2024
Research Report
& Fiscal Year Annual Report

Pennsylvania Soybean Board

Ensuring a strong and profitable future for Pennsylvania's soybean growers.

Here's How the Soy Checkoff Works

The national soy checkoff was created as part of the 1990 Farm Bill. The Federal Act & Order that created the soy checkoff requires that all soybean farmers contribute 0.5% of the market price per bushel to the soy checkoff at the first point of sale of the soybeans. These funds are used for promotion, research, and education. Led by volunteer farmers, the United Soybean Board and the Pennsylvania Soybean Board invest and leverage soy checkoff dollars to MAXIMIZE PROFIT OPPORTUNITIES for all U.S. soybean farmers.

Pennsylvania Soybean Board

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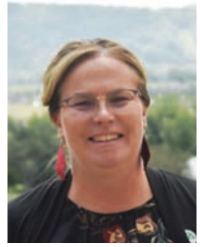
PA Soybean Farmers are Resilient



Emily Landis
Chair, Pennsylvania Soybean Board

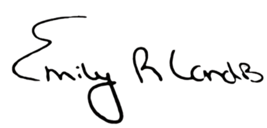
If 2024 has proven one thing, it is that Pennsylvania soybean farmers are resilient in times of challenge. This year brought a considerable change in commodity prices and remarkable variances in weather – from planting through harvest. Please know that you are not alone in facing these challenges. Your PA Soybean Board is here to partner with you.

Comprised of farmer-leaders, the PA Soybean Board is committed to our strategic initiatives to invest checkoff dollars wisely. Investments made with leading agricultural research institutions and their innovators continue to advance the profitability and success of the soybean industry. Delivering practical knowledge and tools applied at the farm level is always at the forefront in the conversations and decisions made by your Board. One of these examples is the important data that comes from our Pennsylvania Soybean Yield Contest entrants. In 2024, we had more than 30 entrants with a contest-record-breaking yield of 117.30 bushels per acre. A key outcome of this investment is being able to share the production practices of the contest participants, which can be found in the 2024 Soybean Yield Contest report on the PSB website.

We also see the need for investment in future Pennsylvania ag leaders and farmers. By partnering with educators and other organizations, we can continue to inform science-based practices, share soybean lessons and introduce the importance of agriculture in our daily lives to the younger generation.

At the beginning of the new year, the Board will engage in a new strategic planning session to affirm and refresh our mission and deliverables to you. The Board remains committed to ensuring a strong and profitable future for Pennsylvania Soybean Growers.

Your valued contribution to the future of PA soybean farming is appreciated. Thank you, and best wishes for continued success in 2025.



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OCT. 1, 2023 – SEPT. 30, 2024

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* *Also serves on United Soybean Board*

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Bringing Research Findings to Farmers

The articles in this research report summarize the checkoff-funded research being conducted in Pennsylvania. But checkoff-funded research goes far beyond the state.

Check out the findings from the research projects the soy checkoff invests in at the national and state levels on the Soybean Research & Information Network (SRIN) website.

SRIN was launched to communicate checkoff-supported research projects to soybean farmers across the country and be a virtual resource full of information and toolkits for more efficient soybean production.

Each article on the SRIN website provides insight and explanation on the research findings and links directly to the study in the research database for further exploration.

Follow SRIN on social media:

Soybean Research Information Network

@SoyResearchInfo

soybeanresearchinfo.com

Pennsylvania Soybean Board Annual Financial Report

Fiscal Year 10.1.2023 to 9.30.2024

CASH & ASSETS	
Operating Funds	$996,010
Emergency Preparedness Fund	$399,407
Dissolution Fund	$269,942
Equipment, Net	$187
Less: Liabilities	$144
Net Assets at 9.30.2024	$1,665,690
REVENUE:	
Assessment Income	$2,058,632
Less Assessments Paid to USB & Other State QSSBs	$1,127,754
Other Revenue	$105,608
PROGRAM EXPENSES:	
Communications	$71,909
Promotion & Education	$245,388
Research*	*$387,907
Administration/Audits/ Compliance/Insurance/Other	$163,561
Increase/(Decrease) in Net Assets	$167,721

* This amount reflects the actual disursement of the funds allocated for research as of September 30, 2024.

Visit the NEW PSB Website!

The Pennsylvania Soybean Board's website underwent a full redesign that went live in July of 2024. To better serve the needs of growers, First Purchasers, teachers and consumers the site is now easier to navigate with updated functionality, new content, and is more mobile responsive.

The user-friendly platform offers a range of new features that make it easier than ever to access valuable information, learn about the latest soybean research, stay informed about upcoming events and explore the educational resources available.

Whether you're a grower looking to enhance your knowledge, a First Purchaser looking for forms or contact information, or an educator looking for ag resources for the classroom, the website is a go-to resource.

If you haven't yet please visit the new and improved website at **www.pasoybean.org today!**

PENNSYLVANIA **SOYBEAN YIELD CONTEST**

A. Dale Herr Jr, top grower in the 2024 Pennsylvania Soybean Yield Contest.

Lancaster County farmer A. Dale Herr, Jr. was the commonwealth's top producer in this year's Pennsylvania Soybean Yield competition, sponsored annually by the Pennsylvania Soybean Board. His winning yield topped more than 30 other entrants with a contest record-breaking 117.30 bushels per acre.

THE PENNSYLVANIA SOYBEAN YIELD CONTEST is designed to focus farmers' attention on agronomic and management skills that will increase soybean profitability. The contest showcases crop management practices of some of the top soybean producers in the state. It recognizes not only the state-wide grand champion, but also the top growers in each of five production regions of Pennsylvania, based on maturity map.

ELIGIBILITY: Any bona-fide farmer who farms in Pennsylvania and grows 5 acres or more of soybeans within the state is eligible.

PRODUCTION: For the state-wide and regional yield contest winners, participants must use nonirrigated soybeans, but are not restricted as to variety, fertilization, spacing or other cultural practices.

PRIZES! In addition to bragging rights, the state champion receives an educational trip for two (the winner and one other individual* with a direct financial interest in their farming operation) to the Commodity Classic. (Up to $2,500.) The top yield winner in each region receives an educational trip for the winner to the Commodity Classic. (Up to $1,500.)

HOW TO ENTER: If you would like to enter the Pennsylvania Soybean Yield Contest, you must register by September 1. Online registration is available at www.pasoybean.org. Harvest report forms must be postmarked by November 15.

You may also request a registration form from your local Penn State Extension Educator, or by contacting: Penn State Extension

Lebanon County
PA Soybean Yield Contest
c/o Del Voight
2120 Cornwall Road, Suite 1
Lebanon, PA 17042-9777
717-270-4391

Penn State Extension-
Montgomery County
PA Soybean Yield Contest
c/o Andrew Frankenfield
1015 Bridge Road, Suite H
Collegeville, PA 19426-1179
610-489-4315

2024 Pennsylvania Soybean Yield Contest Winners

1st Place State Overall & South-Central Region
A. Dale Herr Jr,
(Lancaster County)
117.30 bu./acre

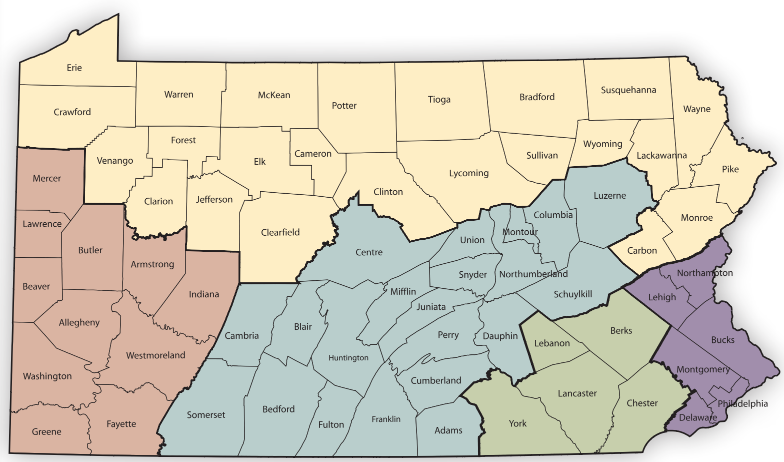
1st Place Northern Region
John Tebbs
(Lycoming County)
102.18 bu./acre

