In This Issue

From the Editor's Desk

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

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

This issue features articles on integrated insect management strategies, spotlight articles on cucumber beetles and dandelions, and research results from a sweet potato weed management study and a consumer study about salad mixes. We also take a look at the weather and get updates on auction prices from the Clearspring Produce Auction.

Timeless Articles

This issue features three articles published by Dan Egel, who is now retired from Purdue University.

Cantaloupe and Watermelon Transplant Diseases. Issues 673, 688.
https://vegcropshotline.org/article/cantaloupe-and-watermelon-transplant-diseases-3/

10 Useful Rules for Fungicide Application. Issues 630, 718.
https://vegcropshotline.org/article/10-useful-rules-for-fungicide-application/

Melon Disease Forecaster 2024. Issue 718.
https://vegcropshotline.org/article/melon-disease-forecaster-2024/

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!

Integrated Insect Management Strategies for Vegetable Farms

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What is integrated management?

Regardless of the size of a farm, crops grown, or growing practices, integrated pest management (IPM) is a framework that can be used by all growers. The idea of IPM is that you are taking measures at all stages of production and utilizing a variety of tools to minimize the damage that insects may pose to crop loss. The foundation of this approach relies on a pyramid of strategies to employ, with specific emphasis on pest prevention using cultural management tools. The order and size of each piece of the pyramid represent their value to sustainable pest management and level of pest intervention (Fig. 1). The goal of IPM is to provide a holistic, long-term approach to minimize crop loss and interference of beneficial insects, such as pollinators and natural enemies, that provide essential and free services on the farm.

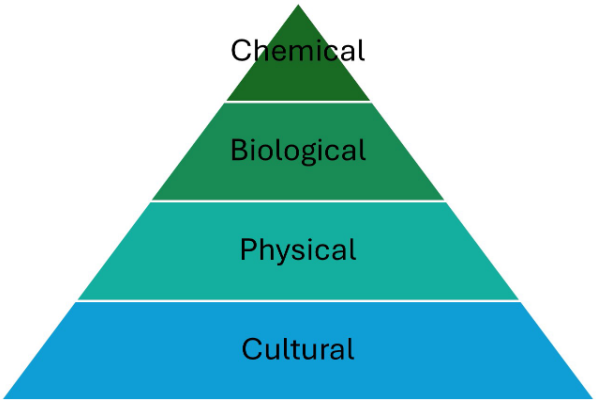

Figure 1. Integrated pest management triangle.

Cultural approaches to management

Cultural controls are the foundation of this pyramid and lay the groundwork for the resilience of a growing system. This category includes pest prevention tactics such as tillage, removal of nearby weeds that may be harboring pest populations, proper location selection (for some insects rotating a specified distance can inhibit their travel to the crop host), timing of planting to avoid the pest on the landscape, cultivar selection, and crop sanitation or disposal of infested plants or plant parts. Many of these cultural tools can be used on all farms, but not all. For example, rotating a potato field more than 400 m from the previous year for Colorado potato beetle management may be impossible on a small farm or if a neighbor is growing potatoes nearby. In that situation, taking years off between crops and coordinating this with neighbors can help break the cycle.


Figure 2. A strawberry plant is next to a weedy patch that is hosting damaging aphids (Photo by Samantha Willden).

Weeds provide refuge or an alternative host for pests, including aphids (Fig. 2). To implement the timing of crop initiation during a season, you can use degree-day simulation models that can help predict, according to the weather in your area, pest lifecycles and when to plant to avoid peak damaging life stages. The University of Wisconsin maintains one of these models that expands into Indiana: VDIFN. Alternatively, this is something that you can begin to record and make alterations based on your local observations from year to year.

Cultivar selection for disease resistance is something that is well-published and available from many seed companies. In relation to diseases that are transmitted by insects, you can find published information that allows you to select plant cultivars that are resistant to the disease. This does not necessarily mean they won't be infested with the insect, so direct damage from the pest is still a potential threat. In practice, insect performance on various cultivars is sometimes context-dependent and doesn't translate from one location to the next. It is best for you to experiment with different cultivars and settle on one that you see less damage occurring on. Or ask your seed provider what they know about a particular pest and its preferences among the cultivars you may be considering. Sometimes, you can find this information in a variety of trial reports as well.

Physical management approaches

This category refers to the physical exclusion of pests to prevent them from gaining access to the crop. This option is often most available to smaller farms because of the material and labor needs. Examples include exclusion netting, low tunnels, caterpillar tunnels, high tunnels (Fig. 3), and even greenhouses. However, large-scale strawberry and melon farms sometimes use low tunnels in some locations. In addition to providing a physical barrier against pests, many of these coverings can insulate crops by capturing heat, which is particularly useful in winter and during the shoulder seasons. In some orchards and vineyards there are tree-sized mesh bags or cages to exclude particular insects or other animals from damaging the crop. For farmers who follow organic production methods, physical exclusion is one of the best strategies available for things like cucumber beetles or flea beetles.


Figure 3. High tunnels provide several benefits to crop production, including a physical barrier for pests and crop insulation (Photo by Samantha Willden).

Biological management approaches

This refers to the use of living organisms to manage a pest population. The most common method would include biological control. On a farm there are two different strategies to implement biological control that can be effective. The first is conservation biological control, which refers to creating a habitat that conserves and promotes natural enemies that are already present in the environment. This can include the installation of beetle banks, floral strips, or companion plants (Fig. 4) to provide supplemental habitat for natural enemies, which forage on a variety of different insect pests or consume plant pollen or nectar. One common

natural enemy that can be recruited includes syrphid flies (Fig. 5). The second strategy is augmentative biological control, which introduces commercially purchased natural enemies, such as lacewings (Fig. 6), ladybeetles, minute pirate bugs (Fig. 7) and other, into the habitat. One goal of augmentative is to flood the environment with high numbers of natural enemies without the intention of establishing them long-term. This method follows a similar mindset to spraying a pesticide for temporary pest knockdown. Alternatively, you may try to inoculate the habitat with lower numbers of a natural enemy that will establish, reproduce, and maintain control. This method is much more difficult, and there are research gaps regarding the most effective strategies for achieving this in open-field production.

Figure 4. Companion planting with sweet alyssum (Photo by Samantha Willden).

Figure 5. Syrphid fly larvae are common naturally occurring predators of soft-bodied pests, such as aphids, thrips, and spider mites. They are common targets for conservation biological control and are not commercially available in the United States (Photo by Samantha Willden).

Figure 6. Egg card containing commercially reared green lacewing eggs. Cards were deployed on tomatoes for aphid management (Photo by Samantha Willden).

Figure 7. Minute pirate bugs are a commonly used augmentative biological control agent for thrips and aphid management. They are widely available commercially in the United States (Photo by Samantha Willden).

Another category of biological control includes the use of biopesticides to suppress pests. Many biological organisms have been formulated as pesticide sprays to apply to food crops. Some, but not all, of these products are OMRI-approved. They include active ingredients that are naturally derived and, in many cases, include living organisms such as viruses, insect-killing nematodes (Fig. 8), bacteria, and fungi. Their efficacy can be species-specific (i.e., viruses typically only infect one species of host pest) and rely on a suitable environment to effectively establish and infect the host insect (i.e., many are temperature and humidity-dependent and sensitive to direct sunlight).

Figure 8. Entomopathogenic nematodes are used as a product for below-ground insect pest management (Photo by Samantha Willden).

Chemical management strategies

Chemical management rests at the top of the IPM pyramid and should be used sparingly and as a last resort when cultural, physical, and biological control efforts fail. The risks of relying too heavily on chemical pest control are a risk of pesticide resistance and disruption of natural enemies and pollinators that can lead to larger problems on the farm down the line. There are a variety of different chemicals originating from biological or synthetic sources. Some carry the Organic production-approved label, while many do not. The most important thing to know is that despite the origin of the killing compound in the chemical spray, resistance can develop. To help alleviate this, we have created the Insecticide Resistance Action Committee (IRAC,) which has assigned a number corresponding to the mode of action for which the compound works to kill the insect. To reduce the development of resistance, the applicator should rotate among these modes of action. For assistance in selecting the proper chemical for your pest situation, consult the Midwest Vegetable Production Guide. Always follow the label on the product. The label is the law.

