

2024 SFC Poster Descriptions

Economics of Biological Control

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and Ariana Torres*
Purdue University

This study addresses the economic feasibility of using biocontrol strategies to address pest management in HT production systems. Specifically, we are using dynamic enterprise budgets to understand the changes in profit, costs, and breakeven prices and yield when using biocontrols to grow spinach under HT. We are using this information to build an online tool that will assist farmers in making financial decisions about their crops and pest management practices. The tool will be designed to take into account the specific needs and conditions of individual farms, as not every farmer grows the same way.

By answering inputs and expense questions, farmers will be able to obtain financial guidance and assess the impact of new technologies, varieties, and markets. The tool will also show the long-term impact of integrated pest management on profitability, which is essential to consider as small farmers have a small profit margin and this tool aims to help them to find best match of crops and pest management. Our findings will help small farmers, especially those targeting local markets to increase the economic viability of sustainable food production, improved management strategies tailored to HT systems, increased farm profitability and sustainability, and increased sales of fresh and pesticide-free locally-produced food.

Avian Influenza Risk Analysis: Small-Scale Farm Focus

Glen Morris and Shawn Ehlers
Purdue University and ABE

Geographical information systems (GIS) can play a vital role in monitoring disease risk, particularly for small-scale farms. This project explores the significant environmental factors posing risks to poultry in livestock operations in the 2022 avian influenza outbreak. This study leveraged GIS to assess avian influenza risks. The findings revealed that only 2.8% of grid cells in all of Indiana exhibited high or very high risk, while 65.4% displayed moderate or greater risk levels. Intriguingly, densely populated counties with small farms were also associated with very high risk, and 31.5% of the positive livestock cases were in very high risk counties, highlighting the complexity of disease transmission dynamics.

Research indicates that wild birds infected at breeding sites and places of high environmental risk are likely to interact with diverse species, heightening the risk of interspecies transmission on farms. Analysis will undergo further validation using the livestock cases of avian influenza. By weighting factors related to avian influenza, researchers gain insight into transmission risks which could aid in decision-making and targeted interventions on the county or grid level. GIS tools provide essential situational awareness, enabling effective analysis of these dynamics.

A Comparative Analysis of Floral Preservative Efficacy on Specialty Cut Flowers

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One of the challenges Hoosier flower farmers face is how to effectively and cost-efficiently extend the life of an ephemeral crop after the point of sale. Floral preservatives are typically included with customer cut flower bouquets and arrangements. What is the best preservative? An initial survey of published research, including that done by floral preservative companies, shows inconsistent results. This randomized, controlled, single-blinded study will investigate multiple preservation methods (e.g., sugar, bleach, and professional products) on a selection of specialty cut flower crops commonly grown in Indiana (e.g., snapdragons, stocks, etc.). In this research, I will draw on my background in high school chemistry and biology studies, 4-H agricultural production projects, and four years' production and design experience operating French Rabbit Flowers, an urban micro flower farm located in Fort Wayne.

Effect of Buckwheat and Silage Tarps on Sweet Potato Row-Middle Weed Control

Emmanuel Cooper and Stephen Meyer

Purdue University

In response to challenges faced by organic sweet potato growers in the United States, where limited weed management options often lead to labor-intensive and costly practices, a study was conducted in 2023 on certified organic land in Lafayette and Vincennes, IN. The aim was to compare buckwheat and silage tarps to cultivation for row-middle weed control. The experiment, utilizing a randomized complete block design, featured four row-middle treatments (silage tarp, buckwheat, cultivation, and weedy check) with four replicates. The

treatments were initiated immediately after transplanting 'Covington' slips, 30 cm apart, into raised bed plots. Buckwheat was planted three weeks after transplanting (WAP) at a rate of 96 lbs a-1 in row-middle. Visual buckwheat and sweet potato canopy cover, weed and buckwheat densities, and weed heights, were recorded throughout the growing season.

