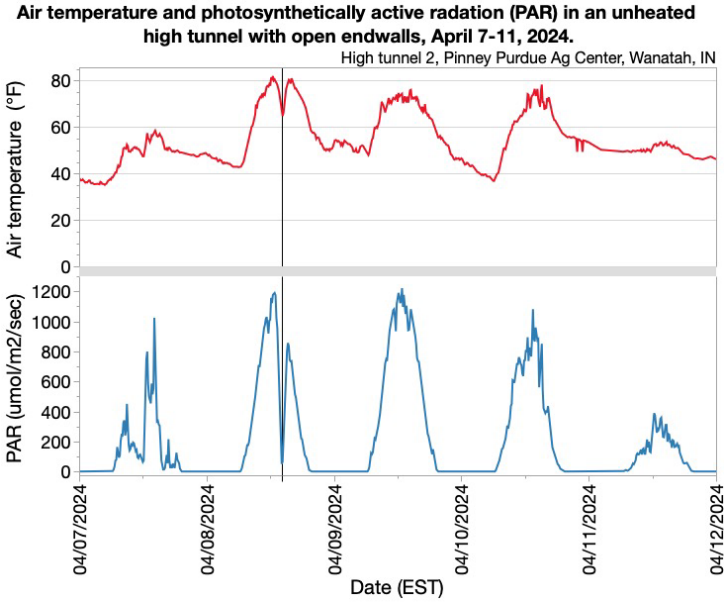
In an effort to communicate more market information, we are publishing Clearspring Produce Auction volumes and prices. You will be able to view volumes and pricing below:

April 11, 2024

Air Temperature and Light in an Unheated High Tunnel During the Solar Eclipse

(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)

The April 8th solar eclipse reduced temperature and light for a period in the afternoon of an otherwise mostly sunny day. Sensors in an unheated high tunnel with open end walls at the Pinney Purdue Ag Center, Wanatah, IN, captured the change as the moon covered 96% of the sun (Figure 1). The air temperature dropped 17 degrees, from 82 to 65 °F. Photosynthetically active radiation dropped from 1189 down to 51 µmol /m^2/second. Plant growth responds more to temperature and light levels across the whole day than to ups and downs during the day. Growing degree days and daily light integrals (DLI) capture those daily differences (Table 1). On the day of the eclipse, growing degree days in the tunnel were almost the same as the following day (22 vs 21) and higher than other days that weren't as sunny. The daily light integral on April 8 took a bigger hit: at 24.9 it was only 83% of the DLI for April 9, which was also a sunny day. Other days that were cloudy had even lower DLI: as low as 7 on April 11. The eclipse was a big event for many people, but for plants, it may have been just another spring day.



Weather Impacts From Eclipse

(Beth Hall, hall556@purdue.edu)

Something exciting happened on April 8th that many of you might be glad is over and no longer filling your news feed – the total solar eclipse. The Indiana State Climate Office, however, is now getting a chance to dig into the data collected from the Purdue Mesonet – a collection of 14 weather stations around the state – to see the various weather impacts from the event. While 3-second data was collected throughout most of the daylight hours on Monday (and yet to be analyzed), the public can view changes in the 5-minute data on the Purdue Mesonet Data Hub by clicking on a station, then scrolling down through the time series of various variables. All stations across Indiana experienced a drop in incoming solar radiation (no surprise there), but most stations also recorded at least a 5-degree drop in temperature (Figure 1) and a decrease in wind speed of approximately 5 miles per hour! Check out the data for the station closest to where you were and recall if you felt those various changes!

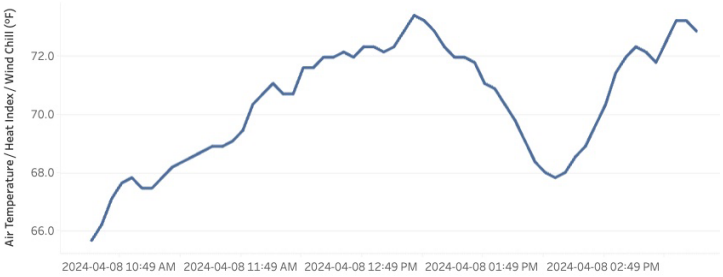


Figure 1. Example time series of temperature during the total solar eclipse that peaked around 2:00 PM local standard time (note: this is 3:00 PM local daylight time) for a station in Randolph County.