Findings From Two Years of Organic Sweet Potato Weed Management Research

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Background

Sweet potato is a staple crop that provides nutritional benefits to humans globally, but weed interference (Figure 1) can reduce yields by 22 to 90%. Despite increased organic sweet potato production in the United States, growers face challenges with limited weed management options and often resort to cultivation and hand-weeding.

Figure 1. Sweet potato planted on raised beds (left) at Vincennes and the same plot shown 6 weeks after transplanting with a lot of weed interference (right) (Photo by Emmanuel Cooper).

Objectives and Methodology

To address this challenge, we conducted research trials in 2022 and 2023 at Purdue Agriculture Centers at Lafayette and Vincennes to determine (1) if sweet potato cultivars differ in their ability to compete with weeds, (2) if in-row plant spacing can improve weed suppression, and (3) if a buckwheat cover crop or silage tarps can provide row-middle weed control. For the various studies, we used three different cultivars: 'Covington' (orange skin and flesh), 'Monaco' (orange skin and flesh), and 'Murasaki' (purple skin, cream flesh). At the start of the study, Monaco was considered for organic production systems because of its bunching growth habit and improved tolerance to soil-dwelling insect pests. Covington and Murasaki have longer vines (Figure 2). All plots were planted in early June and harvested 112 days after transplanting. Data collection in all studies included sweet potato canopy cover, weed count, weed height, and sweet potato yield by grade.

Objective 1. Do sweet potato cultivars with different growth habits differ in their ability to compete with weeds?

Year: 2022

Cultivars: Covington, Monaco, and Murasaki

Treatments: Sweet potatoes were transplanted. Weeds were removed by hand and allowed to establish and compete with the crop beginning at 0, 14, 21, 28, 35, or 42 days after transplanting.

Our findings:

As the weed-free period increased from 14 to 42 days after transplanting, sweet potato ***canopy cover*** increased from 30% to 87% for Covington, 29% to 89% for Monaco, and 34% to 97% for Murasaki (Figure 2). At 15 weeks after transplanting, Murasaki had the largest numerical canopy cover of the three cultivars for weed-free intervals of 21, 28, 35, and 42 days after transplanting. This superiority in vine canopy by Murasaki is likely due to its growth habit, which results in a rapidly formed dense canopy.

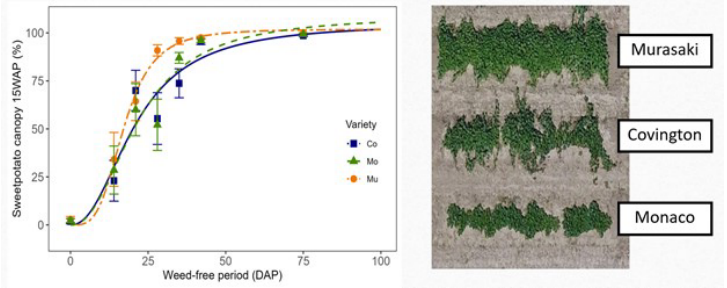

Figure 2. Effect of weed-free period on sweet potato canopy 15 weeks after transplanting (WAP) pooled across Lafayette and Vincennes in 2022. DAP = days after transplanting (Photo by Ashley Adair).

The longer weeds were allowed to exist in the crop, the more pronounced the reduction in yield became. Season-long weed interference reduced total yield by 76% for Covington, 88% for Monaco, and 65% for Murasaki relative to a weed-free control (Figure 3). To keep potential total yield loss to 10% or less, sweet potatoes needed to be maintained weed-free for 24 days after transplanting for Covington, 20 days after transplanting for Murasaki, and 33 days after transplanting for Monaco.

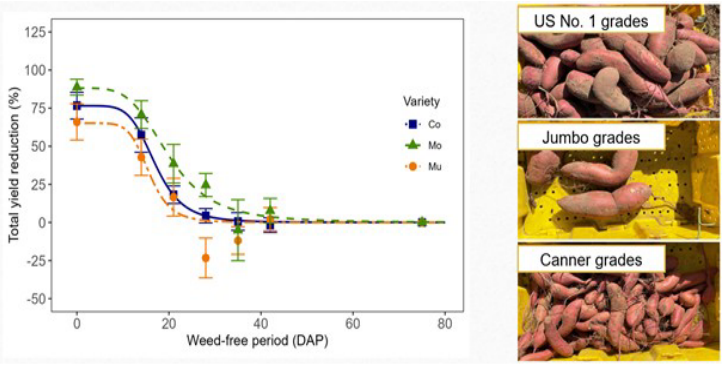

Figure 3. Effect of weed-free period on total yield reduction of sweet potato roots pooled across Lafayette and Vincennes in 2022. Total yield was the sum of U.S. No. 1, jumbo, and canner grades. DAP = days after transplanting (Photo by Emmanuel Cooper).

Objective 2. Can in-row plant spacing improve weed suppression?

Years: 2022 and 2023

Cultivars: Covington and Monaco

Treatments:

Our main treatment for this study was in-row plant spacing (20, 30, and 40 cm). Additionally, we evaluated two weeding frequencies: weekly from 2 to 6 weeks after transplanting or weekly for the entire 16-week growing season (Figure 4).

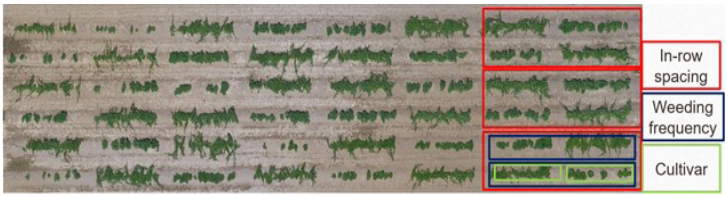

Figure 4. Plot layout at Lafayette in 2022 for Objective 2 (Photo by Ashley Adair).

Our findings:

Numeric trends showed that as in-row spacing decreased in 2023 from 40 to 20 cm, weed density decreased from 188 to 167 weeds m^{-2} at 3 weeks after transplanting. However, *statistically,* in-row plant spacing, weeding frequency, and cultivar had no significant effect on weed density at 3 and 6 weeks after transplanting.

In 2023, Monaco canopy cover was greater at the 20 cm spacing than the 30 or 40 cm spacings (Figures 5 and 6) at 5 weeks after transplanting. At all in-row spacings, Monaco had greater canopy cover than Covington at 5 and 16 weeks after transplanting (Figure 6).

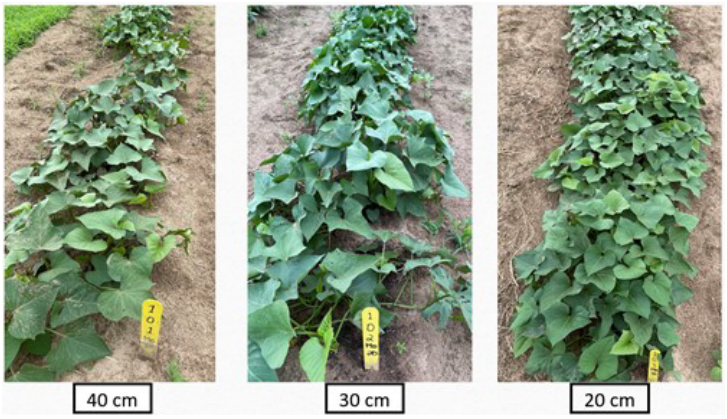

Figure 5. Visual representation of three in-row spacings evaluated at Vincennes (Photo by Emmanuel Cooper).

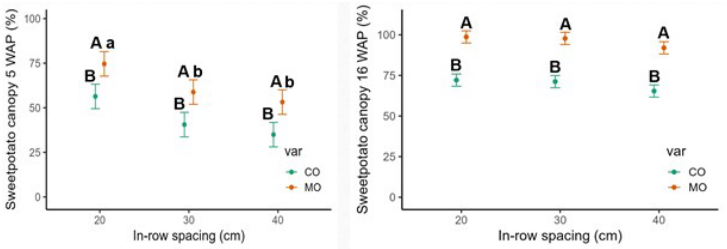

Figure 6. Effect of in-row plant spacing on sweet potato canopy 5 weeks after transplanting (WAP) (left) and 16 WAP (right) pooled across Lafayette and Vincennes in 2023. Lowercase letters represent differences by in-row spacing, and capital letters represent differences by cultivar with Tukey's HSD ($p<0.05$).