We harvested sweet potato storage roots 112 days after transplanting. At 6 WAP, weed density was 436 plants m⁻² for the weedy check, 184 plants m⁻² for buckwheat, and 162 plants m⁻² for traditional cultivation. Sweet potato canopy coverage at 6 WAP was 2% for the weedy check, 4% for buckwheat, 9% for cultivation, and 19% for silage tarping. The weedy check yielded 5,640 kg ha⁻¹, while buckwheat (11,050 kg ha⁻¹), cultivation (19,790 kg ha⁻¹), and silage tarps (17,810 kg ha⁻¹) demonstrated increased yields. In conclusion, silage tarping effectively suppressed weeds, providing sweet potato yields comparable to cultivation. Buckwheat, though yielding more than the weedy check, fell short of silage tarping and cultivation in terms of overall yield.

Insect Communities in High Tunnels Along a Rural-Urban Gradient

Isabela Arias and Samantha Wilden

Purdue University

High tunnels represent a unique growing environment for specialty crops, with accumulating evidence that the pest communities inside them vary. To better understand this variation, across seasons and geographic locations, we have surveyed the insect communities in high tunnels on farms along a rural-urban gradient in Indiana. Here we present the communities of pests, pollinators and predators collected on sticky cards. This information can give farmers a broader understanding of the ecology of insect communities within their tunnels, across the

seasons. Specifically, we can identify peak periods of beneficial insect activity and use this information in developing integrated pest management programs.

Hermetia illucens Compost Application

Milena Agila and Laura Ingwell
Purdue University

Urban farmers confront several challenges, one of which includes low quality soil in urban spaces. With the aim of making improvement to the soil, several farmers choose to apply soil amendments, such as compost. A new avenue for compost production includes the digestate created through composting with the use of Black Soldier Flies (*Hermetia illucens*). This study focused on quantifying and analyzing two BSF by-products to use as agricultural sources, specifically as a soil amendment for specialty crop production. We found that the 23.52 ± 6.81 kg of organic waste to rear one gram of BSF eggs was converted into 3.1 ± 0.99 kg of BSF digestate and 2.41 ± 0.75 kg of BSF prepupae. Additionally, the BSF byproducts had higher NPK content compared with commercially available composted cow manure, and three times more organic matter content according to the analyzes carried out. This poster will highlight the nutritional composition of BSF products and its application in urban agriculture.

Syrphid Flies in High Tunnels

Allison Zablah, Samantha Willden and Laura Ingwell
Purdue University

Since reducing the number of pests in high tunnels, especially soft-bodied insects like aphids, is always hard, our study focused on identifying naturally-occurring natural enemies. Syrphid flies, which are predatory in their larval stage, are often encountered in these systems.

Through on-farm monitoring with collaborating growers we sampled adult syrphid populations using yellow sticky cards throughout the calendar year. The study's goal is to help farmers use more environmentally friendly methods by finding out more about the specific species of syrphids and providing the resources required for these species to flourish. Through our grower collaborators, we have a wide range of crops and changes with the seasons, which helps us identify how syrphids and pests interact with each other. Our goal is to provide conservation biological control recommendations to improve syrphid fly pest management in high tunnel systems.

IPM cucumber plan

Leslie Alejandra Lopez, Liz Maynard, Wenjing Guan and Laura Ingwell
Purdue University

High tunnels (HT) are a protected agriculture tool for specialty crop farmers. Cucumbers (*Cucumis sativa* L.) are well suited for HT production because their vertical growth pattern allows for space optimization and repeated flowering, offering multiple harvest opportunities. However, the twospotted spider mite (*Tetranychus urticae* Koch; TSSM) is one of the primary pests of cucumbers in HT systems. TSSM often goes unnoticed by farmers until the damage is irreversible and the pest is difficult to control. Here, we present a comprehensive integrated pest management (IPM) plan designed to mitigate the effects of TSSM on cucumber production, thus enhancing the feasibility of cucumber production in high tunnels (HT). Our approach encompasses both cultural and biological strategies, including the identification of more TSSM-tolerant cucumber varieties. Recommendations are formulated based on the optimization of commercially available natural enemies of TSSM for effective biological pest suppression. Also, our research evaluated the efficacy of biopesticides that may be used with biological control. Developing an

IPM plan tailored to the unique growing environment in a high tunnel increases the economic viability of cucumber production in this system.