Precipitation continues to be above normal, with most of Indiana having received at least 200 percent of normal amounts since the beginning of April (Figure 2). While April 1-7 was on the drier side, by the middle and near end of last week, more rain had come, keeping amounts high enough to eliminate any drought. According to the U.S. Drought Monitor, only southwest Indiana

counties are in the Abnormally Dry category (Figure 3).

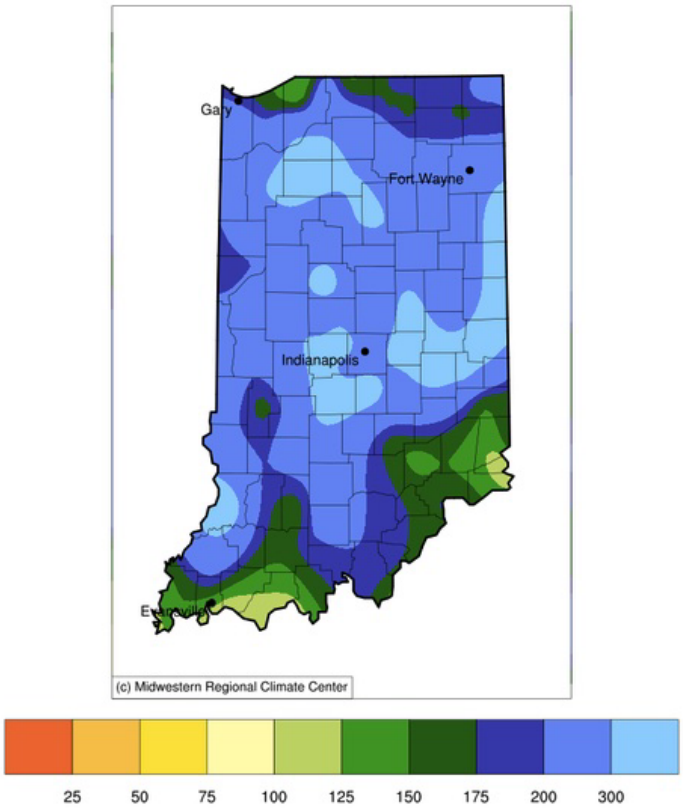


Figure 2. Percent of normal precipitation based upon the 1991-2020 period for April 1st through the morning of April 11th, 2024. Areas above 100 percent are wetter than normal.

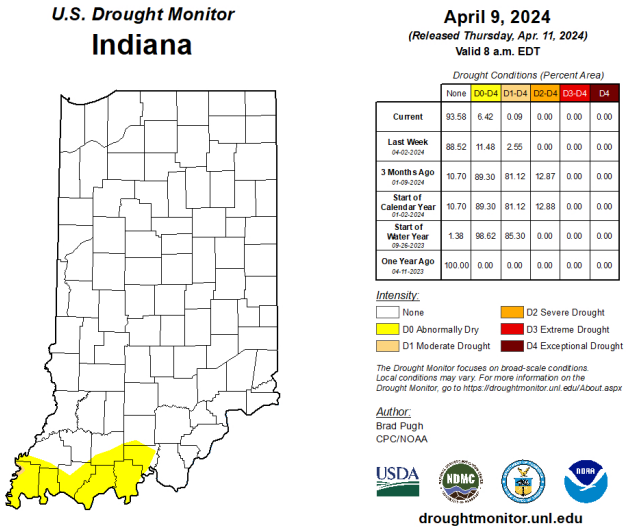


Figure 3. U.S. Drought Monitor map for Indiana based on data through the morning of Tuesday, April 9th.

Modified growing degree days since April 1st are within 5 units of normal as of April 11th, with accumulations ranging from 70 units in southern Indiana to as low as 30 units in northern Indiana. Hopefully, this product will get more exciting with time, particularly since the National Climate Prediction Center (CPC) is strongly favoring above-normal temperatures over the April 16-20 period. The CPC is also strongly favoring above-normal precipitation over this same period, with a possible continuation of wetter-than-normal conditions likely to occur next week.