1st Place Southeastern Region
Brad Kiefer
(Northampton County)
100.54 bu./acre

1st Place Western Region
Ricky Telesz
(Lawrence County)
86.31 bu./acre

1st Place Central Region
Eric Myers
(Franklin County)
88.21 bu./acre

1st Place Irrigated Class
Steve Chapin
(Columbia County)
85.06 bu./acre



Scan the QR code to learn about the Pennsylvania Soybean Yield Contest

pasoybean.org

Soybean Management Practices – Regional Award Winners

Region	South Central	Central	West	Northern	Southeast
Winner	A. Dale Herr, Jr	Eric Meyers	Ricky Telesz	John Tebbs	Brad Kiefer
County	Lancaster	Franklin	Lawrence	Lycoming	Northampton
Previous Crop	Corn	Corn	Corn	Corn	Corn
Row Width	15″	30″	15″	15″	15″
Tillage Type	No-Till	Conventional	Min-Till	Min-Till	Min-till
Variety	Pioneer P35Z76E	Pioneer P49Z02E	Asgrow AG32XF2	Asgrow AG35XF1	Pioneer P37Z06E
Seeding Date	4/27/24	4/26/24	4/30/24	4/25/24	5/2/24
Seeding Rate	140,000	110,000	178,000	140,000	140,000
Final Stand	102,660	102,000	127,020	80,500	120,000
Seed Treatment	Pioneer Premium	Pioneer Premium	Fungicide & Insecticide	Seed Shield	Pioneer Premium
Inoculation	Dry	Liquid	Pre	Liquid	Pre
Fungicide	Stratego YLD	Miravis Neo	Approach	Revytek	Delaro Complete
Insecticides	Sniper	Mustang Maxx	Yes	Mustang Maxx	None
Pre-Herbicide	Roundup, Sharpen, Tribal	Verdict, Zidua	Metribuzin, Valor	Antares Complete Gramoxone	None
Post-Herbicide	Roundup, Enlist, Intensity One	Roundup	Roundup	Classic Roundup	Roundup, Liberty, Synchrony
Date of Harvest	10/12/24	10/10/24	10/18/24	10/11/24	10/23/24
Yield	117.30	88.21	86.31	102.18	100.54
Moisture %	11.90	14.40	12.80	14.20	9.87
Ave Pod Count	93	89	39	68	65
Harvest Loss	0.75 bu/a	2.00 bu/a	0.68 bu/a	0.25 bu/a	1.00 bu/a
Biostimulant	Radiate	No	None	None	–
Foliar Fertilizer	Nutrisync, Reax K, Ativus PK, Terramar	Yes	None	Yes	–
Cover Crop	yes	Wheat	Clover/Rye Interseeded into standing beans	Rye	Rye

To read the complete Pennsylvania Soybean Yield Contest 2024 Report scan the QR code or request a copy from your local Penn State Extension Educator.

pasoybean.org

PENNSYLVANIA
SOYBEAN ON-FARM NETWORK

Principal investigator & co-investigators:

Dr. Paul Esker, PSU Extension Plant Pathologist and Professor

Dr. Daniela Carrijo, PSU Extension Agronomist and Assistant Professor

Dr. Alyssa Collins, PSU Extension Plant Pathologist and Associate Research Professor

Sarah Frame, PSU Extension Field and Forage Crops Educator

Andrew Frankenfield, PSU Extension Field and Forage Crops Educator

Anna Hodgson, PSU Extension Field and Forage Crops Educator

Dr. Mihail Kantor, Assistant Research Professor

Ashley Isaacson, PSU Extension Field and Forage Crops Educator

Dr. Adriana Murillo-Williams, PSU Extension Field and Forage Crops Educator

Dr. Heidi Reed, PSU Extension Field and Forage Crops Educator

Dr. John Tooker, PSU Extension Entomologist and Professor

Dr. John Wallace, PSU Extension Weed Scientist and Associate Professor

Delbert Voight, PSU Extension Field and Forage Crops Educator

FUNDED AMOUNT: $290,190

RESEARCH SUMMARY

Since 2009, the Pennsylvania Soybean On-Farm Network has conducted on-farm research to address important questions driving soybean production in the Commonwealth. The importance of these trials and educational efforts is evident. Participants in the trials and workshops have indicated that they have gained a moderate to high amount of knowledge from the program.

Also, 75% to over 90% of workshop participants have indicated that they would adopt a new practice on their farm during the next one to two growing seasons. Interviews with farmer cooperators also show the value of the network, with comments ranging from indicating the importance of testing ideas at the farm scale to figuring out what works and does not work under production situations.

THANK YOU!

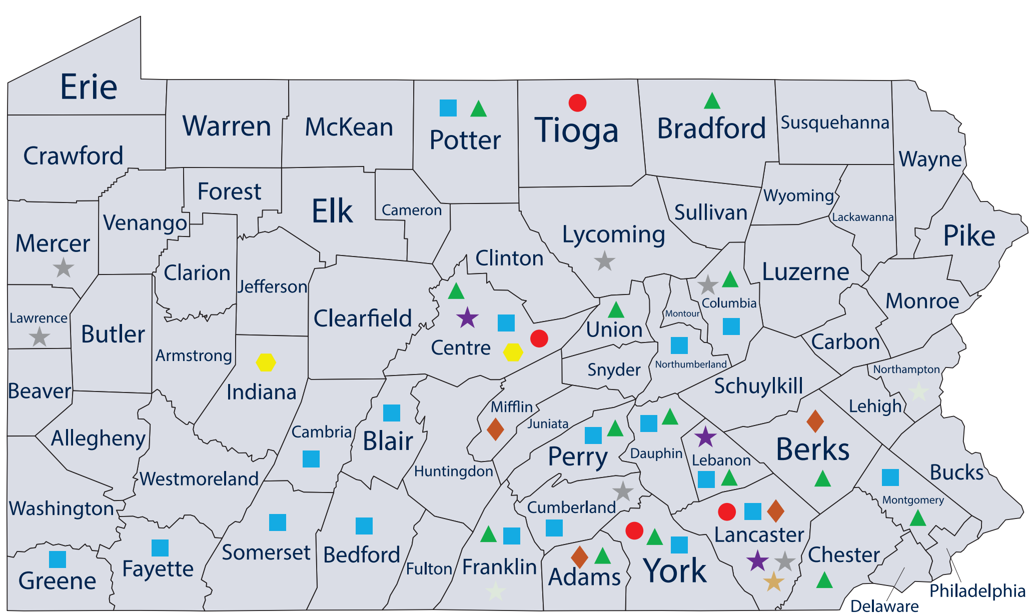
We thank our grower cooperators who participated in the 2024 Soybean On-Farm Network, our Penn State Extension Field and Forage Crops Extension Team members, and our staff scientists, graduate students, and interns for making this research possible. Conducting on-farm research requires additional time and effort from our growers, and we value your participation in testing new and novel ideas in production situations.

We look forward to continued collaborations in 2025.

2024 On-Farm Trial Sites by County

Locations of the 2024 Pennsylvania Soybean On-Farm Network trials and monitoring programs.