Identification and Characterization of a Virulent *Meloidogyne incognita* Population, Breaking the Tomato Mi-1.2-mediated Resistance, in Indiana

Vijay Kunwar, Lei Zhang and Wenjing Guan
Purdue University

High tunnel production is gaining momentum among farmers in the US for its efficacy in extending growing seasons. The cultivation of high-value crops like tomatoes is considered one of the most profitable crops in the high tunnel. However, high planting density, elevated soil temperature, and constant soil moisture in high tunnels lead to the buildup of plant-parasitic nematodes (PPN) in soils. Among these, root-knot nematodes (RKNs) pose a significant threat due to their broad host range and ability to damage the roots of tomatoes and other specialty crops. Growing RKN-resistant tomato cultivars or using the grafting technique with RKN-resistant tomato rootstock are considered effective in controlling RKNs.

Our study identified a virulent *Meloidogyne incognita* population from an Indiana high tunnel, capable of infecting 'Better Boy' and 'Early Girl' cultivars with the RKN-resistant gene, Mi-1 gene. This is the first report of Mi-1.2-gene resistance-breaking *M. incognita* in Indiana, mirroring findings in California and Georgia. We also conducted controlled experiments to evaluate the virulence and progression of developmental stages of the virulent RKN in different tomato cultivars – Rutgers, Early Girl, and Better Boy. This discovery emphasizes the urgency of developing integrated RKN management for high-tunnel tomatoes. While grafting enhances yield, it may not curb RKN population growth. Growers must monitor RKN density and virulence regularly to formulate

effective strategies. Our research provides essential insights for farmers navigating challenges posed by virulent nematode populations, contributing to the sustainable future of high-tunnel tomato farming.

Exploring Nematode-Suppressive Soils of Indiana for Sustainable Vegetable Production Resistance, in Indiana

Vijay Kunwar, Lei Zhang and Wenjing Guan
Purdue University

Root-knot nematode (*Meloidogyne* spp.; RKN) poses a significant threat to global vegetable production, causing extensive damage to crops such as tomatoes. The nematode induces gall formation in plant roots, disrupting water and nutrient uptake, ultimately resulting in yield loss. While soil fumigation effectively controls RKN, it adversely affects non-target organisms and human health. An environmentally sustainable alternative is naturally occurring suppressive soils, which harbor a unique microbial community capable of reducing disease incidence.

In our study, we identified nematode-suppressive properties across three distinct farms. We conducted controlled laboratory experiments to assess their efficacy against *Meloidogyne incognita*, a nematode species infecting tomato plants. For each farm soil, half of the soil was steam-sterilized to kill any microbial community and the other half was kept at room temperature until use. The results were remarkable: in comparison to steam-sterilized soil counterparts, these suppressive soils exhibited a significant decrease in gall formation and total nematode egg count within tomato roots. Across all three identified suppressive soils, the reduction in total eggs per plant and total galls per plant ranged between 74% - 79% and 73% - 78%, respectively, compared to steam-sterilized counterparts. Our research aims to understand microbial communities, farming practices, and ecological

factors that contribute to suppressive soils and develop strategies to promote soil's natural nematode-fighting abilities. This holds immense potential for sustainable and environmentally friendly vegetable production, benefiting both growers and consumers.