Wet Conditions Continue

(Beth Hall, hall556@purdue.edu)

There was an interesting conversation among drought experts this week about how best to communicate drought, particularly when surface conditions appear so saturated. I thought of Indiana a lot during this discussion because with all the rain the state has received over the last several weeks (over twice the normal amount!), there is localized flooding, and streams seem to be in good shape. However, groundwater levels are still below normal across much of the state (particularly western Indiana, but also locations in northeast, central, and southern Indiana), so what we see on the surface may not be making its way down into our aquifers. This could become critical for water supply, not only for domestic use but also for irrigation later in the growing season. In fact, according to the National Oceanic and Atmospheric Administration (NOAA), southwestern Indiana is still trying to make up an approximate 3-inch precipitation deficit and southern Indiana is facing a 3-to-6-inch deficit. Fortunately, April has been wet, so those deficits will hopefully be eliminated within the next few weeks. However, when one sees the most current U.S. Drought Monitor (USDM) map for Indiana and wonders how there could still be areas designated as Abnormally Dry (D0), remember that all types of drought (e.g., hydrological, socioeconomic, meteorological) are being considered and not just agricultural drought. The latest USDM continues to show a small band of Abnormally Dry (D0) conditions in southwestern Indiana along the Ohio River. (Figure 1).

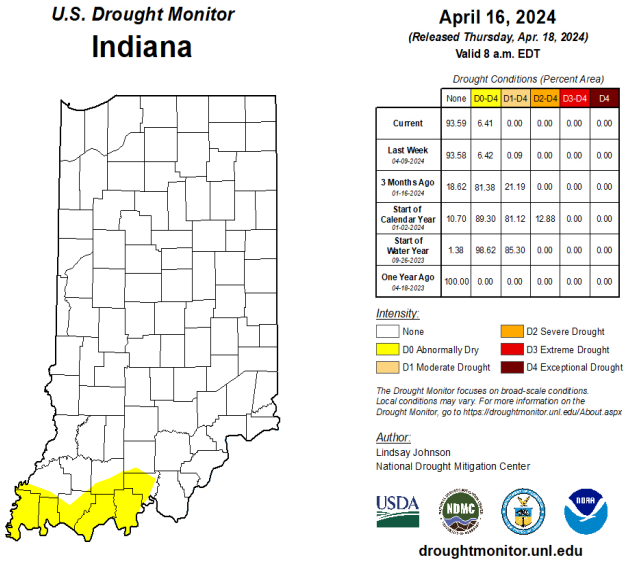


Figure 1. U.S. Drought Monitor conditions for data collected through Tuesday, April 16, 2024.

Due to the warmer temperatures, modified accumulated growing degree days since April 1st continue to increase rapidly. Ranges now extend from over 80 units in northern counties to over 140 units in southern counties (Figure 2). This is only about 5 to 20 units ahead of normal for this time of year.

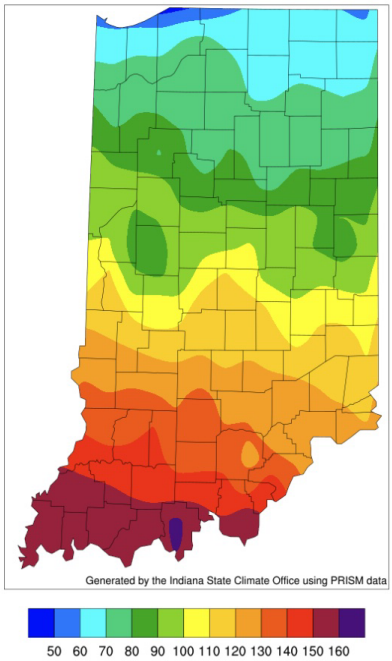


Figure 2. Modified growing degree day (50°F / 86°F) accumulation from April 1-17, 2024.

Aside from another rain event passing through our area at the end of this week, conditions appear to clear up for most of this next week. NOAA climate outlooks for April 23-27 (6-10-day outlook) is favoring near-normal temperatures with a slight chance of above-normal precipitation. However, the 8-14-day outlook (Apr 25-May 1) is strongly favoring above-normal temperatures and precipitation. The climate outlook for May (released April 18th) is favoring above-normal temperatures for Indiana. For northern Indiana, the outlooks indicate an equal chance of either above- or below-normal precipitation, with southern Indiana slightly favoring a wetter-than-normal May. Similar outlooks regarding temperature and precipitation have been released for the 3-month period of May-June-July.

2024 Midwest Mechanical Weed Control Field Day

(Ashley Adair, holmes9@purdue.edu)

The 7th Annual Midwest Mechanical Weed Control Field Day is heading to Meigs Horticulture Research Farm in Lafayette, IN, in 2024!

This amazing event consistently draws more than 150 farmers from around the Midwest to hear from experts, meet with company representatives, network with other farmers, and experience in-field equipment demonstrations of all manner of weeding tools. Whether you have products to showcase or equipment to demonstrate, this is your opportunity to get dedicated face-to-face time with a captive audience of farmers who are interested in what you have to offer. The field day is promoted to farmers throughout the US (with a focus on the Midwest) in print, digital, and social media.