- Agronomy Projects
- Cover Crops
- Research Validation Plots
- Soybean Sentinel and Data-Driven
- Slug Monitoring
- See and Spray Trials
- 2023 & 2024 State Yield Contest Winner
- 2023 & 2024 Regional Yield Contest Winners



Production Agronomy

RESEARCH SUMMARY

With the changes in production practices and weather over the years, there is a need for continued local agronomic research. Soybean planting dates have shifted earlier for full season soybeans, and double crop soybean systems have expanded to new regions. This project aims to evaluate interactions between soybean maturity and planting time and support variety testing across the Commonwealth, including the maintenance and evaluation of off-patent saved seed stocks that have been locally grown since 2019. Variety trials were established in Centre (full season), Lancaster (full season and double crop), York (full season and double crop), and Tioga (full season) counties. Further, in 2024 we initiated a study to evaluate soybean growth enhancer products marketed to boost soybean vigor early in the season, especially under early planting conditions. First year results from this study are summarized in this report.

One field trial was implemented in Centre County to evaluate the potential of soybean growth enhancers and other products to improve soybean emergence and yield. Ten treatments were selected based on producer surveys (Table 1). All treatments were evaluated under an ultra-early planting date (April 23), intended to represent cold emergence conditions, and a normal planting date (May 21). The total of 20 treatment combinations were replicated five times. Seeding rate was 160,000 seeds per acre in all cases.

Early Trial Vigor

Table 1. *Description of soybean growth enhancer treatments evaluated in two planting dates. Soybean stand and yield were averaged across planting dates because there was no interaction between planting date and treatment. Different letters within a column indicate significant differences (p=0.05).*

Treatment Description*				Early soybean stand (x1,000 plants/A)	Yield (bu/A)
T#	Name	Type	Placement		
T1	Absolute Control	-	-	118 ab	81 ab
T2	Biological Control	-	-	99 b	77 b
T3	Biobuild Soy BioST+R	Biological	Seed treatment	113 ab	80 ab
T4	Biotrinsic M34+N13+E13	Biological	Seed treatment	123 a	87 a
T5	Symvado ST	Biological	Seed treatment	115 ab	81 ab
T6	Terramax	Biological	Seed treatment	116 ab	80 ab
T7	Fertiactyl ST liquid	Fertilizer	Seed treatment	110 ab	80 ab
T8	Protivate NU4-DRI	Fertilizer	Seed treatment	108 ab	83 ab
T9	AMS (20 lb N/A)	Fertilizer	Broadcast pre-plant	122 ab	80 ab
T10	Urea (20 lb N/A)	Fertilizer	Broadcast pre-plant	108 ab	84 ab
			ANOVA p-value	0.048	0.019

**Except for the absolute control, all seeds received a commercial fungicide and insecticide seed treatment. T1=untreated seed. T2=seed treated with fungicides and insecticides but no biologicals.*

(continued from previous page)

Production Agronomy

FINDINGS

Plant emergence was monitored over the first month after planting. Independent of planting date, the application of Biotrinsic M34+N13+E13 (T4) increased soybean emergence compared to the Biological Control (T2), in which the seeds were treated with insecticides and fungicides but not with a biological product. At the 2-leaf stage, soybean stand was 24% higher in T4 compared to T2. Similar differences between treatments were observed for grain yield, which was 12% higher for T4 than T2 independent of planting date. Apart from Biotrinsic M34+N13+E13, no other product increased or decreased soybean emergence or yield compared to the control treatments. Further, no treatment, including T4, was significantly different than the absolute control (untreated seed) with regards to emergence or yield.

While there were no interactions between planting dates and treatments, planting date had a significant effect on soybean emergence and yield. On average across treatments, early soybean stand and yield were higher for the soybeans planted on April 23 compared to the soybeans planted on May 21.

These results show that the biological seed treatment Biotrinsic M34+N13+E13 improved emergence and yield compared to fertilizer treatments or seed treatments without biologicals in this trial. Importantly, this product was evaluated in 103 trials across the US, including one trial in Pennsylvania in 2023, and did not show evidence of a yield advantage. Therefore, the yield advantage observed in this trial may not be consistent across years and locations.

The higher yield observed with the ultra-early planting date agree with published results showing a consistent yield advantage with early planting as long as plant establishment is not compromised. In this trial, slug pressure was low, planting was not immediately followed by rain (no imbibitional chilling was observed), and there was not a killing frost after plants emerged. Therefore, conditions were favorable for the potential yield advantage associated with early planting to realize.

Table 2. *Effect of planting time on soybean stand and yield. Different letters within a column indicate significant differences (p=0.05).*

Planting time	Early soybean stand (x1,000 plants/A)	Yield (bu/A)
Ultra-early (April 23)	122,000 a	85 a
Normal (May 21)	104,000 b	78 b

Expanding Cover Crop Options: Drone Interseeding Into Standing Soybeans Versus Post-Harvest Seeding

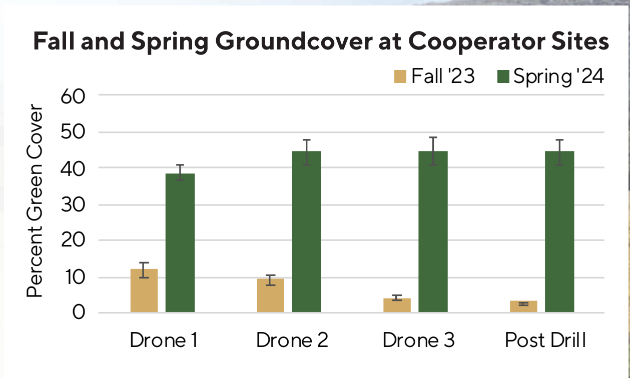
RESEARCH SUMMARY

Prior years of this project have shown that the benefit of broadcast interseeding cover crops into standing soybeans increase as post-harvest seeding and spring termination dates get later. With drone applications becoming more economically viable as payloads and battery technology improve, this year our objective was to compare establishment success of drone-seeding cereal rye into standing soybeans at three different dates compared to post-harvest seeding.

Establishing cover crops after soybeans is important for soil conservation and nutrient management but can be difficult. We continue to collect data that shows the drone seeding method works, but there are circumstances where it fits best, saving farmers time, money, and frustration from figuring these out themselves through trial and error.

Three farmer cooperators were selected across a range of climates, geographies, soil types, and management strategies in Adams, Berks, and Juniata Counties. Drone service was provided by Swift Aeroseed, LLC out of Carlisle, PA. Swift Aeroseed, LLC drone seeded cereal rye at approximately 80 pounds per acre starting at the initiation of leaf yellowing, then every other week for three total drone seeding dates. Farmer cooperators post-harvest seeded rye with their own equipment, as soon as possible after soybean harvest.

We took similar measurements to prior years of the project; soil nitrate (0-6 inches), cover crop density (plants per square foot), and groundcover (percent) in the fall and spring; and cover crop biomass (pounds per acre) in the spring.



Experimental Drone in action at the Juniata Co. site; germinated rye at the Juniata Co. site on 10/2/23.

FINDINGS

At cooperator sites, cereal rye density was highest in the drill seeded treatment in both the fall and spring. The percentage of the groundcover was higher the earlier the cover crop was seeded. However, by spring sampling, there was no difference between seeding dates or methods. Rye biomass was maximized by drill seeding after soybean harvest (3,462 pounds per acre dry matter), or drone seeding at the second planting date (3,794 pounds per acre dry matter), or between September 28 and October 2.

At SEAREC, Groundcover and rye density trended highest at the third seeding date, October 4. However, differences were minimal by spring. Like the cooperator sites, broadcasting between September 27 (2,731 pounds per acre dry matter) and October 4 (2,558 pounds per acre dry matter) resulted in significantly higher biomass than other planting dates, including drill-seeding after soybean harvest (1,686 pounds per acre dry matter). Planting date and method had no impact on soil nitrate across locations.