Evaluating Compatibility of Entomopathogenic Nematodes with High Tunnel Management Practices

Julia Wooby

Purdue University

High tunnels, also called hoop houses or polytunnels, are growing in popularity among specialty crop farmers in the US. In these systems, crops are grown in the ground beneath unheated, semi-permanent, and manually ventilated polyethylene tunnels. These tunnels provide a unique environment that resembles but is separate from both greenhouse and field conditions. Because of the novelty of this system, management practices are understudied, and there are few recommendations available for growers.

For those interested in organic or low-input farming, biological control of agricultural pests is of great interest. Entomopathogenic nematodes (EPNs) are minute, obligate insect parasites that infect and kill various pests with soil dwelling life stages. EPNs have been evaluated under both field and greenhouse conditions, but little is known of their efficacy in high tunnel soils. Characteristics of high tunnel farming that extend the growing season may also prolong the period of suitable soil conditions for EPN activity, influencing soil moisture, soil temperature, and host availability. We looked at the effects of high tunnel management practices such as irrigation methods and the use of weed barriers on the persistence and efficacy of EPNs. Three EPN species, *Steinernema feltiae*, *S. carpocapsae*, and *Heterorhabditis bacteriophora* were applied to soils in high tunnels on 9 farms

across Indiana. EPN persistence was quantified through laboratory waxworm bioassays on soil samples collected from these 9 farms. Determining compatibility of various management practices with EPN applications can better inform the use of these biological control agents for pest management by high tunnel growers.

Effectiveness of Biochar as a Soil Amendment

Philip Grabowski and Maddie Borchelt

Taylor University

Biochar is a charcoal soil amendment produced from biomass sources such as wood chips for the purpose of improving soil quality, biologically, chemically and physically. Biochar improves soil aggregation, enhances nutrient- and water-holding capacity, provides habitat for soil organisms, modulates microbial activity and biodiversity, and provides a stable form of soil organic carbon. This research tested the effectiveness of biochar as a soil amendment by adding 436g of biochar to half of our planting stations of zucchini and cucumbers and weighing the total produce. For butternut squash we used the following treatments: no biochar, one scoop (436g), two scoops, and three scoops of biochar. The zucchini and cucumber with biochar produced less than the control. We suspect there were not enough nutrients added to the biochar, which can temporarily immobilize nutrients in the soil. However, the zucchini with biochar produced more than the control in the second half of the harvest period.

We also observed later attack by the squash borer larvae with biochar. In contrast, all of the butternut planting stations with biochar out produced the control. Going forward we plan to add more nutrients when charging the biochar with chicken manure and liquid fish. Another option is to add the biochar to our vermicompost in the fall to charge it with those nutrients until late spring. Next year we also

plan to record data for subsequent crops (tomatoes and peppers) in the rows where we added biochar this year since the biochar should still be having some effect.

Testing an IPM program for Aphids in High Tunnel Winter Crops

Cristhian Ochoa, Laura Ingwell, Samantha Willden and Allison Zablah
Purdue University

High tunnels are an increasingly popular method for crop protection and season extension for specialty crop production in the U.S. However, high tunnels support higher densities of some pests, namely aphids, on winter crops. The purpose of this poster is to present research describing different options in IPM using a combination of biocontrol predators and biopesticides. Our goal is to fill knowledge gaps in winter pest management to support growers adopting high tunnel production in Indiana.

Recruiting Good Bugs to High Tunnels: Companion Plants vs Weeds

Samantha Willden, Laura Ingwell and Robert Grosdidier
Purdue University

High tunnels offer ideal conditions for tomato production due to the warm and dry environment; however, some pests (especially spider mites, aphids and thrips) also benefit from these conditions and may require management intervention. Natural pest control by predators and parasitoids can be effective against many tomato pests but recruiting and retaining them on tomato alone can be a challenge in high tunnels. A similar challenge exists for pollinator recruitment, as high tunnel structures may provide a physical barrier to foraging pollinators. This project determined if interplanting tomato with common companion

plants can recruit and retain natural enemies and pollinators on tomato, and if natural weeds provide a similar benefit to companion plants.