Every element of the event is crafted to maximize contact between the participants and sponsors. The morning features a dedicated Trade Show area for farmers to connect with exhibitors. Additionally, the morning includes educational events such as presentations and roundtable discussions. But, by far, the main draw is the afternoon in-field equipment demonstrations, including tools of all scales of production. The demonstrations feature everything from walk-behind tractors, autonomous weeding machines, belly-mounted vegetable tools, and 6-row camera-guided row crop cultivation tools. The demonstration plots are planted specifically for the field day so that crops are at the optimum stage for cultivation. Each sponsor runs their demonstration several times so that all attending farmers can see each demo, giving sponsors quality face-to-face time to show how their machines work in the field and to connect with farmers.

The Midwest Mechanical Weed Control Field Day is a partnership between Sam Oschwald Tilton, Purdue University, and The Land Connection (TLC). The Land Connection is a 501 (c)(3) non-profit based in Champaign, IL. TLC offers training, resources, and support to farmers, food businesses, and eaters so that together, we can realize a more just, equitable, and sustainable food system that we know is possible. All sponsorship funds are used for the organization and execution of the Midwest Mechanical Weed Control Field Day.

Visit the event registration website to see videos, press coverage, and sponsor testimonials from the previous six years of the field day.

Thank you for being an integral part of sustainable agriculture,

Crystal Siltman and Jesse Schaffer, Farmer Training Coordinators, The Land Connection

Sam Oschwald Tilton, MMWCFD Event Founder and Organizer, Glacial Drift Enterprises

Website: https://www.thelandconnection.org/event/2024-mmwcfd/

Sponsorship Packet

Flyer

Gardening for Science

(Celina Gomez, cgomezva@purdue.edu)

Purdue is looking for volunteers to grow strawberry and marigold plants at home from May through September. All materials will be provided to participants for free. For further details: https://www.purdue.edu/newsroom/releases/2024/Q2/citi-sci-gardening-for-science-experiment-focuses-on-gardening-preferences-and-effects-on-mental-health-seeks-participants.html

Strawberry Disease Management Considerations

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

In addition to frost protection, disease management is pivotal during the blooming stage, particularly concerning gray mold (caused by *Botrytis* spp.) and Anthracnose. To protect the fruit, fungicide application should commence at or even before blooming. The pressure of both diseases is heavily influenced by weather conditions, with Botrytis favoring wet and cool climates and Anthracnose thriving in wet and warm conditions. While Botrytis is widespread, plasticulture generally experiences lower Botrytis pressure compared to matted row systems. Conversely, the primary source of anthracnose infection is likely from asymptomatic planting materials, and the disease could be more severe in plasticulture than in matted row systems. Dry weather during blooming and harvest stages may mitigate disease risks. However, in the event of a wet spring, timely fungicide application becomes imperative to disease management.

How often should apply fungicide? The best way to decide fungicide application frequency is through a weather-based forecasting tool. The Network for Environment and Weather Applications (NEWA) offers infection risk levels for Botrytis and Anthracnose and gives recommendations for application frequency. The system has three weather stations currently operational in Indiana—Romney, Converse, and New Castle. Growers in nearby areas can leverage this tool to guide fungicide applications. A weather station is not yet available in southern Indiana. Please let me know if you are interested in setting up one at Southwest Purdue Agriculture Center (SWPAC). Growers may also consider investing in one for their farm.

As a general guideline, one to three fungicide applications during bloom can provide sufficient control for Botrytis. Additional fungicide spraying post-bloom may not yield additional control against Botrytis and might lead to fungicide resistance. Hence, utilizing multisite fungicides and rotating between groups is imperative whenever feasible.

For specific fungicide recommendations, please consult the Midwest Fruit Pest Management Guide. Dr. Janna Beckerman had fungicide recommendations for each strawberry growth stage in the production guide.

For additional information about strawberry diseases and disease management considerations during the spring, please refer to the Strawberry Chat podcast Spring Diseases and Management Episode 9. March 9, 2023

Indiana Strawberry Crop Status Update

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

Harvesting of high tunnel-grown strawberries has started from southern to central Indiana.

Early cultivars in open-field plasticulture are fruiting in southern Indiana, with harvest right around the corner. The crops are generally a week earlier than last year. Late cultivars, second-year patches, and fields covered with straw in the winter are slightly lagging behind.

Moving north, early cultivars grown on plasticulture have begun to bloom, while plants on matted row systems are generally behind.