We found the greatest benefit to drone seeding the rye was quicker groundcover in the fall, with minimal impact on biomass production or spring groundcover. However, we found no benefit to broadcasting cereal rye into standing soybeans when done within one month of soybean harvest and post-harvest seeding (if drilled or broadcast/incorporated). Drone seeding (or any broadcast method) into standing soybeans can be more appealing to farmers who delay termination in the spring.

Spot-spray Technology: Where is the Fit in Pennsylvania's No-till Soybean Production Systems?

RESEARCH SUMMARY

Significant technological advancements have led to real-time, camera-based weed detection systems that can be used on commercial sprayers for site-specific weed control. Cost savings associated with this practice will be a function of (1) herbicide efficacy relative to broadcast applications, which can influence crop yield loss; and (2) weed pressure within fields (i.e., density and spatial distribution), which can influence the proportional reduction in herbicide inputs relative to broadcast applications. Total herbicide reduction also has important implications for environmental stewardship, particularly given the likely increase in regulation of herbicide use.

In the 2024 production season, we collaborated with John Deere to evaluate the return-on-investment of spot-spray technologies on a western PA grain farm. On-farm demonstration trials provide realistic estimates of herbicide input savings from spot-spray technologies across a range of weed infestation levels in Pennsylvania production fields. The on-farm demonstration trial was completed using John Deere's See-and-Spray Ultimate, which includes a dual tank system that allows for simultaneous targeted and broadcast applications. Our objectives were to (Obj 1) quantify herbicide input reduction as a function of field size (i.e., no. of acres) when utilizing spot-spraying; and (Obj 2) relate herbicide input reduction from spot-spray technologies to weed distribution patterns within fields.

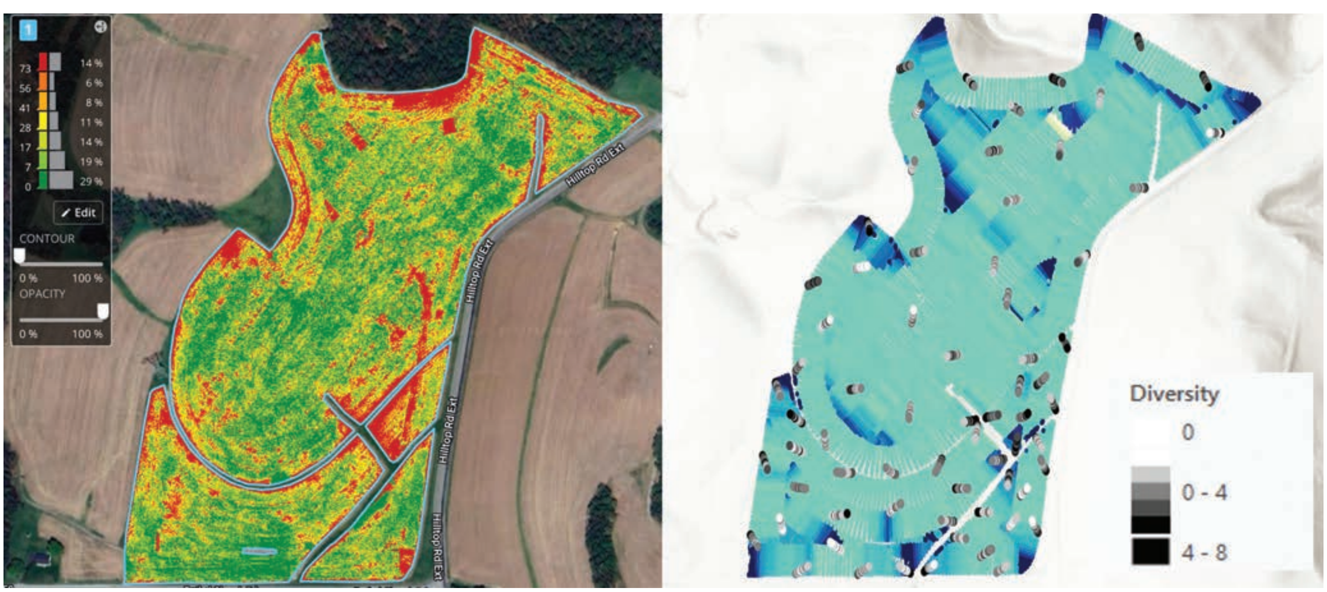
FINDINGS

Approximately 400 ac of soybean were sprayed using See-and-Spray technology at the POST application timing in full season soybean. Within 3 to 5 days of the spot-spray applications, PSU Weed Science staff conducted weed surveys within each targeted field. The size of surveyed fields ranged from less than four acres to greater than 30 acres.

- Based on data available from See-and-Spray Ultimate, weeds were absent within 35% of the field on average (see, Fig 1 for example), but the proportion of acres not sprayed was less than 5% on average, resulting in marginal herbicide input reduction and return-on-investment relative to a broadcast application.
- Weed surveys conducted within targeted fields showed that field edges had higher weed coverage due to greater density and diversity of weed species (see, Fig 1 for example), including several wind-dispersed annual species as well as biennials or perennials.
- The discrepancy between weed coverage and herbicide input reduction was due, in part, to weed distribution patterns in the field. Specifically, several no-till weed species (dandelion, yellow woodsorrel) that persisted in the early season were distributed throughout the field, which lowered cost savings in the field interior.

FUTURE WORK. In 2025, we anticipate collaborating with additional commercial grain farms to conduct weed surveys following spot-spraying operations. Conducting surveys across a range of management practices and landscapes will provide a more complete picture of the potential return-on-investment from spot spraying technologies. In addition, we are working to create a data management pipeline that allows for comparison of weed coverage maps to other precision agriculture data layers, including yield maps, field topography, and soil data.

Figure 1. *Example of (L) weed coverage (%) map generated by See-and-Spray Ultimate at the time of spot spray application; and (R) weed survey data collected in transects after spot spray application to characterize the density and diversity of targeted weed species.*