Indiana AgrAbility - Cultivating Accessible Agriculture

Chuck Baldwin, Bill Field, Steve Swain and Ed Sheldon
Indiana AgrAbility

In 1979, a farmer with severe disabilities asked Purdue's Department of Agricultural and Biological Engineering for help with modifying his tractor so he could continue farming. His request ultimately led to the establishment of the Breaking New Ground (BNG) Resource Center, now an internationally recognized source of information on assistive technology for agricultural worksites. Soon after it started, the BNG Resource Center established the Breaking New Ground Outreach Program to serve rural Indiana residents affected by disabilities. The BNG Outreach Program, a part of Purdue Extension, became a model for the USDA AgrAbility Program that now supports similar projects in more than 20 states, including Indiana.

The Indiana AgrAbility Project serves farmers and other rural residents with disabilities through a collaborative effort between the USDA, the BNG Outreach Program, and several disability and agriculture-related organizations, including Easterseals Crossroads, Indiana Vocational Rehabilitation Services, and more. The program works with individuals impacted by all types of disabilities, and there is no charge for AgrAbility services. Indiana AgrAbility's poster presentation focuses on services provided to Indiana farm families and agricultural workers, including:

- One-on-one in-person consultations, farm visits, and site assessments for worksite or home modifications, self-employment, and enterprise development

- Referrals to other sources of information and assistance, including potential funding sources
 - Underserved populations outreach (veterans, socially disadvantaged farmers, migrant and seasonal farmworkers, Old Order)
 - Partnership with Easter Seals Crossroads – Assistive Technology Expo, assistive technology lending library
 - Bridging Horizons Community Service contest
 - Partnership and collaboration with Purdue Extension.
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Stay Emergency Aware with INdiana PREPared
Ed Sheldon¹, Amanda Mosiman² and Shawn Ehlers³

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INdiana PREPared (Purdue Rural Emergency Preparedness) is a Purdue Extension initiative launched in 2019. IN-PREPared was created to serve as a resource center for Extension staff, first responders, rural citizens, media, and organizations with an interest in rural emergency and disaster preparedness. IN-PREPared continues Extension’s long legacy of supporting the efforts of Hoosiers to more effectively prepare for and respond to natural and manmade disasters, agricultural-related emergencies, and other challenges. While IN-PREPared serves all Indiana residents, the program maintains a focus on issues affecting the state’s rural population.

A primary objective of IN-PREPared is to encourage and facilitate collaboration between organizations, institutions, and agencies that share the similar goal of safe, prepared Indiana rural communities. Establishing and maintaining partnerships within Purdue University and the broader land-grant system through the Extension Disaster Education Network (EDEN), along with cultivating productive relationships with governmental agencies, emergency service providers, and agricultural organizations are

vital to ensuring effective and sustainable outreach. This poster presentation highlights resources available through INdiana PREPared, with an emphasis on those that are especially applicable to the needs of small farmers and Extension professionals. The program website, www.inprepared.org, serves as an extensive and growing library of teaching and educational resources. Teachers, Extension Educators, emergency personnel, and employers have quick access to a wide range of training materials for rural emergency preparedness and safety. The website is updated regularly to focus on seasonal-specific issues, and is complemented by a Facebook site to distribute timely information to the public.

In-ground Strawberry Production in a High Tunnel in Southern Indiana

Wenjing Guan¹ and Dean Haseman²

¹Purdue University

²Southwest Purdue Ag Center

The poster describes lessons we learned through in-ground strawberry production in a high tunnel in southern Indiana.

Take-top Strawberry Production in a High Tunnel- Lessons Learned in Southern Indiana

Wenjing Guan¹ and Dean Haseman²

¹Purdue University

²Southwest Purdue Ag Center

This poster describes lessons we learned through table-top strawberry production in a high tunnel in southern Indiana.