For the open-field grown strawberries, growers across Indiana should remain vigilant in safeguarding the crops against frost damage. The last frosts at the end of March caused some damage in southern Indiana. Still, the flowers were generally okay if you applied protection with either row covers or overhead irrigation (Figure 1). Set fruits can tolerate lower temperatures than open blooms.

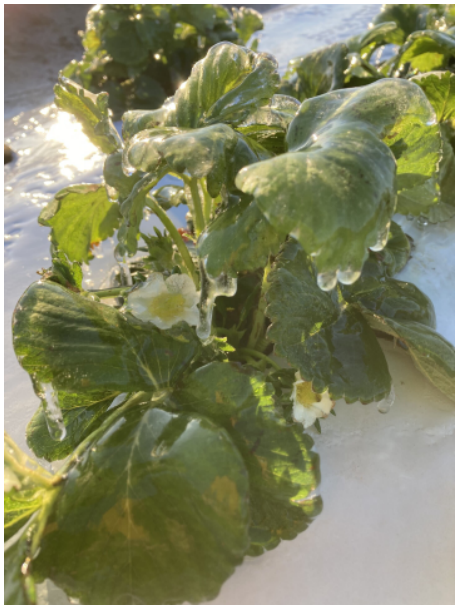


Figure 1. Frost protection using overhead irrigation. The picture was taken on the morning of Mar. 28 at Southwest Purdue Agricultural Center.

2024 Purdue Fruit and Vegetable Field Day

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

Purdue Extension presented its second Fruit and Vegetable Field Day post-pandemic at the Throckmorton Purdue Agriculture Center's Meigs Horticulture Research Farm, located in Lafayette, on July 20th, 2023. Extension Specialists and Graduate Students presented specialty crop research to 90 attendees. Attendees had only good things to say about the event. 'It was an interesting program, I learned quite a bit." "Excellent information and material." "Excellent information and resources on new horticultural technology and techniques." "Diversity of the tales, well explained and some topics never heard of before." "I learned new techniques and gained some new ideas for the future". As a result of the Fruit and Vegetable Field Day, 96% of survey respondents indicated (agree or strongly agree) that they learned something they didn't know before, nearly half indicated they plan to adopt practices for horticulture and the environment (41%), and a third plan to adopt practices that increased yields (36%) and conserve resources (32%). Nearly three-quarters of past field day participants (71%) indicated that they had adopted new, recommended practices for their farm or operation. When asked what new practice they had adopted, participants responded: alteration of insect control program, refrain from using pesticides in high tunnels, and new ideas of types of trees to plant. All of the participants (100%) reported that they had experienced financial improvements because of adopting new, recommended practices from information presented at past field days.

Below are some of the production topics presented at the field day. We expect to have a similar lineup for the 2024 field day.

- Black Soldier fly composting and specialty crop production
- Collard insect management trial
- High tunnel diversification and biological control
- Plasticulture strawberry research
- Silage tarps for weed management in potatoes
- Soil health and pepper yield
- Sweet corn pest management
- Unmanned aerial vehicle demonstration
- Watermelon weed management

We are happy to announce that Purdue Extension is presenting its annual Fruit and Vegetable Field Day on July 18, 2024, at the Throckmorton/Meigs Horticulture Farm, Lafayette, IN.

More information about the upcoming field day will be available in May 20243.

Contact Lori Jolly-Brown or Petrus Langenhoven if you have any questions.

2024 Purdue Small Farm Education Field Day

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

The 2023 Purdue Small Farm Education Field Day was held at the Purdue Student Farm in West Lafayette, Indiana. With 105 participants registered, the in-person event featured an array of on-farm demonstrations and was a resounding success.

Nearly 84% of attendees reported that they learned something they didn't know before. A third (34%) indicated they plan to adopt recommended practices for diversified farming systems, and a quarter (24%) plan to adopt recommended practices for creating, improving, or strengthening their business. Nearly half (45%) indicated they plan to adopt practices for horticulture and the environment or practices that will increase efficiency (42%). Over a third plan to adopt practices/technologies for the conservation of resources (37%). Nearly half (46%) of past field day attendees indicated that they had adopted new, recommended practices for their farm or operation. When asked what new practice they had adopted, participants responded:

- Alternate BT and Spinosad on brassicas.
- Pest scouting.
- Applied BT for brassica caterpillar complex control.

- Integrated pest management

Over three-quarters (80%) of participants reported that they had experienced financial improvements because of adopting new, recommended practices from the information presented at past field days.