Soybean Sentinel Monitoring and Data-Driven Scouting Solutions

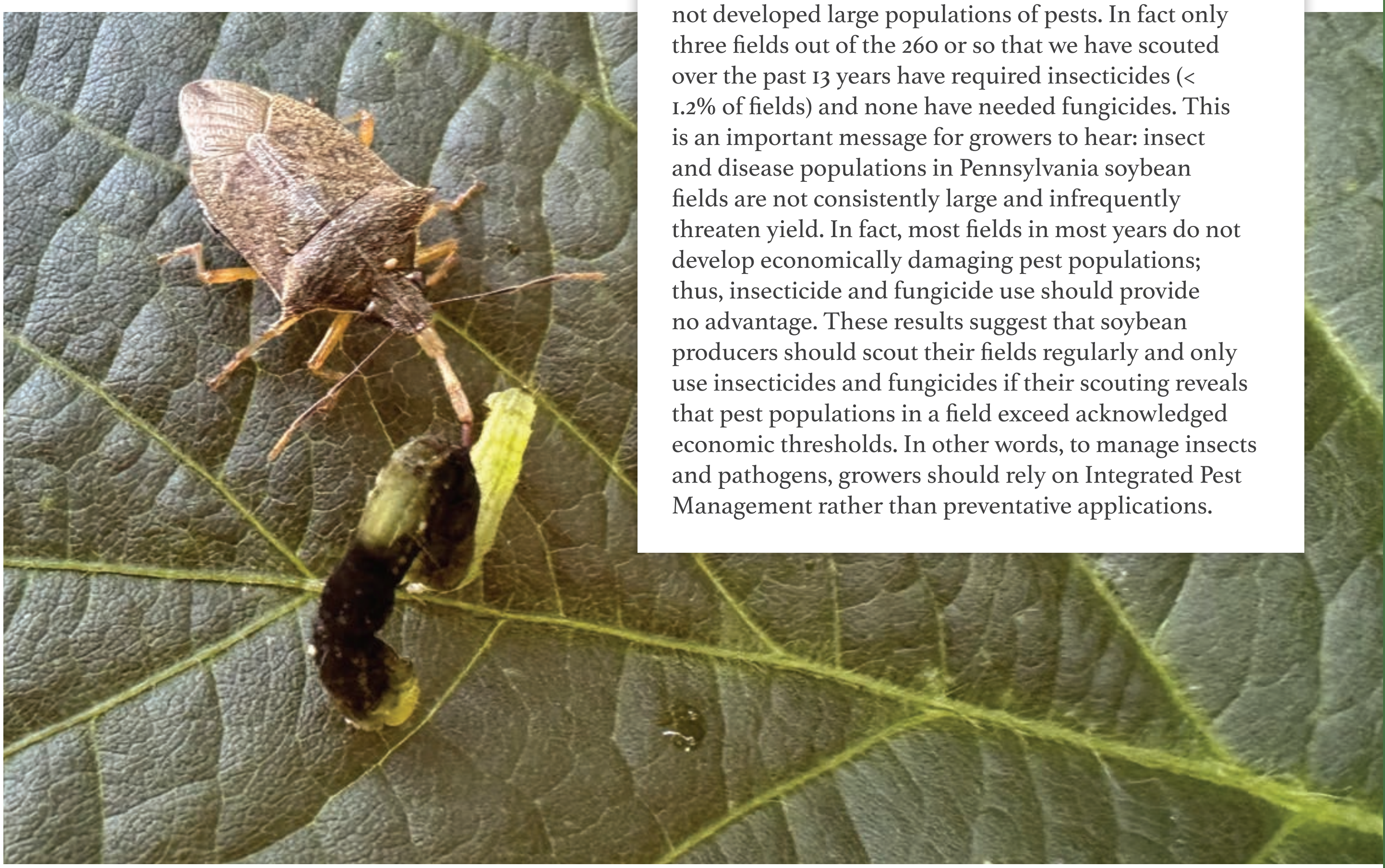
RESEARCH SUMMARY

In 15 counties in Pennsylvania, we established sentinel plots in commercial soybean fields. We purposely selected soybean fields that did not receive preventative applications of insecticides and fungicides so we could assess the actual threat of pests to fields. Penn State Extension Educators then scouted these plots weekly for insects (pest and beneficial species) and diseases. The project sought to provide soybean growers with unbiased and timely regional assessments of insects and diseases active in soybean fields. In these fields without preventative insecticides and fungicides, we expected that insect and disease populations would remain small and not threatening to yield. The goal of our project was to demonstrate the value of scouting for understanding local populations, including pests and beneficial species, and encourage growers to adopt Integrated Pest Management in their soybean production.

FINDINGS

In 2024, like previous years, our scouting efforts discovered a narrow range of insects and diseases infesting soybean fields. The main pests we encountered were bean leaf beetles, Japanese beetles, grasshoppers, Septoria brown spot, and frogeye leaf spot. Importantly, none of the pest populations that we found during our weekly scouting efforts exceeded economic thresholds; thus, the fields we were scouting did not require rescue treatments of insecticides or fungicides. One of the main reasons that insect pest populations did not grow large enough to threaten yield was the presence of robust communities of natural enemies that help control insect pests. Soybean fields can harbor good populations of beneficial species (mainly insects and spiders), but fields that receive insecticides (seed applied or foliar-applied insecticides) unnecessary do not host good communities of natural enemies and therefore do not benefit from the control that they can provide.

Since 2012 when we started this project, the great majority of soybean fields that we have scouted have not developed large populations of pests. In fact only three fields out of the 260 or so that we have scouted over the past 13 years have required insecticides (< 1.2% of fields) and none have needed fungicides. This is an important message for growers to hear: insect and disease populations in Pennsylvania soybean fields are not consistently large and infrequently threaten yield. In fact, most fields in most years do not develop economically damaging pest populations; thus, insecticide and fungicide use should provide no advantage. These results suggest that soybean producers should scout their fields regularly and only use insecticides and fungicides if their scouting reveals that pest populations in a field exceed acknowledged economic thresholds. In other words, to manage insects and pathogens, growers should rely on Integrated Pest Management rather than preventative applications.



A predaceous stink bug attacking a caterpillar species. This is one of the many predaceous insect species that can be found in soybean fields; these valuable allies in pest control can be conserved by using insecticides sparingly within an IPM framework.

Pennsylvania Slug Monitoring Project

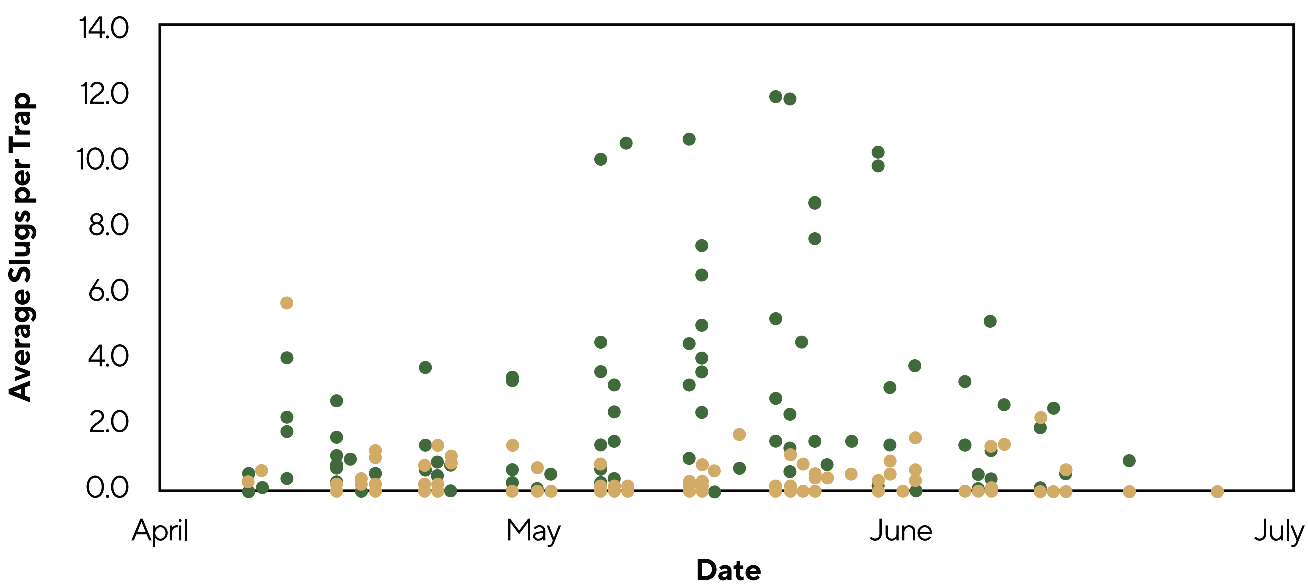
Slug eggs found in York County, Pa.

Slugs on underside of shingle in Montgomery County, Pa.

RESEARCH SUMMARY

In spring 2024, slugs were a major challenge for PA grain farmers and soybean growers in particular—this was the worst slug season most of us have ever seen. Most farmers had at least one field that needed to be replanted due to slug damage. The mild winter paired with a cool, wet spring created perfect conditions for slugs. This year, we deployed slug traps in 18 fields (10 shingle traps per field) in 14 counties (Adams, Berks, Blair, Bradford, Centre, Columbia, Dauphin, Franklin, Lebanon, Montgomery, Perry, Potter, Union, and York). Extension educators checked the traps weekly to count and identify slugs to species and characterize their feeding damage. Each week from mid-April to mid-June, we published a report in Penn State's Field Crop News (an online newsletter that reaches >12,000 subscribers) to summarize what educators were finding (https://extension.psu.edu/2024-pennsylvania-slug-monitoring-project). Grey garden slugs were the most common species followed by marsh slugs. As we would expect, grey garden slugs increased in number from mid-April and peaked around mid-May (Figure 1). Slug bait is recommended when traps average 1-2 slugs with increasing crop damage. Twelve of our 18 fields had a trap average of more than 2 slugs at some point during the season and at least 4 fields applied slug bait. The data we collected will also contribute to development of a degree-day model that should help predict when slugs will hatch from overwintered eggs in spring.