Recruiting Good Bugs to High Tunnel Tomato: Companion Plants vs. Weeds

Robert Grosdidier, Samantha Willden and Laura Ingwell

Purdue University

High tunnels offer ideal conditions for tomato production due to the warm and dry environment; however, some pests (including aphids and thrips) also benefit from these conditions and may require management intervention. Natural pest control by predators and parasitoids can be effective against many tomato pests but recruiting and retaining them on tomato alone can be a challenge in high tunnels. A similar challenge exists for pollinator recruitment, as high tunnel structures may provide a physical barrier to foraging pollinators.

This project determined if interplanting tomato with common companion plants can recruit and retain natural enemies and pollinators on tomato, and if natural weeds provide a similar benefit to companion plants. Our research shows that companion plants (particularly sweet alyssum) recruit and retain more biocontrol agents and pollinators, but that this retention does not translate to lower pest counts on tomatoes. The similar community assemblage indicates that while companion plants attract higher numbers of insects to tomato, the balance between feeding guilds was similar to monoculture tomato and tunnels with weeds.

Entomopathogenic Nematodes for CPB Management

Allison Zablah, Samantha Willden and Laura Ingwell
Purdue University

This study evaluates the effect of a spray rotation using organic products and how susceptible were the Colorado potato beetles to entomopathogenic nematodes. The research was conducted exploring alternative organic pesticides that can be used in a spray program with Spinosad to conserve the effectiveness of this product. It also includes the incorporation of EPNs to help suppress the pupal stage of this beetle, which occurs in the soil at the base of

the plants. The EPN species that we will use in this study is *Steinernema carpocapsae*. The experimental design is a full factorial and evaluates two different treatments: 1. A soil application of EPNs and 2. five different spray programs. Bioassays were used to determine how susceptible CPBs were to EPN using a nematode product compared to water control. White traps were used to collect the EPN from the death insects.

Our analysis shows there was little effect of any spray program on the number of adults on potato plants. Larvae were effectively managed using spray programs 7 and 6 when Spinosad was applied early in the season. Both life stages were susceptible to EPN infection, although larvae were more so than adults. The next step of this research is to apply EPN to potatoes during Fall when larvae begin to pupate and adults overwinter. We conclude that the Colorado potato beetle would have no effect under any spray program and that larvae were more affected by entomopathogenic nematodes.

Impact of Soil Fertility Amendments and Cover Cropping on Soil Health

Petrus Langenhoven and Nathan Shoaf
Purdue University

Challenges often associated with organic food production systems include lower yields relative to conventional systems. Optimizing soil health and plant nutrient management can be challenging in these systems due to the slow release of nutrients from organic fertilizers. Soil health can be improved while simultaneously optimizing nutrient availability using best management practices such as planting cover crops, applying compost, rotating crops, and pathogen management while maintaining agricultural productivity and profitability.

Building soil health requires a lot of biomass, and cover cropping provides a sustainable

solution. Cover cropping offers clear benefits to farmers and the environment. The biomass produced adds organic material to the soil. It increases soil carbon, reduces soil erosion, and enhances nitrogen cycling within the plant-soil system by reducing nitrate losses and weed pressure in subsequent cash crops. In this poster presentation, we will discuss the impact of conventional, organic, and mixed soil amendment systems, summer and winter cover cropping, and the application of compost on soil health and the yield of three pepper varieties grown at the Throckmorton/Meigs Purdue Ag Center in Lafayette, Indiana.

Building Soil Health: Sustainable Management Approaches to Overcome Production Challenges

Petrus Langenhoven and Nathan Shoaf
Purdue University

Just like any other farming system, organic farming systems have limitations. One common issue is that the demand for specific nutrients can exceed the supply available for plant uptake. It is challenging to predict the amount of nitrogen that will be available in the soil at a particular stage of plant growth. Over-applying organic soil amendments, such as composted manure as the sole source of fertilizer input, can result in high nitrate concentrations leaching into groundwater. Compost applications can also contribute to excessive soil phosphorus if added at rates greater than phosphorus removal in the harvested crop. This may diminish the sustainability outcomes of organic farm operations that prefer less reliance on off-farm inputs. The over-application of fertilizer on conventional farms also leads to the leaching of nutrients into the environment.