There were no differences in yield between our two weeding frequencies. However, as in-row spacing increased from 20 to 40 cm, sweet potato yield for U.S. No. 1, canner, and total grades decreased while the yield for jumbo grade increased (Figure 7).

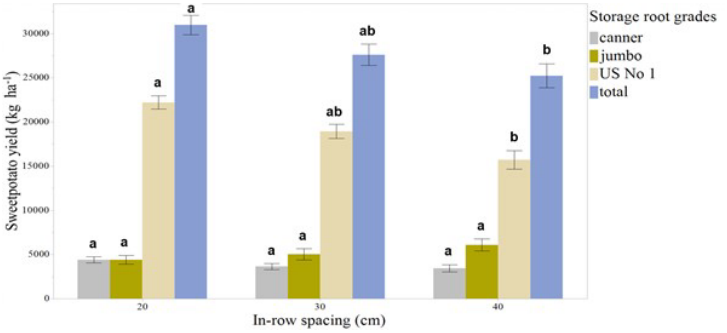

Figure 7. Effect of in-row plant spacing on Covington canner, jumbo, U.S. No. 1, and total yields pooled across weeding frequency and location in 2022. Letters represent differences by in-row spacing within each grade with Tukey's HSD ($p<0.05$).

Notably, in 2023, Monaco had a greater U.S. No. 1 yield than Covington, but Covington had a greater jumbo yield than Monaco (Figure 8).

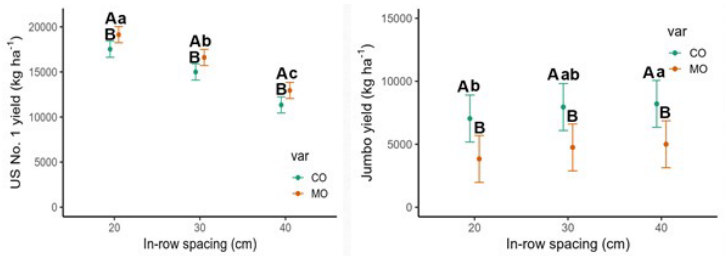

Figure 8. Effect of in-row plant spacing on U.S. No. 1 (left) and jumbo (right) yields pooled across Lafayette and Vincennes in 2023. Lowercase letters represent differences by in-row spacing, and capital letters represent differences by cultivar with Tukey's HSD ($p<0.05$).

Objective 3. Can a buckwheat cover crop or silage tarps be used for weed control in sweet potato row middles?

Year: 2023

Cultivar: Covington

Treatments: The main treatment was weed management method in the area between rows and included buckwheat or silage tarping established 3 weeks after transplanting and cultivation (3, 5, and 7 weeks after transplanting) (Figures 9 and 10).

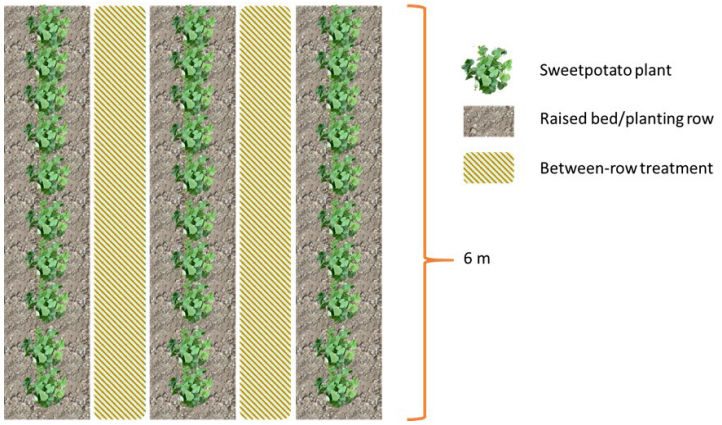

Figure 9. Experimental unit of treatments. Each unit consisted of three raised beds, with only the middle one harvested and evaluated. The sweet potato was planted at 30 cm spacing. Between-row treatments were on each side of the middle-raised bed.

Figure 10. Visual representation of the three treatments in the study (Photo by Emmanuel Cooper).

Our findings:

The buckwheat and cultivation treatments had similar impacts on weed density at 6 weeks after transplanting (Figure 11), but weed height in the cultivation treatment was far less than that in the buckwheat treatment because a cultivation event at 5 weeks after transplanting removed established weeds.

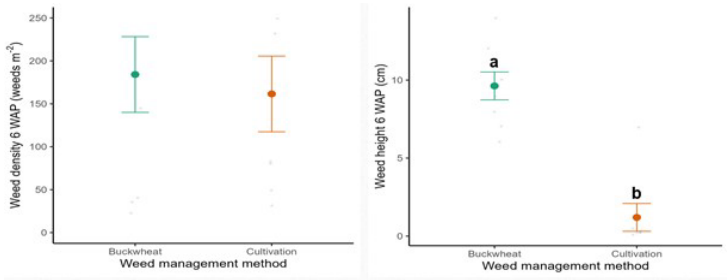

Figure 11. Effect of weed management method on weed density (left) and weed height (right) at 6 weeks after transplanting pooled across Lafayette and Vincennes in 2023. Letters represent differences by weed management method with Tukey's HSD ($p<0.05$).

At Lafayette, there were no differences in total yield across all treatments. However, at Vincennes, the total yield in the buckwheat treatment was less (10,798 kg ha^{-1}) than in the cultivation (25,042 kg ha^{-1}) and tarping treatments (21,471 kg ha^{-1}) (Figure 12). The buckwheat treatment reduced total yield by 22% at Lafayette and 57% at Vincennes compared to the cultivation treatment.

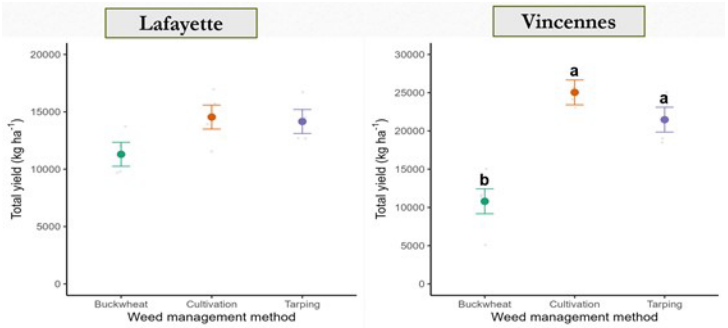

Figure 12. Effect of row middle weed management method on total sweet potato yield at Lafayette (left) and Vincennes (right) in 2023. Letters represent differences by weed management method with Tukey's HSD ($p<0.05$).

Conclusions

From our findings, we determined that:

1. Sweet potato cultivars do differ in their tolerance to weed interference.
2. When sweet potatoes are maintained weed-free during their critical period for weed control, decreasing in-row spacing did not improve weed suppression but did result in increased No. 1 and total yield.
3. Silage tarps applied to sweet potato row middles provided excellent weed control and resulted in yield comparable to repeated cultivations.

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Seedling Damage by Maggot Pests

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Each and every spring we get reports of poor seed emergence, seedling and transplant damage in early planted crops of all sorts. Most recently in untreated sweet corn, home gardens and transplanted onions. Lucky for us, we got to dive right into this pest and see them in action, but not so lucky for the growers who weren't expecting it! While we don't have a lot to offer in terms of a rescue for these crops affected this year, we hope to help you plan for this in the future and understand what the threat looks like for the remainder of the season.

There are two different species to blame: the Onion Maggot (*Delia antiqua*) and the Seed Corn Maggot (*Delia platura*). There is a third species that attacks brassica crops referred to as the Cabbage Root Fly (*Delia radicum*). All three are nearly identical to the naked eye but can usually be determined based on the host crop association. The remainder of this article focuses on the Onion and Seed Corn Maggots.

What are onion and seed corn maggots and why do I care?

Onion maggot and seed corn maggot can wreak havoc on many vegetable crops, especially if populations have been left unchecked for multiple years. Both maggot species will feed on seedlings and either kill the plant before it can successfully mature or injure the plant, thus

giving entry to soil pathogens (think bacterial rots). Damage is typically greater in cool, wet seasons and in soils with high organic matter.

Onion and seed corn maggot are very similar, and even belong to the same fly genus, *Delia*. These cream-colored maggots are small (0.2-0.6 inch) and have between 3-5 generations per year. Both species will overwinter as pupae in the soil and emerge as adult the following year to find suitable host plants.