Figure 1. *During the spring of 2024, average number of slugs per trap across monitoring locations (grey garden slugs (green); marsh slugs (yellow).*



Proactively Monitoring Plant Parasitic Nematodes in Pennsylvania Soybean Fields

RSEARCH SUMMARY

Since 2018, we have implemented a comprehensive nematode monitoring program targeting agronomic crops in Pennsylvania. This program, offered at no cost to farmers and stakeholders, involves the distribution of pre-labeled soil bags with sampling instructions and a field history form to facilitate participation. We focus on the plant parasitic nematodes soybean cyst nematode (SCN, Heterodera glycines), root lesion nematodes (Pratylenchus spp.), and root-knot nematodes (Meloidogyne spp.). These nematodes are significant threats to staple crops worldwide and infest a variety of plants, including soybeans, resulting in considerable yield losses and economic damage.

Among these pests, SCN stands out as the most damaging soybean pathogen in North America. First identified in North Carolina in 1954, SCN has since spread to nearly every county where soybeans are cultivated. In Pennsylvania, SCN was first reported in Lancaster County in 2002. The potential yield losses associated with SCN damage can exceed 50%, underscoring its destructive impact.

Root-knot nematodes, traditionally associated with southern U.S. regions, also pose an emerging threat due to Pennsylvania's diverse cropping systems. While their prevalence in the state is still relatively low, understanding their role in soybean production is critical. Given the widespread impact of nematodes on agriculture, proactive monitoring and research into their behavior, distribution, and interactions with other soil organisms are vital for effective management. The combination of the Pennsylvania Soybean Board's investment with improved infrastructure at Penn State lays a strong foundation for Pennsylvania to respond and adapt quickly to threats to agronomic crop production due to nematodes.

Due to the significant prevalence of root lesion nematodes across most surveyed counties in Pennsylvania (Figure 1), we expanded our research focus in 2024 to include species-level identification of this nematode using advanced molecular techniques such as PCR and metabarcoding of soil samples obtained in Pennsylvania. These methods allow us to investigate the interactions between nematodes and other soil microbes, contributing to a more comprehensive understanding of their impact on soybean health and productivity. These efforts are significant in informing farmers about plant parasitic nematode management decisions.

FINDINGS

Since implementing the nematode monitoring program, we have processed 927 soil samples from 52 counties in Pennsylvania. SCN has been documented in 8 counties, including several major soybean production areas, while root-knot nematodes have been observed in 12 counties. Most notably, root lesion nematodes exhibit the most widespread distribution in 48 counties.

These findings underscore the critical need for ongoing surveillance and development of best management practices to mitigate nematode-induced damage. Our molecular studies aim to clarify the interactions between these nematodes and other soil microbes, enhancing our understanding of their combined effects on soybean health. Ultimately, this research supports the development of more effective, science-based management strategies for nematode control in agronomic systems.

The results of this program are vital for ensuring the sustainability of soybean production in Pennsylvania and beyond. By equipping farmers with actionable insights and evidence-based recommendations, we aim to minimize the economic and environmental impacts of plant-parasitic nematodes.

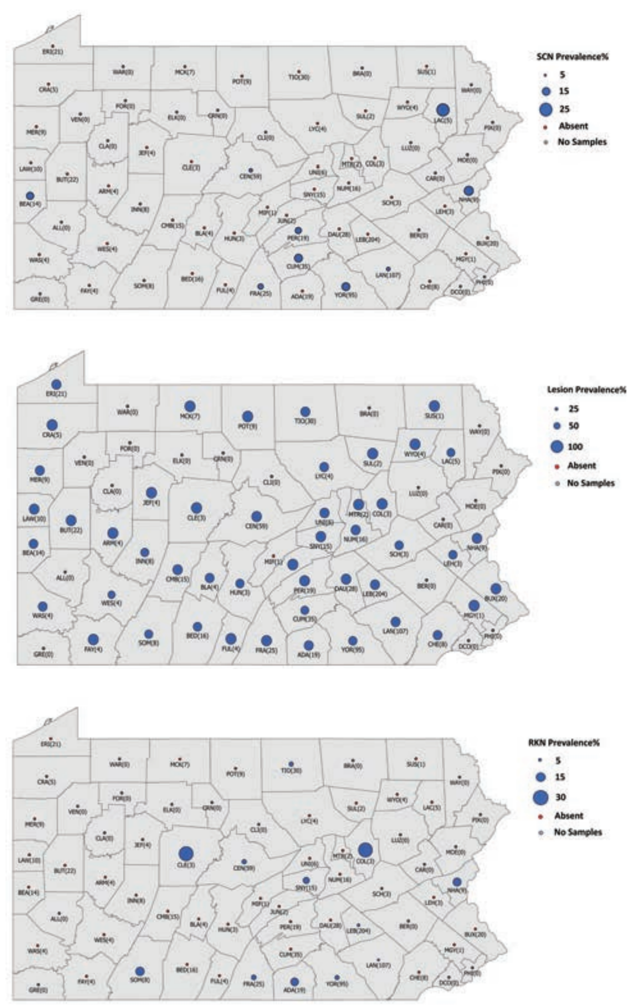


Figure 1. *Maps showing the current prevalence of soybean cyst nematodes (upper), root lesion nematodes (middle), and root-knot nematodes (lower) in Pennsylvania. Since 2018, 927 samples have been received and tested from 52 Pennsylvania counties.*

Adjusting Soybean Harvest Time to Reduce Late Season Yield Loss and Protect Grain Quality

Principal researcher: Dr. Daniela Carrijo, PSU Extension Agronomist and Assistant Professor

FUNDED AMOUNT: $17,536

RESEARCH SUMMARY

Erratic weather late in the season threaten soybean yield and grain quality. In 2024, many places in the Commonwealth experienced a hot and dry summer followed by long lasting rain events brought by Hurricane Helene in late September. This weather pattern promoted late season yield losses and grain quality issues in soybean fields that reached harvest maturity just before the rainy weather. These fields exhibited widespread pod splitting, seed shattering, pre-harvest sprouting, and other grain quality issues. There is a critical need for new studies aimed at quantifying the impact of harvest timing on soybean yield and grain quality.

To address this need, we joined the Science for Success team in a national effort to implement a harvest timing study in 14 states across the nation. In Pennsylvania, we implemented one field trial at Rock Springs, PA, in 2024. The trial included 18 treatments representing combinations of two planting dates (May 2 and May 20), three soybean maturity groups (1.9, 2.7, and 3.6), and three harvest times as follows: the first time grain moisture reached 15-16% after physiological maturity (Harvest Time 1, H1), two weeks after H1 (Harvest Time 2, H2), and 4 weeks after H1 (Harvest Time 3, H3). This treatment structure was intended to create staggered harvest dates representing the typical soybean harvest window in Pennsylvania. Treatments were replicated five times. Plots were 10 feet wide and 60 feet long and were harvested with a 2-row plot combine.

FINDINGS

Treatments were harvested as close as possible to the protocol-defined times as long as the weather permitted. Harvest dates ranged from September 16th to November 15th. Lodging and green stem severity were assessed immediately before harvest and were zero or minimal whenever present, even at the last harvest date. The soybeans in this trial were planted at 30" row spacing and at 160,000 seeds per acre, thus conditions were not overly conducive to lodging.