Regardless of the farming system used, soil fertility cannot be managed independently. Microbial activity and nutrient mineralization are interconnected, and optimizing soil health requires adding a lot of biomass to soils.

Therefore, cover cropping offers a sustainable solution for farmers interested in building soil health. The biomass produced adds organic material to the soil. It increases soil carbon, reduces soil erosion, and enhances nitrogen cycling within the plant-soil system by reducing nitrate losses and weed pressure in subsequent cash crops. In this presentation, we will discuss the impact of conventional, organic, and mixed soil amendment systems, summer and winter cover cropping, and the application of compost on soil health and the yield of three pepper varieties grown at the Throckmorton/Meigs Purdue Ag Center in Lafayette, Indiana.

Grab-and-Go Resources for Youth Engagement: Junior Master Gardener

Ashley Shufflebarger and Jayde Grisham
Purdue Extension Marion County

Our poster presentation aims to introduce small farmers in Indiana to the benefits of incorporating the Junior Master Gardener (JMG®) program into their agritourism and outreach practices. This poster presentation will outline how JMG can be a transformative tool for cultivating the next generation of environmentally conscious and skilled individuals within the farming community and will give farmers easy to use tools and activities to meaningfully engage young people. Small and urban farmers in Indiana can benefit significantly from the JMG program by using research-based, experiential activities meant to inspire, engage, and connect generations within the community.

Our poster will showcase easy-to-implement JMG activities for future field trips, youth events, and agritourism opportunities. We aim to empower Indiana's small farmers with the knowledge and tools needed to effectively engage youth and build a strong community. We will focus on JMG activities that can be implemented in 30-45 minutes or can be self-directed. Each activity covers a foundational

growing concept. The following activities will be covered: Plant Parts We Eat - young gardeners explore basic plant parts and identify various plant parts used for food. Fruity Beauty and Blind Taste Test - young gardeners practice a charting exercise and explore their senses through a taste test. Shake, Rattle and Roll - young gardeners investigate soil components through color, texture, and structure analysis. Finally, small farmers who engage with this presentation and are interested in learning more will receive information for upcoming spring Junior Master Gardener train-the-trainer sessions to extend and deepen their learning.

The Buzz About Wild Bees: Identifying Indiana's Specialty Crop Pollinators

Ella Stroh

Purdue University

Pollination of specialty crops by bees increases fruit set and yield. While managed bees are commonly stocked in some crop systems to provide pollination, Indiana has over 400 species of wild bees that provide this pollination service for free. Despite this fact, there are few Indiana-specific records of which wild bee species contribute to pollination. In this study, we characterized bee communities in several of Indiana's specialty crops, including apples, blueberries, tomatoes, and watermelons. We quantified the proportion of crop flower visits attributed to different types of bees, allowing us to identify important pollinators and provide tips for identification and life history information. Regional data on the composition of wild bee communities promotes a better understanding of their value to specialty crops in Indiana, and providing tools to identify bees empowers growers to understand the pollination dynamics on their farms. This provides potential avenues for improving fruit set and yield by emphasizing the role that wild bees can play in providing free pollination services.

Use of Silage Tarps for Early-Season Weed Management in Small-scale Potato Production.

Josue Cerritos

Purdue University

While significant research and resources have traditionally focused on weed management in large-scale agriculture, small farms are essential contributors to local food systems. Small-scale farmers can benefit from innovative practices like reusable materials such as silage tarps that can be used for creating a stale seedbed or to facilitate emergence of slow-germinating crops such as carrots. In 2023, a field study was conducted to evaluate the use of silage tarps for early season weed management in potato production to determine if tarping could potentially replace an at-planting PRE herbicide application.