How do I tell the difference between seed corn and onion maggot?

There are some slight differences in behavior and size that may indicate what species you have on your farm. **Onion maggots have a strong preference for allium species**, and are most problematic in onion, garlic, and leek. **Seed corn maggots are highly polyphagous** and can be found in as many as 40 different plant hosts. Notable cultivated hosts for seed corn maggot include soybeans, corn, beans, peas, cucumber, melon, pepper, potato, and even onion. As a general rule, seed corn maggots typically damage the seed, whereas onion maggots often feed on seedling roots.

If you find a plant infested with maggots, you *may be* able to distinguish species by size. Onion maggots tend to be fairly large (0.3-0.6 inch), about the size of your average housefly maggot. Seed corn maggots are smaller (0.2-0.3 inch). Determining the maggot species is difficult, and you may need to consult a local expert in order to get a positive identification.

Does it matter what species I have if I (ultimately) want them dead?

No, not really. Both species of maggot can cause significant damage to vegetable crops, and management options are very similar between the species. If you are dealing with maggot damage on your farm, consider some of the options below.

1. **Prevention is key.** If you know you have a history of either seed corn maggot or onion maggot, make sure you take action by preventing an infestation before it starts.
    1. Allow sufficient time for organic matter to break down from the previous crop/cover crop/compost application in order to deter adult oviposition. They are attracted to the decomposing organic matter. Another option is to use a moldboard plow to bury the organic matter deep enough to deter oviposition.
    2. Rotate your crop. Onion maggot, in particular, will continue to be a problem in fields successively planted with alliums year after year. If you want to limit future infestations, consider planting a non-host crop to decrease the likelihood of subsequent maggot problems. If you are rotating your crop to a non-host, make sure you rogue out any volunteers from the previous year.
    3. Use a seed treatment. Insecticide treated seed can be very effective at managing either maggot species. A number of efficacious products are available including thiamethoxam+ spinosad (FARMORE), cyromazine (TRIGARD), and clothianidin and imidacloprid (SEPRESTO) for many vegetable seeds (Table 1). **If you plan on using seed treatments, exercise good insecticide resistance management practices**. Rotate products between years so you are not exposing multiple generations to the same active ingredient. For example, if you are using FarMore in year 1, rotate to a different seed treatment like Trigard or Sepresto in year 2.

Table 1: seed treatment options to manage Delia maggot infestations in vegetables. Please note that efficacy of these products may differ based on maggot infestation and/or soil type.

Product	OMRI listed?	Active ingredient	Relative control of maggot	IRAC codes
FarMore FI500	No.	thiamethoxam+ spinosad	Excellent.	4A, 5
Trigard OMC	No.	cyromazine	Excellent.	17
Sepresto 75 WS	No.	clothianidin+ imidacloprid	Good.	4A, 4A
Regard SC	Yes.	spinosad	Excellent/Good.	5

2. **Exclude flies from the crop.** One viable management approach is to keep female flies from finding your crop. Isolate your crop either physically or temporally to reduce maggot infestations.
    1. Keep it covered. Consider using row covering over your susceptible crops to stop adult oviposition (egg-laying). Multiple studies have found that this is a highly effective method at limiting damage from either seed corn or onion maggot larvae.
    2. Avoid maggot damage altogether by planting later in the season to bypass peak infestation. Onion and seed corn maggot have predictable phenological patterns, and you can use degree day models to accurately predict times in the season when maggot risk is high (peak emergence of adults for each generation). Are you interested in having this information available to delay planting to avoid peak adult emergence? If so, email lingwell@purdue.edu.
2. **Monitor, monitor, monitor.** While there is little you can do to manage maggot infestations within the immediate growing season, it's important to identify problem areas so you can plan accordingly for the following year.
    1. The best way to tell if you have Delia maggots on your farm is to scout early and often. Fields with poor plant emergence or wilted seedlings (Figure 1) should be inspected for maggot damage (Figures 2-4). Make sure you cull any infested plants.
    2. Use a trap. Multiple trapping methods for adult flies have been developed. A recent study found that white, large diameter, spherical traps paired with Delia Lure attractant were the most attractive and caught the greatest number of *antiqua* adults. Yellow sticky cards can also be an effective option when placed around the edges of your field. Admittedly, trapping is the second-best method for scouting seed corn or onion maggot flies. Adults are tricky to properly identify and often don't accurately indicate the degree of infestation, but these are viable detection strategies.

Figure 1. Onion transplants wilting because of maggot infestations. Photo by John

Obermeyer.

Figure 2. Maggot in young onion transplant with a penny referenced for size. Photo by John Obermeyer.

Figure 3. Variation in maggot damage among onion transplants. Photo by John Obermeyer.

Figure 4. Seed corn maggot infesting a melon transplant. Photo by John Obermeyer.

NOTE: Avoid "chasing" adult flies. You may see adult flies (Figure 5) in your field but using foliar insecticides to kill adult flies is not an effective option for either species. Keep in mind the damage is in the soil, so make sure you target your management decisions to strategies that will protect the below-ground tissues of the plant (I.e. seed treatments or in-furrow applications at planting/transplanting).

Figure 5. Pupal case and adult seed corn maggot fly, Delia platura. Photo by John Obermeyer.

4. Are there **natural enemies** that can help suppress the populations?

Yes, both staphylinid and ground beetles are predators that will feed on the soil-dwelling stages of these flies. Entomopathogenic nematodes (EPNs) are another option for control. They have been shown to be effective in laboratory settings, but more research is needed to identify the critical time, soil conditions and rate at which to release these enemies for adequate control in field situations.

Insect Spotlight: Cucumber Beetles

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

Striped (*Acalymma vitattum;* StCB) and, to a lesser extent, spotted (*Diabrotica undecimpunctata;* SpCB) cucumber beetles are damaging pests on crops in the family Cucurbitaceae (e.g., cucumber, squash, pumpkin, watermelon). These pests not only inflict severe damage to various plant parts, including roots, leaves (Figure 1), flowers (Figure 2), and fruits (Figure 3), but transmit the bacterial wilt pathogen (*Erwinia tracheiphila*) that can kill cucurbits (Figure 4).

Figure 1. Feeding damage on zucchini by the adult beetles on leaves (Photo by John Obermeyer).

Figure 2. Adult StCB beetles are feeding from melon flowers (Photo by John Obermeyer).

Figure 3. Feeding damage on zucchini fruit caused by the adult beetles (Photo by John Obermeyer).

Figure 4. Wilted cucumber plants indicate the presence of bacterial wilt disease, caused by the pathogen *Erwinia tracheiphila*, transmitted by cucumber beetles (Photo by John Obermeyer).

How to identify cucumber beetles?

Adult striped cucumber beetles are about 1/5 inch long and 1/10 inch wide. They are yellow-green in color with three black stripes running the length of their bodies, and they have a black head and antenna (Figure 5). Striped cucumber beetles are frequently mistaken for western corn rootworm beetles (*Diabrotica virgifera virgifera*) (Figure 6), although the last do not typically pose a threat to cucurbits but can be found feeding on plant parts. A simple way to differentiate between the two is by inspecting their undersides: striped cucumber beetles have black abdomens on the underside and four distinct stripes on the top side that extend the full length of the abdomen, whereas western corn rootworms have yellow-green abdomens, and the stripes on the top side are often smudged and do not extend the entire length of the abdomen.

Figure 5. Striped cucumber beetle feeding squash leaf (Photo by John Obermeyer).

Figure 6. Adult female Western corn rootworm (Photo by John Obermeyer). Notice the stripes on the abdomen are smudged and don't extend the entire length of the body.

Spotted cucumber beetle adults are similar in size to striped cucumber beetle adults. They are yellow-green in color, with 12 black spots on their backs (Figure 7).

Figure 7. Adult spotted cucumber beetle (Photo by John Obermeyer).

Life cycle

Beetles overwinter as unmated adults on the edges of agricultural fields. In Indiana, their life cycle includes two distinct generations. The first generation typically emerges from their overwintering sites in late April or early May. Subsequently, the second generation, originating from the offspring of the preceding one, emerges around late July to early August. After beetles emerge, they engage in mating and females deposit their eggs at the base of a host plant. StCB are cucurbit specialists, while SpCB can reproduce and live on other crop hosts. The

larvae then develop in the soil, primarily subsisting on plant roots. While this feeding behavior generally does not lead to significant economic damage, there are occasions when the larvae can cause harm by infiltrating developing fruits that come into contact with the ground. Both types of cucumber beetle larvae exhibit a worm-like appearance, characterized by a white body with a dark head and three pairs of legs. After completing their larval stage, pupation occurs in the soil, culminating in the emergence of adult beetles approximately one week later.