Yield harvest losses were measured immediately before and after harvesting by counting the number of grains on the ground using a 1-foot square quadrat. All loose grains and grains in pods that were detached from plants were counted. Pre-harvest losses were largely caused by seed shattering given the absence of lodging in this trial.

Across planting dates and maturity groups, pre-harvest losses increased as harvest was delayed from H1 to H3 (Figure 1). On average, pre-harvest yield losses were less than 0.2% when the soybeans were harvested early (H1) but increased to 1.5% when harvest was delayed for another four weeks (H3). However, pre-harvest losses were generally low, with over half of the plots having zero measurable pre-harvest losses. Post-harvest yield losses were generally higher and averaged 2.5 bushels per acre across treatments. When pre- and post-harvest losses were consolidated into total harvest losses, some treatment differences disappeared (Figure 2). Delaying harvest from H1 to H3 increased total harvest yield losses for the MG 1.9 variety, but not for the other two later maturing varieties.

Under the conditions of this trial and in the absence of lodging, delaying soybean harvest up to 4 weeks after the grain first reaches 15-16% moisture only affected total harvest yield losses in certain conditions. A more comprehensive data analysis, including weather and plant growth data, is underway and will help us identify the main drivers of these losses. Grain quality analyses are also underway.

Figure 1. *Pre-harvest yield loss calculated as a percentage of yield.*

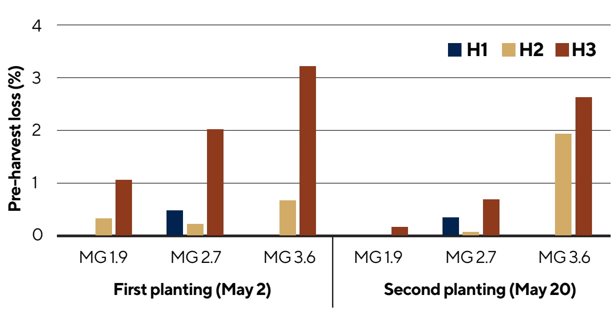
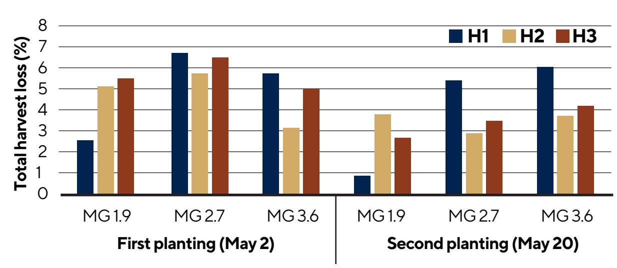


Figure 2. *Total harvest yield loss (pre- and post-harvest) calculated as a percentage of yield. Different letters within a planting and maturity group (MG) indicate significant differences (p=0.05) between harvest times.*



Advancing Herbicide Resistance Monitoring and Quick Diagnosis in Pennsylvania

Principal researcher: Dr. Caio Brunharo, PSU Assistant Professor, Applied Weed Physiology Laboratory

FUNDED AMOUNT: $22,487

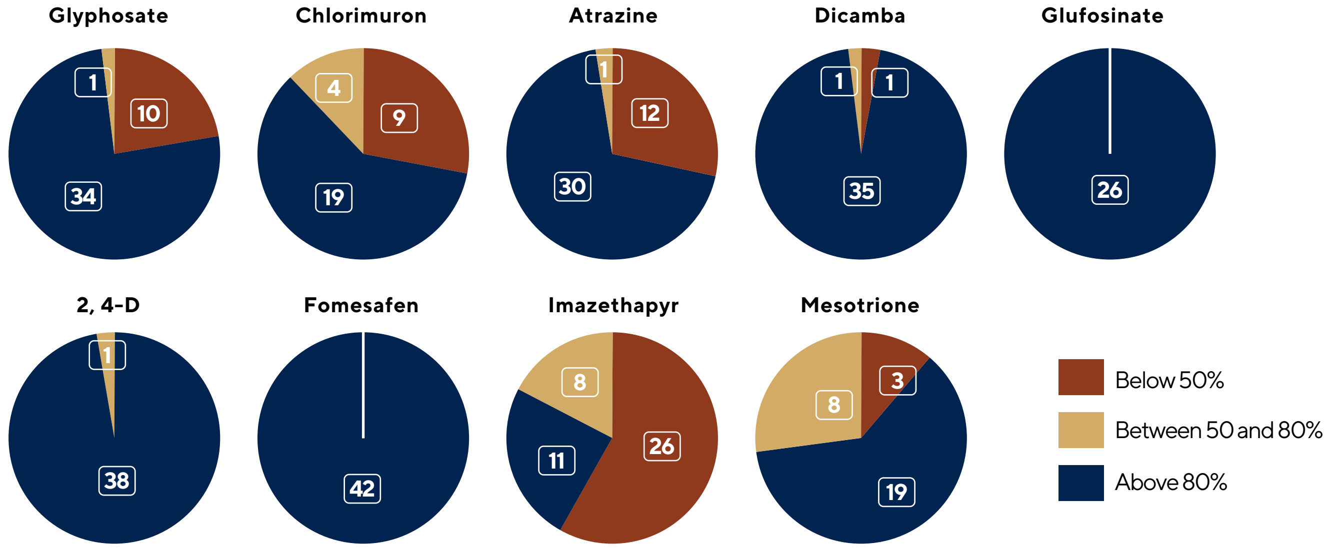
RESEARCH SUMMARY

The overarching goal of this project is to characterize the current state of herbicide resistance in Pennsylvania soybean fields and develop methods for the rapid diagnosis of resistance to key herbicides. Conventional methods to characterize herbicide resistance are time-consuming and the turnaround time is extremely long, and the information obtained is rarely used within the same growing season. Ultimately, our goal is to develop an herbicide resistance monitoring program where farmers could send suspected resistant populations to our program and receive timely reports on herbicide resistance and susceptibility status. The first steps toward these goals are to (i) understand what types of herbicide resistance there are in Pennsylvania, and (ii) understand the resistance mechanisms so quick molecular methods can be developed. We have sampled populations of Palmer amaranth and waterhemp, and have been conducting herbicide resistance screenings with nine commonly used herbicides (2,4-D, atrazine, chlorimuron, dicamba, fomesafen, glufosinate, glyphosate, imazethapyr and mesotrione).

FINDINGS:

Our current pigweed collection has 19 populations of waterhemp and 27 populations of Palmer amaranth from 18 PA counties. Each population was treated with twice the labeled rate of each herbicide, with 10 replications for each population × herbicide combination. In total, we had 3390 experimental units to date (population × herbicide × replication combinations). Based on the frequency of resistant individuals present, a population was classified as susceptible (i.e., if more than 80% of the individuals were controlled), intermediate (between 50 and 80% of individuals were controlled), and resistant (more than 50% of individuals survived). The most common type of herbicide resistance identified is to group 2 [chlorimuron (Classic) and imazethapyr (Pursuit)] and 9 [glyphosate (Roundup)] (Figure 1). The fact that we did not observe cross-resistance in all populations to group 2 herbicides indicated populations might have different resistance mechanisms. Resistance to group 5 [atrazine (Aatrex)] and 27 [mesotrione (Callisto)] was also identified. We did not detect resistance to fomesafen (FlexStar) or glufosinate (Liberty), and detected low frequency of resistance to 2,4-D and dicamba. We are currently completing the screenings with post-emergence herbicides, as not all herbicides were tested against all populations. We are also conducting pilot studies and will be testing pre-emergence herbicides. Finally, we are currently assessing the molecular mechanisms of glyphosate, chlorimuron, imazethapyr, and atrazine resistance with the goal of developing molecular markers for quick resistance diagnosis. In conclusion, our results indicated that herbicide resistance to group 2, 5, and 9 has evolved in PA, but it is still not widespread, suggesting resistance diagnostics could assist farmers with the decision-making. In addition, our results indicated 2,4-D, dicamba, fomesafen and glufosinate continue to be effective tools in weed management as few to no populations have evolved resistance.