In this study we employed a split plot design which allow us to divide 8 beds into 4 blocks. Each block consisted of two beds, one covered with a tarp and a second that remained uncovered. The experiment had a factorial treatment arrangement consisting of three at-planting PRE applications (S-metolachlor at 800 g h⁻¹, flumioxazin at 82 g ha⁻¹ + pyroxasulfone at 104 g ha⁻¹, and tarping) by three layby applications made after hilling (no herbicide, rimsulfuron at 26 g ha⁻¹, and metribuzin at 670 g ha⁻¹). A non-treated weedy control was also included.

On May 5, 'Eva' potato seed pieces were planted, and tarps were laid on the ground immediately after planting, also PRE herbicides were applied broadcasted over-the-top of the rows not covered by tarps. Tarps were removed 3 weeks after planting (WAP) and layby herbicides were applied over-the-top of the bed on June 6 (4 WAP) just after hilling. Crop injury and weed control data were rated visually on a scale of 0 % (no injury/no weed control) to 100 % (crop death/complete weed control) at 2, 4, 6, and 8 WAP. Weed biomass was collected 2

weeks before harvest. Potatoes were harvested, graded into marketable and non-marketable tubers, and tuber weight and counts were recorded for each plot.

From Grasses to Forbs: Enhancing Arthropod-Mediated Ecosystem Services with Flowering Cover Crops

Zeus Mateos, Ashley Leach and Ian Kaplan
Department of Entomology, Purdue University

Grass cover crops, such as rye, are extensively used in commercial watermelon fields to protect seedlings against wind damage but these cover crops can act as alternative host plants for pests which can move into the crop. Additionally, grass cover crops do not provide resources to support natural enemies and pollinators. This results in intense spray programs to control pests and the use of managed pollinators (e.g. honeybees) to secure yields. In contrast, forbs (flowering cover crops) can provide extra resources such as alternative non-crop prey, nectar and pollen.

The study was conducted at three locations across Indiana. At each location, we established five treatments with five replicates, including i) rye, ii) crimson clover, iii) vetch, iv) buckwheat and v) mustard. Two watermelon beds were made interspersed with each cover crop. Weekly surveys were conducted from May-September 2023 recording density and diversity of natural enemies, pollinators and pests. Quantity (fruit set) and quality (weight) were recorded at harvest.

More natural enemies and pollinators were recorded in all flowering cover crops compared to rye. However, only on watermelon plants adjacent to buckwheat and mustard, more natural enemies were found compared to rye ($P=0.02$ and $P<0.01$, respectively). While only on watermelon plants next to vetch, more pollinators visited watermelon flowers compared to rye ($P<0.001$). Similar quality was

recorded but more watermelons were harvested with the vetch cover crop compared to rye ($P<0.01$). These results suggest that flowering cover crops may help growers increase production while reducing costs on insecticides and managed pollinators.

Mastering Home Food Preservation

Karen Richey¹, Atina Rohzon² and Dr. Amanda Deering³

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Purdue Extension's Food Safety team offers a variety of programs and resources throughout Indiana. Certifications and certificate trainings, food preservation classes with hands on experiences, as well as a variety of online and printed resources are available to Indiana stakeholders seeking food safety information and guidance. As part of a poster session, participants will learn about resources offered and how to connect with local Extension staff to further their (horticulture and or small farm) operation. Participants will also learn of services offered to stakeholders, such as dial gauge pressure canner testing. Indiana has in recent years adopted new regulatory requirements for the sale of home-based goods. Purdue Extension offers resources to assist vendors in this area and will be shared through the poster session. As part of the land grant system, Purdue Extension also has ties to other state resources, including the North Central Food Safety Extension Network. Participants will learn how to be connected to resources even beyond Purdue University.

Thank you to all of the poster presenters for their work with small farms & local food systems!