Damage

These two species of beetles serve as vectors of bacterial wilt (mentioned earlier). Upon acquisition, the bacterium spreads through their feces or on their mouthparts. As they feed on the leaves, they create openings that facilitate the entry of the pathogen into the plant. Once inside, the bacterium proliferates within the xylem, leading to rapid wilting and eventual death of the plant. Unfortunately, there are no effective methods for saving an infected plant. Infected plants pose a risk as other cucumber beetles can pick up the bacterium from these plants and transmit it to healthy ones. Therefore, it is crucial to promptly remove and destroy any wilted plants to prevent further spread of the disease.

Susceptibility to bacterial wilt varies among cucurbit crops. Cantaloupe and cucumber are very susceptible and succumb to the disease. Squash, pumpkin, and watermelon are resistant to the disease but still vulnerable to damage from beetle feeding. In crops unaffected by bacterial disease, a higher beetle population per plant can be tolerated. For cantaloupe and cucumber, the economic threshold stands at 1 beetle per plant, while for watermelon, pumpkin, and squash, it rises to 5 beetles per plant before action is needed.

How to control it?

On small farms and for organic growers, physical exclusion of the beetle is the best management strategy. It can be very effective in high tunnels to install exclusion netting over the openings to eliminate the pest from entering and bringing with it bacteria. See this YouTube video for a demonstration. For large-scale commercial growers, insecticides are the best tool. They do not need to be applied via seed treatments if you are planting transplants in the field. Rather, if you are planting when beetles are present, a soil drench at planting will be most effective, using the low rate on the label. If you have delayed planting or don't suffer from beetle damage until midsummer, scouting the fields until you reach an economic threshold and then applying a foliar spray of insecticide is the best option. Using the Midwest Vegetable Production Guide, choose a product suitable for your needs and based on the phenology of the plant; avoid systemic products and most neonicotinoids during bloom to preserve pollinators.

You can find more detailed information about alternative tools to manage beetles in organic production: https://vegcropshotline.org/article/organic-control-methods-for-striped-cucumber-beetles/

The US Market for Salad Mixes

(Ariana Torres, torres2@purdue.edu)

Americans are eating more greens, and salad mixes (i.e., spring mix, salad kits, packaged salad) are among the top drivers of this increased consumption. Salad mixes include different varieties of lettuce, spinach, cabbage, arugula, and other leafy greens. Salad mixes have gained popularity as a modern alternative to traditional vegetables, primarily due to their nutritional value and freshness. The ease of consumption of salad mixes further contributes to their widespread appeal, as they are known for their grab-and-go convenience. Market reports convey the worldwide salad mixes market was valued at $10.78 billion in 2020, with an expected compound annual growth rate of 8.2% from 2021 to 2028.

The increase in food production and consumption has had major impacts on the environment, including increased greenhouse gas emissions, loss of biodiversity, and greater pollution from chemicals. The environmental footprint of food production, distribution, and consumption has made consumers aware and more concerned about the impact of their food choices. Consequently, individuals often referred to as "green consumers" are increasingly influencing the demand for environmentally friendly food products. For example, a report by the Food Marketing Institute (2023) revealed that Gen Z (born between 1997 and 2008) and Millennials (born between 1981 and 1996) prioritize sustainable and environmentally friendly foods when making purchasing decisions. Compared to more conventionally grown foods, environmentally friendly products claim to have less impact on the environment and be less damaging to human health. Some of the more common terms on environmentally positive labels on foods include carbon footprint, organic production, pollinator-friendly, fair trade, chemical-free, etc.

The demand for pro-environmental labels has helped food retailers leverage consumers' preferences for environmentally friendly foods. Many food companies are using pro-environmental labels to communicate the environmental benefits of their products through product labels, phrases, and logos. These pro-environmental labels are intended to influence consumer behavior and raise awareness about the relationship between consumption and the environmental impact of food choices. Previous research has discussed the efficiency and value of pro-environmental labels in the food industry.

This publication highlights the findings of a research article titled "Characterizing the US Market for Salad Mixes Through the Lens of Environmental Preferences" (Ulloa et al., 2024).

The study characterized the US market for salad mixes by segmenting consumers based on their preferences for pro-environmental labels. Market segmentation is a widely used strategy that includes the segmentation of a marketplace into clusters of consumers with dissimilar requirements, features, or behaviors across clusters. Thus, segmenting the market can help businesses identify the preferences and needs of niche markets and tailor marketing strategies for targeting segments.

Findings

The most valued pro-environmental labels were those conveying low fertilizer use, followed by pollinator-friendly practices and low greenhouse gas emissions. Other labels valued by consumers were low food miles, low carbon footprint, biodegradable packaging, low water use, and low energy use. These results are consistent with prior research emphasizing the importance of chemical-free labels influencing consumer decisions when purchasing foods. Consumers in the study reported consuming an average of 2.84 cups of fresh vegetables daily, which is close to the recommended daily range of 2 to 3 cups of vegetables suggested by the Centers for Disease Control and Prevention. Approximately 38% of consumers purchased most of their salad mixes from retail stores, 34% bought from large chain stores, 23% preferred direct-to-consumer markets, and only 5% opted for online market purchases when purchasing most salad mixes.

The study found 3 market segments of salad mixes consumers based on their preferences for production- (low energy use, low fertilizer use, low greenhouse gas emissions, low water use, and pollinator-friendly) and marketing-related (biodegradable packaging, low carbon footprint, and low food miles) pro-environmental labels.

Cluster 1, labeled ***deep-rooted***, represented the second-largest group including 760 respondents or 36% of the market segment. The *deep-rooted* consumers reported the highest valuation to all pro-environmental labels compared to other clusters. Specifically, consumers in the ***deep-rooted*** cluster ranked high for labels such as low fertilizer use, low greenhouse gas emissions, and pollinator-friendly. When comparing the three clusters, the ***deep-rooted*** cluster showed the highest proportion of high-income households, those having more children in the household, consumers with higher educational attainment, those living in urban areas, and those with higher daily consumption of fresh vegetables. ***Deep-rooted*** consumers preferred to purchase salad mixes from DTC and online markets compared to the other clusters. Overall, consumers in this cluster showed the highest importance rating for all measured market characteristics and represented the largest percentage of respondents who considered all environmental perceptions extremely important.

Cluster 2, the largest market segment, is comprised 40% of the sample or 843 respondents. Cluster 2 was named ***indecisive*** given that consumers in this segment ranged halfway between the first cluster and the third cluster for all environmental labels. The most important labels for the ***indecisive*** were low fertilizer use, pollinator-friendly, and low greenhouse gas emissions. The least valued labels for cluster 2 were low energy consumption and low water use. The ***indecisive*** cluster had the highest proportion of low-income households and consumers living in rural areas. This group reported midpoint importance for market characteristics compared to the other clusters.

Cluster 3 was named ***skeptic*** due to the lowest importance placed for all pro-environmental labels on salad mixes compared to the other two groups. Representing 23% of the market or 497 consumers, this segment preferred labels related to low fertilizer use, pollinator-friendly, and low food miles. The ***skeptic*** cluster had the highest proportion of older consumers and female participation, as well as medium-income households. They were characterized by residing in the Midwest, living in suburban areas, and having the lowest daily consumption of vegetables. The ***skeptic*** cluster had the lowest valuation for market characteristics and represented the lowest percentage of respondents who considered all environmental perceptions extremely important relative to the other clusters.

Take-Home Message

The main contribution of this study is the categorization of the US salad mixes market into three market segments*:* ***deep-rooted***, ***indecisive***, and ***skeptic*** segments. The ***deep-rooted*** cluster highly valued all the pro-environmental labels, with a particular preference for labels such as low fertilizer use, pollinator-friendly methods, and low greenhouse gas emissions.

Compared with other clusters, the ***deep-rooted*** comprised consumers with high incomes, more children at home, high educational attainment, residing in urban areas, and preferring direct-to-consumer and online marketplaces to purchase salad mixes.