Attendees commented .....

- "I recommend this event to any beginner small-scale producer.
- I brought my sons and my father to this event. It was a family education day for sure, and each one of us learned several things we didn't know. Please continue to offer these events. It's very helpful!
- Good information and a fun, interesting presentation
- I like the wide variety of topics, and I think that so much could be covered in such a short amount of time.
- Lots of helpful information covering a wide variety of topics.
- Always learn, gain knowledge, and learn from questions others ask. When I get home, I can read the literature provided and share it with family in Virginia who farm.
- Very informative and builds on previous research.
- Everyone should learn about these topics.
- It was a good way to be exposed to a variety of horticultural crops.
- I am just beginning to develop my vegetable garden. The information given at the Field Day program was very useful, and I am confident I will create a beautiful garden space with plants that will give me a great yield. Also, I appreciate learning what insects I should keep an eye on."

The event featured an array of "demonstration stations" on the farm where participants learned about a variety of topics:

- High Tunnel Pepper Production and Variety Selection
- High Tunnel Table Grape Production
- Silage Tarps and Their Potential Uses on Small Farms
- Growing Grains on the Small Farm – Dry Edible Bean Variety Trial
- Predator-Prey Dynamics in High Tunnel Crop Production
- Biorational Pesticide Efficacy for Controlling Caterpillars and Flea Beetles in Crucifer Crop Production
- Black Soldier Fly Composting and Specialty Crop Production
- Raised Garden Beds for Vegetable Production
- Postharvest Food Safety Demonstration
- Choosing Fertilizer Injectors for Drip Irrigation for Small Plots

Save the date for the next field day – July 25, 2024

Educational topics for the 2024 field day will be available in May. To learn more about the field day, visit our webpage at www.purdue.edu/hla/sites/studentfarm/events/ or contact Lori Jolly-Brown or Petrus Langenhoven.

Vegetable Crops Hotline © Purdue University - vegcropshotline.org
Editor: Petrus Langenhoven | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907 | (765) 496-7955

Market Report for
Clearspring Produce Auction
2050 S 300 W
LaGrange, IN 46761
* Phone (260) 463-4131
* Fax (260) 463-4362
* Market Report (260) 463-4131

Date of Report:	11-Apr	2024

				Price	
Description of Product		Unit	Units Sold	Average	High
Angelonia			144	$ 0.07	
Begonia			1552	$ 0.40	$ 1.05
Calibrachoa			550	$ 0.07	$ 0.10
Coleus			1250	$ 0.14	$ 1.00
Combo Liners			250	$ 0.12	$ 0.35
Daffodills			24	$ 1.50	
Ferns		10-12 inch pot	40	$ 11.50	$ 14.00
Fushia			300	$ 0.14	$ 0.15
Geraniums			136	$ 0.28	$ 0.50
Gerbera Daisy			50	$ 0.30	
Grass, Ornamental			392	$ 0.09	$ 0.50
Green Onion		bunches	50	$ 0.50	
Hanging Baskets		misc	166	$ 8.67	$ 17.00
Herbs. Misc			3602	$ 0.11	$ 0.45
Hibiscus			145	$ 2.10	$ 6.00
Houseplants, misc			287	$ 0.35	$ 10.00
Hyacinths			48	$ 4.00	
Impatiens			830	$ 0.11	$ 0.35
Kohlbabi			38	$ 0.45	
Lantana			380	$ 0.06	$ 0.17

Licorice			210	$ 0.02	
Marigold			560	$ 0.10	
Million Bells			240	$ 0.04	
Pansy			286	$ 0.39	$ 0.40
Petunias			1440	$ 0.12	$ 0.30
Rhubard starts			24	$ 3.83	$ 7.00
Roses		potted	18	$ 14.44	$ 20.00
Salvia			491	$ 0.15	$ 0.25
Sedum			261	$ 0.35	
Snapdragon			1100	$ 0.04	$ 0.05
Spikes			954	$ 0.11	$ 0.50
Spring Rye			120	$ 0.01	
Strawberry	plants		24	$ 2.00	
Strawflowers			340	$ 0.05	
Succulents	misc		1505	$ 0.59	$ 2.00
Sweet Potato Vine			470	$ 0.12	$ 0.25
Vegetables		Flat	75	$ 11.74	$ 15.00
Verbena			800	$ 0.05	$ 0.07
Vinca Vine			566	$ 0.14	$ 0.35
Wandering Jew			496	$ 0.06	$ 0.10