Our findings support other researchers' recommendations that highlight the significance of environmental sustainability in consumers' food choices and the importance of promoting sustainable agricultural practices like pollinator-friendly and low fertilizer-use methods to meet the growing demand for environmentally conscious food products.

The fact that individuals with a preference for buying salad mixes through online markets were more likely to be part of the ***deep-rooted*** segment suggests companies showing environmental footprint labels through their websites.

The findings also suggest that emphasizing pro-environmental features, including factors like the carbon footprint, can attract ***deep-rooted*** consumers and potentially boost salad mixes sales by encouraging increased purchases and consumption.

Literature Cited

Ulloa, M. C., Marques, J. M., Velasco, J. E., Philocles, S., & Torres, A. P. (2024). Characterizing the US Market for Salad Mixes through the Lens of Environmental Preferences. *HortScience*, *59*(4), 533-541.

Weed Spotlight: Dandelion

(Celia Corado, ccoradom@purdue.edu) & *(Stephen Meyers, slmeyers@purdue.edu, (765) 496-6540)*

Common names: Dandelion, lions-tooth, blow-ball, cankerwort, Irish daisy, pee-a-bed, wet-a-bed

Latin name: *Taraxacum officinale*

Family: Asteraceae (Aster family, sunflower family)

Life Cycle

Dandelion is a perennial weed that reproduces by seed. Seeds germinate in spring and summer, and seedlings form a rosette (Figure 1). Dandelions begin flowering in their second year of growth, with concentrated flowering from April to May in Indiana and sporadic flowering until the first fall frost. Viable seeds are set just days after flowering. Dandelions overwinter by storing carbohydrates (plant food) in their large taproots (Figure 2). This stored "plant food" is used for spring growth and development. This seed-propagated perennial life cycle allows dandelion to effectively reproduce and maintain large populations.

Figure 1. Dandelion seedling rosette (Photo by Celia Corado).

Figure 2. Dandelion taproot (Photo by: Celia Corado).

Figure 3. Scattered hairs are sometimes found in the midvein and undersurface (Photo by Celia Corado).

Identification

Leaves

The first true leaves are alternate, hairless, teardrop shaped, and have gray-green on their lower surface (Figure 1). Young leaves are oval-shaped with a long petiole and lack hairs. By the third true leaf, margins are wavy with irregular, widely spaced teeth. Older leaves can have some appressed crinkled hairs on upper and lower surfaces (Figure 3) and widely spaced teeth pointing toward the leaf base (Figure 4). When cut, leaves, flower stalks, and the taproot exude a milky white sap (Figure 5).

Figure 4. Dandelion rosette habit. Note the widely spaced “teeth” of the leaf pointing toward the base of the plant (Photo by John Obermeyer).

Figure 5. Dandelion exuding milky white sap after being cut (Photo by Celia Corado).

Flowers and Seeds

A dandelion “flower” is actually a composite of hundreds of smaller flowers. The flower head (Figure 6) consists of 100-300 yellow-petaled flowers, each with five points at the tip. Although their flowers are a source of nectar for spring pollinators, dandelion flowers do not require pollination to develop viable seeds. The seed head is gray-white and spherical (Figure 7). Each seed contains a pappus, the plant equivalent of a parachute, that allows the seed to be carried in the wind.

Figure 6. A dandelion inflorescence (flower head) consisting of hundreds of individual yellow flowers (Photo by John Obermeyer).

Figure 7. A dandelion seed head containing hundreds of mature seeds, each with its own pappus (parachute) (Photo by John Obermeyer).

Fun Fact

Dandelions are edible from flower to root. People have used dandelion flowers for wine, and the roots can be roasted and used as a coffee substitute. Dandelion leaves can be used as a salad green.

Management

Dandelions thrive in no-till and reduced tillage production settings, suggesting that tillage is a viable means of control. Because of its low growth habit, mowing is not an effective option. Here are some other weed control options for dandelion:

- Cover crops: Utilize cover crops to outcompete dandelion for resources and provide a physical barrier to its growth. Because dandelions are low-growing, there are many options for cover crops that can overtop the dandelion canopy. And because dandelions are perennial, effective use of cover cropping is not limited only to fall-planted species. For help choosing a cover crop, we recommend the Midwest Cover Crop Council selector tool: mwcc (midwestcovercrops.org)
- Plastic mulch: Acting as a physical barrier, plastic mulch hinders germinating dandelion seedlings from reaching the soil surface. Ensure that planting holes are sized to fit only your transplant. Excessively large planting holes can allow weeds to emerge next to the crop.
- Cultivation: Frequent cultivation, with tine weeders, for example, can effectively remove dandelion seedlings as they germinate. Take care not to uproot your crop. Tine weeders work best when dandelions (and other weeds) are at the white thread stage and just germinated. More aggressive cultivators can be used for established seedlings.
- Plant-based mulch: Whether you use leaves, wood chips, or straw, plant-based mulches can stop dandelion seedlings from emerging. A thick layer can also cover and kill mature plants. However, dandelion seeds that land on top of these mulches can still germinate and develop.
- Silage tarps: Silage tarps prevent germinating weeds from receiving sunlight. Although they will work well for dandelion seedlings, they will be less effective against established dandelion plants (and perennial weeds in general). Extended tarping will be necessary for acceptable control.
- Hand-weeding, hoeing, and cultivation: Dandelion seedlings can easily be removed by hand or hoe, but established plants will require the removal of the taproot for complete control.
- Flame weeding: Use flame weeding to control dandelion in its

seedling stage. Flaming will not control dandelions that have an established taproot.

- Herbicides: The best time to control dandelions is in the fall when the plant is moving resources into its taproot in preparation for winter. Apply systemic, post-emergence herbicides after a light frost but while dandelions are still actively growing. Broadleaf-selective herbicides, such as 2,4-D, can be very effective. Visit the Midwest Vegetable Production Guide (mwvegguide.org) to learn which herbicides are labeled for the crops you intend to grow.

References

Mohler, C., Teasdale, J., & DiTommaso, A. (2022). Manage weeds on your farm.

Neal, J., Uva, R., DiTomaso, J., & DiTomasso, A. (2023). Weeds of the Northeast (2nd ed.). Cornell University Press.

Patton, A. J., & Beck, L. (2020, 5 febrero). Dandelion. Turfgrass Science at Purdue University. https://turf.purdue.edu/dandelion/

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.

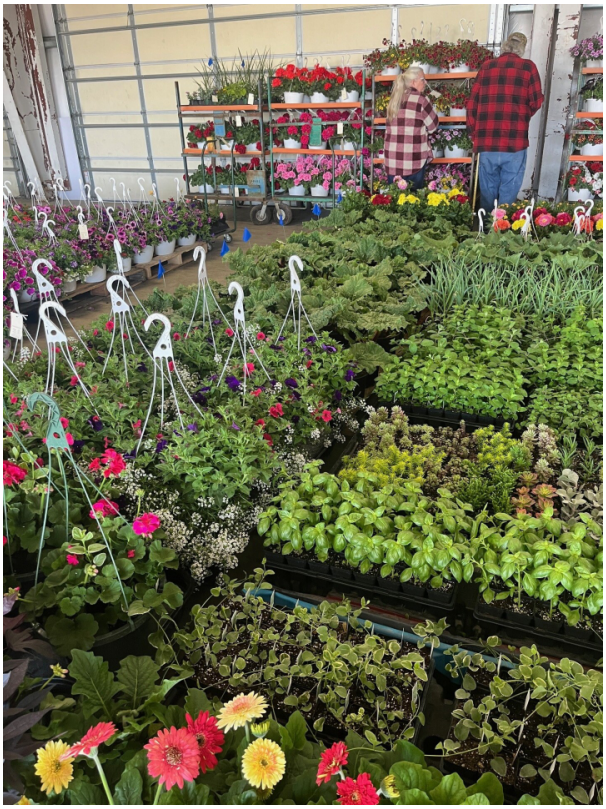

Figure 1. Clearspring Produce Auction (Photo by Jeff Burbrink).

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 18, 2024

April 23, 2024

April 25, 2024

April 30, 2024

April Ends Warm and Wet

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

It's gonna be... I mean... it's already May! How can this be? Early spring flowers have already cycled through, I'm on record pace for mowing my yard, and field activity has been delayed due to a wet April. April began a bit cool, with several mornings of frost advisories and freeze warnings, which was not too out of normal. This cold snap came after a warmer winter and early bud break for many perennial crop producers. We've heard reports from north of I-70 that there may not be a peach crop this year. We'd like to hear from you if you experienced frost or freeze damage to your perennial crops. Kindly email us (in-sco@purdue.edu) so we can document these losses.

After this cooler start, temperatures rebounded. The Indianapolis International Airport recorded the first 80F temperature for 2024 on April 14. The maximum daily temperature surpassed 80F four times this month, which was more than double the 1931-2024 average (1.8 days). April 1977 had the most days (9) with daily maximum temperatures at or above 80F. Despite the cooler start, the preliminary average temperature for April 2024 was 55.1F, which was 3.7F above normal. Average temperature departures ranged from 2.0F above normal in central Indiana to 4.0F above normal in other areas (Figure 1). As a result of the warmer temperatures, Growing Degree Days ran above normal throughout much of the state (Figure 2).

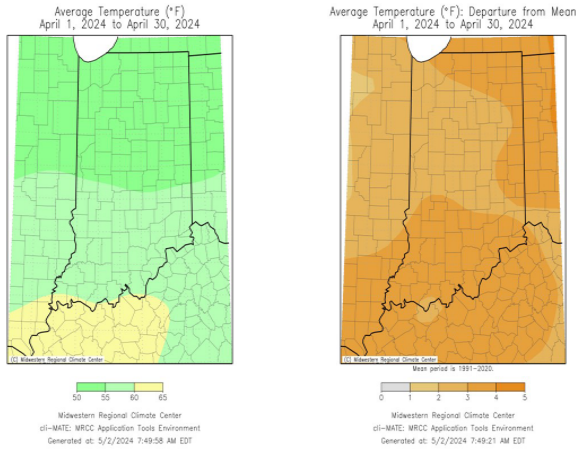

Figure 1. Left – Indiana average temperatures for April 2024. Right – Indiana average temperatures are represented as the departure from the 1991-2020 climatological average.

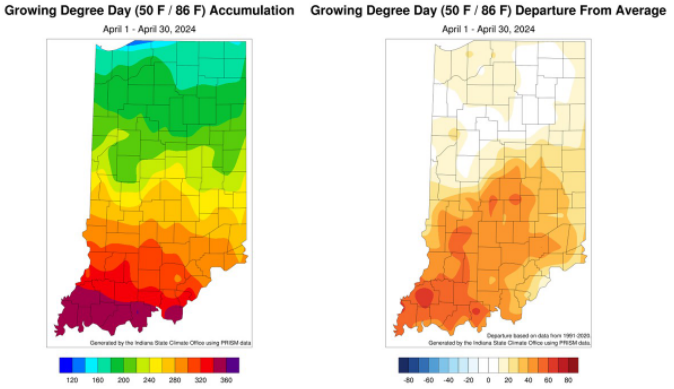

Figure 2. Left – Indiana Growing Degree Day accumulations for April 2024. Right – Indiana's April 2024 Growing Degree Days represented as the departure from the 1991-2020 climatological average.

April was wet. Precipitation totals ranged from 5 to nearly 10 inches across Indiana or 100 to 300 percent of normal (Figure 3). The Indianapolis International Airport had at least a trace of precipitation recorded 19 days throughout the month. This allowed for limited opportunities to get much done outside. Vincennes 4E, located in Knox County, measured 9.6 inches in April, which was 4.71 inches above normal. As a result of the continued wet conditions, the May 2 release of the US Drought Monitor was free of drought for the second week in a row!

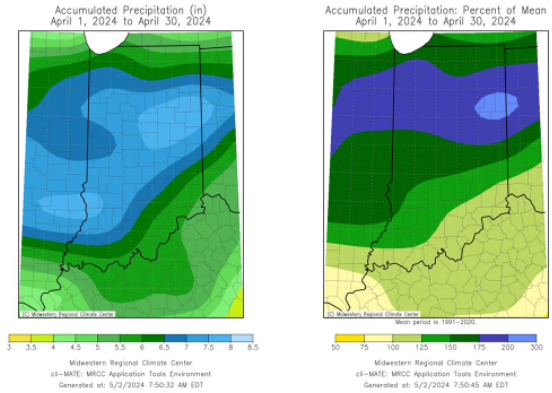

Figure 3. Left – Indiana precipitation totals for April 2024. Right – Indiana's April 2024 precipitation totals represented as the percent of the 1991-2020 climatological average.

The National Climate Prediction Center temperature outlooks favor above-normal temperatures throughout May. Along with this are elevated chances for above-normal precipitation, which is not the most conducive to field activity, especially as soils are still trying to dry out. Forecasted precipitation totals exceed an inch statewide, with southern Indiana possibly seeing up to two inches by May 9.

Indiana is Entirely Free of Drought

(Beth Hall, hall556@purdue.edu)

There is some very exciting news this week for Indiana with respect to the U.S. Drought Monitor. For the first time since April 25, 2023, the entire state is void of any Abnormally Dry (D0) or Drought (D1-D4) conditions. I would include the map, but … drumroll, please … there's nothing to show! This is incredible! Soil moisture is near or above normal; streamflow is mostly near or above normal, and groundwater levels are indicating a rising trend. Certainly, flood warnings are still occurring and there are some areas that could use a break from all this rain. However, this is an ideal time of year to try and replenish all moisture deficits Indiana can since this is the rainier time of year, and soon temperatures will increase, causing rates of evapotranspiration to climb.

Modified growing degree day (MGDD) accumulations have slowed a bit in northern Indiana but are greater than normal for the southern half of the state (Figures 1 and 2). While recent conditions have felt cooler, climate outlooks for the next two weeks strongly favor above-normal temperatures. This will likely cause a rapid increase in MGDDs and soil temperatures. Precipitation outlooks are slightly favoring below-normal amounts for May 1-5, with more near-normal conditions through May 8th.

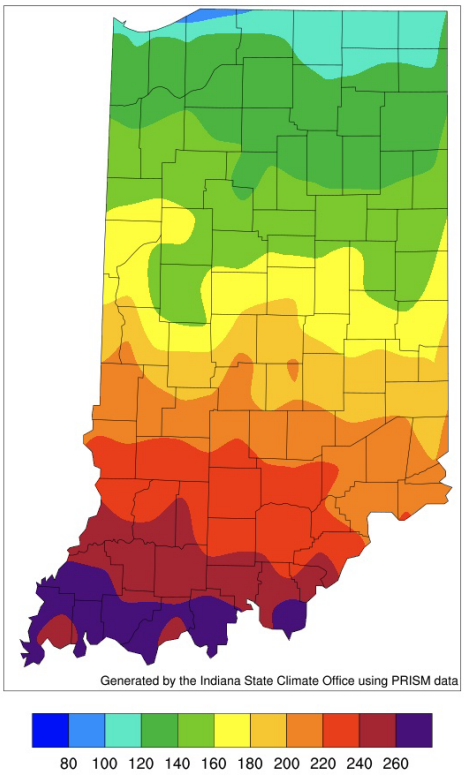

Figure 1. Modified growing degree day (50°F / 86°F) accumulation from April 1-25, 2024.

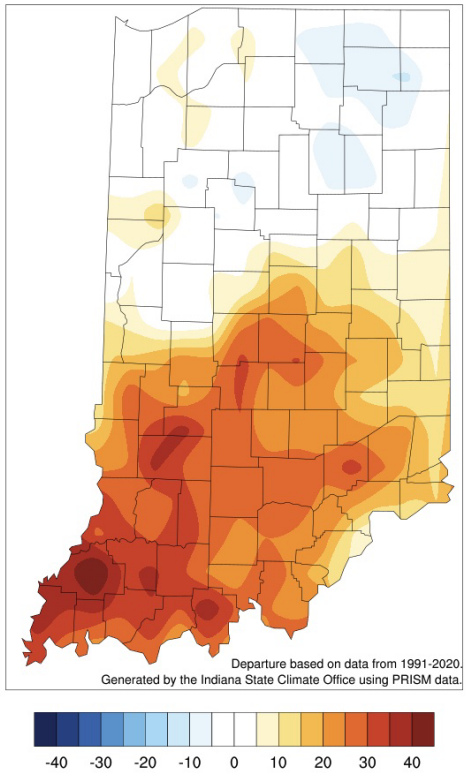

Figure 2. Modified growing degree day (50°F / 86°F) accumulation from April 1 to August 25, 2024, represented as the departure from the 1991-2020 climatological average.

The 7-day precipitation forecast highlights a very strong precipitation event to the west of Indiana (Figure 3), mostly occurring over this coming weekend and into early next week. Forecast models have stayed relatively consistent with this location, but certainly keep an eye on the forecasts in case this system decides to shift slightly to the east.

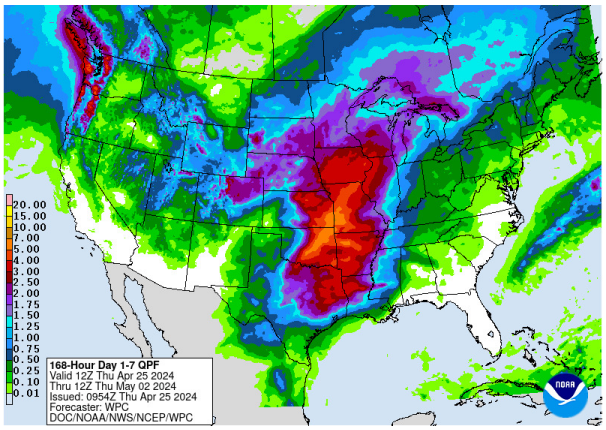

Figure 3. Seven-day total precipitation forecasted for the period from April 26 through May 3, 2024.

2024 Purdue Fruit and Vegetable Field Day – Registration Open

(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.

Registration is now open! Register here: Purdue Fruit and Vegetable Field Day

More information about the upcoming field day will be available by mid-May 2024.

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

2024 Purdue Small Farm Education Field Day – Registration Open

(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

Registration is now open! Register here: Purdue Small Farm Education Field Day

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.

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

Discussion with Dr. Marvin Pritts about Strawberry Production in the Northeast

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198) & (Miranda Purcell, mrpurcel@purdue.edu)

A new episode of the Strawberry Chat podcast is available. In this episode, we talked with Dr. Marvin Pritts from Cornell University. We discussed the new edition of the *Strawberry Production Guide for the Northeast, Midwest, and Eastern Canada*. Dr. Marvin introduced us to the plasticulture day-neutral strawberry product system he has been researching recently. He also shared his previous research and thoughts on nutrient management, winter protection, fruit quality, and pollination. Dr. Marvin did most of the research at USDA Hardiness Zone 5b.

Search 'Strawberry Chat' on your podcast platform to find the program and listen to previous episodes, or click the link here

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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

Order Buyers:
David Schrock & Richard Yoder

Date of Report:	18-Apr	2024

Description of Product		Unit	Units Sold	Price Average	Price High
Asparagus		lb.	7	$ 2.93	$ 3.00
Flower Flats			13	$ 12.50	$ 17.50
Flowers, 4 inch pots			1233	$ 2.20	$ 3.25
Flowers, 6-8 inch pots			233	$ 4.22	$ 9.00
Fruit Trees			2	$ 22.50	$ 35.00
Hanging Baskets, 10 inch			467	$ 10.50	$ 17.00
Hanging Baskets, 12 inch			89	$ 7.66	$ 30.00
Kolrabi		ct	102	$ 1.30	
Onions		bunch	90	$ 2.25	
Radishes		bunch	11	$ 3.00	
Rhubarb		lb.	346	$ 1.19	$ 2.25
Rhubarb Starts			44	$ 10.00	
Specialty Baskets		16 inch	6	$ 32.50	
Succulents			414	$ 2.31	$ 7.00
Urns			4	$ 13.00	
Vegetable Flats			77	$ 7.39	$ 14.00
Vegetable pots, 4 inch			72	$ 1.50	$ 2.25

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Order Buyers:
David Schrock & Richard Yoder

Date of Report:	23-Apr	2024

Description of Product		Unit	Units Sold	Price Average	Price High
Asparagus		lb.	8	$ 2.13	$ 2.50
Chestnut trees			2	$ 4.00	
Flower Flats			60-	$ 6.62	$ 10.00
Flowers, 4 inch pots			2001	$ 0.53	$ 2.75
Flowers, 6-8 inch pots			606	$ 2.22	$ 5.00
Fruit Trees		apple	2	$ 7.00	
Garlic			280	$ 0.50	
Hanging Baskets, 10 inch			1084	$ 8.14	$ 14.50
Hanging Baskets, 12 inch			150	$ 9.53	$ 15.00
Herbs, misc			360	$ 0.20	$ 0.25
Houeplants		4 inch	18	$ 0.10	
Kolrabi		ct	100	$ 0.10	
Lettuce		head	36	$ 0.35	
Morel		quart	3	$ 55.00	
Onions		bunch	90	$ 1.75	
Radishes		bunch	5	$ 0.50	
Raspberry starts			86	$ 1.89	$ 2.50
Rhubarb		lb.	710	$ 0.27	$ 0.45
Rhubarb Starts			23	$ 4.54	$ 5.00
Roses		12 inch	2	$ 6.31	$ 12.00

Roses,		6 in mini	30	$ 6.00	$ 6.00
Specialty Baskets		16 inch			
Succulents			531	$ 0.82	$ 5.50
Urns/Specialty Baskets			26	$ 21.50	$ 27.50
Vegetable Flats			134	$ 4.79	$ 12.50
Vegetable pots, 4 inch			411	$ 0.43	$ 0.75

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Order Buyers:
David Schrock & Richard Yoder

Date of Report:	25-Apr	2024

				Price	
Description of Product		Unit	Units Sold	Average	High
Asparagus starts		pots	4	$ 6.50	
Duck Eggs		dozen	5	$ 2.00	
Ferns		pots	16	$ 14.00	$ 15.00
Flower Flats			14	$ 12.00	$ 14.00
Flowers, 4 inch pots			1098	$ 1.10	$ 3.50
Flowers, 6-8 inch pots			629	$ 3.65	$ 7.50
Hanging Baskets, 10 inch			878	$ 9.14	$ 22.50
Hanging Baskets, 12 inch			195	$ 11.69	$ 20.00
Herbs, misc			390	$ 0.36	$ 1.00
Kolrabi		ct	100	$ 1.00	
Morel		quart	7	$ 27.10	$ 30.00
Onions, green		bunch	96	$ 1.00	
Radishes		bunch	8	$ 1.75	
Raspberry starts			227	$ 0.39	$ 5.00
Rhubarb		lb.	494	$ 0.54	$ 1.20
Rhubarb Starts			79	$ 5.04	$ 7.00
Roses		12 inch	2	$ 27.50	
Roses,		6 in mini	18	$ 5.50	$ 6.80
Strawberry starts			32	$ 2.00	
Succulents			404	$ 1.75	$ 7.00

Urns/Specialty Baskets			26	$ 25.42	$ 34.00
Vegetable Flats			121	$ 6.05	$ 27.00
Vegetable pots, 4 inch			170	$ 1.10	$ 5.00

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Order Buyers:
David Schrock & Richard Yoder

Date of Report:	30-Apr	2024

Description of Product		Unit	Units Sold	Price Average	Price High
Flower Flats			46	$ 12.00	$ 18.00
Flowers, 4 inch pots			1509	$ 1.40	$ 4.50
Flowers, 6-8 inch pots			946	$ 4.11	$ 13.00
Garlic		head	300	$ 0.45	
Hanging Baskets, 10 inch			1178	$ 11.40	$ 18.00
Hanging Baskets, 12 inch			392	$ 12.40	$ 30.00
Herbs, misc			402	$ 0.40	$ 1.25
Kolrabi		ct	124	$ 0.95	
Lettuce		head	8	$ 2.00	
Morel		1/2 pound	27	$ 20.30	$ 27.50
Onions, green		bunch	52	$ 1.50	
Pickles		1/2 peck	14	$ 6.00	
Raspberry starts			30	$ 1.75	
Rhubarb		lb.	777	$ 0.55	$ 1.50
Rhubarb Starts			38	$ 6.58	$ 7.00
Roses		12 inch		$ 32.50	
Roses,		6 in mini		$ 8.00	
Succulents			400	$ 0.55	$ 3.00
Urns/Specialty Baskets			55	$ 27.13	$ 32.50
Vegetable Flats			92	$ 9.51	$ 13.00
Vegetable pots, 4 inch			185	$ 1.11	$ 6.00