Figure 1. *Pie charts illustrating the distribution of herbicide resistance in pigweed species to nine herbicides. Numbers indicate populations under each category. Brown section indicates survival of more than 50% of the individuals screened. Yellow section indicates between 50 and 80% of the individuals were controlled. Blue section indicates more than 80% of the individuals were controlled.*



Development of Best Management Guidelines for White Mold in Pennsylvania

Principal researcher and co-investigators: Dr. Paul Esker, PSU Extension Plant Pathologist and Professor; Tyler McFeaters, Penn State Education Program Specialist; Karen Luong, Assistant Professor, Grove City College

FUNDED AMOUNT: $20,160

RESEARCH SUMMARY

Since 1996, white mold has caused soybean yield loss equivalent to an average of $10 per acre in Pennsylvania. The disease is caused by the fungus Sclerotinia sclerotiorum, which thrives in cool, wet weather. The pathogen can infect numerous host plants and survive in the soil for five or more years as sclerotia, black overwintering structures, complicating disease management. Given the variability of microclimates and production practices across Pennsylvania, targeted risk assessments and management strategies are needed.

Our project aims to improve our understanding of the efficacy of fungicides in managing white mold and testing the pathogen for potential resistance development. To increase the efficiency of screening isolates, we developed a high-throughput fungicide sensitivity assay. These findings give us insight into the durability of fungicides as management tools.

Fungicide efficacy trials were established at an on-farm cooperator's field in Lebanon County, which has a history of white mold. Five fungicides were tested, with treatments applied once (R1 = beginning flowering) or twice (R1 and R3 = beginning pod). There was also an untreated check (UTC). The experimental design was a randomized complete block with four replications. In 2024, we also tested a product from Corteva called Viatude™.

Disease assessments were conducted by rating 50 plants in each plot using a 0-3 scale, where 0 = no disease, 1 = disease only on lateral branches, 2 = disease on the main stem, and 3 = disease on the main stem and plant wilt or death. The disease severity index (DIX, measured as a %) was calculated from the ratings. Yield (bu ac-1), test weight (lb bu-1), and moisture (%) were also recorded.

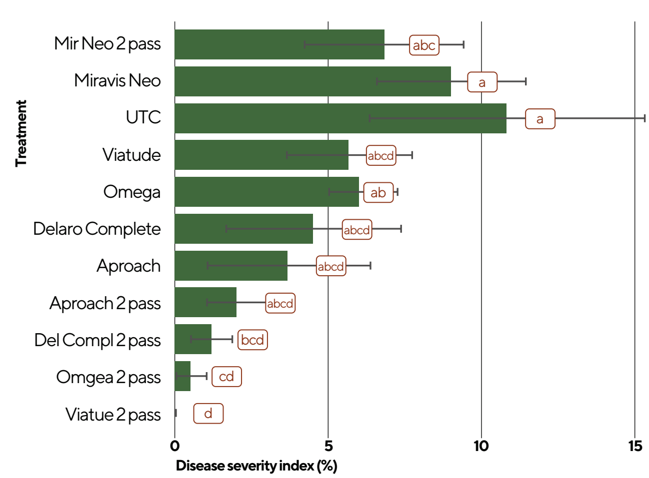
In laboratory assays, 30 S. sclerotiorum isolates from four soybean and one snap bean production region were compared using the high-throughput sensitivity assay and traditional Petri plate assay to verify the reliability of the high-throughput results. Four commonly applied fungicides, Topsin®, Endura®, Aproach®, and Omega®, were diluted to 0.01%, 0.1%, 1%, 10%, and 50% of the recommended field dose and added to potato dextrose broth (PDB). Three 24-well tissue culture plates were used for each isolate with fungicides randomized by row, concentrations by column, and four wells with non-amended PDB positive and negative controls. Fungal density in the wells was measured at 48 hours, and percent fungal growth was calculated and compared to the positive controls (no fungicide).

FINDINGS

On-farm fungicide efficacy trials: The weather during soybean flowering was not conducive to white mold disease development. The untreated check averaged 11% DIX. No single application treatments significantly reduced disease, but all two-pass treatments reduced disease severity, except Miravis® Neo (Figure 1). There were no significant differences among treatments considering yield (α= 0.05). From the single application treatments, Omega yielded the highest with 83 bu ac-1, followed by Viatude® and Aproach® (82 bu ac-1), Miravis® Neo and Delaro® Complete (79 bu ac-1), and the UTC (78 bu ac-1).

Fungicide sensitivity: The high-throughput method was more efficient for screening isolates. However, it results in higher EC50 values, the concentration to reduce fungal growth by 50% compared to the traditional method, which can be corrected through calibration. Topsin® and Endura® could not be analyzed due to solubility issues. This study showed a 13% increase in the EC50 value for Aproach® from a previous study, suggesting the S. sclerotiorum population in Pennsylvania is shifting toward reduced sensitivity. However, there was no evidence of resistance development. Omega® was the most effective fungicide at inhibiting fungal growth.

Figure 1. *The 2024 white mold fungicide efficacy trial in Lebanon County trial bar graph showing disease severity index by treatment. Different letters by treatment indicate differences at the 5% level.*



Evaluating the Effects of Extreme Precipitation on the Efficacy of Weed Management in Soybeans

Principal researcher and co-investigator: Dr. Carolyn Lowry, PSU Assistant Professor; Dr. John Wallace, PSU Extension Weed Scientist and Assistant Professor

FUNDED AMOUNT: $16,813

The Northeast is experiencing a 71% increase in extreme precipitation events, which can increase soil-applied herbicide leaching and runoff, thereby decreasing preemergent residual herbicide efficacy. Cover crop surface residues can suppress weeds, thus offering alternative weed control when residual herbicides fail. However, cover crop surface residues increase soil moisture, which may exacerbate the loss of residual herbicides in response to extreme rain events. Therefore, we are investigating how extreme precipitation affects weed management efficacy.

RESEARCH SUMMARY

Evaluate how variable precipitation influences the efficacy of residual herbicides varying in solubility.

Evaluate whether cereal rye surface residues can enhance weed control when used in combination with residual herbicides when extreme rainfall events occur.

To address these objectives, we have completed one year of research evaluating how Group 15 residual herbicides affect weed control efficacy when combined with and without a cereal rye cover crop. Group 15 herbicide treatments included: None, Dual II Magnum, Outlook, and Zidua. Additionally, we applied the following simulated precipitation treatments with rainfall simulators we developed: 1. Ambient rainfall (0 inches of added precipitation, "0"); 2. Intense precipitation (5 inches of rain in a single day event, "5in x 1"); and 3. Frequent precipitation (2 events of 2.5 inches of rain in one week, "2.5in X 2).

Figure 1. Rainfall simulators used to impose precipitation addition treatments at PSU's research center in Rock Springs, PA.

RESEARCH FINDINGS

Compared to the no herbicide control, all group 15 herbicides reduced the density of emerged pigweeds (Figure 2) and giant foxtail (Figure 3), however, the Group 15 herbicides varied in their response to both cover crop surface residues and added precipitation. Added precipitation had no effect on Zidua control of pigweed (Figure 2); however, both extreme precipitation treatments (2.5x2 and 5x1) decreased Outlook and Dual control regardless of cover crop treatment. We found the simulated extreme precipitation events caused the greatest reduction in weed control when the more soluble Group 15 herbicide, Outlook, was combined with cereal rye surface residues. Overall, both Zidua and Dual effectively controlled pigweed when extreme precipitation events occurred, regardless of cover crop treatment.

Extreme precipitation effects on group 15 control of giant foxtail were more variable (Figure 3), especially when combined with cereal rye surface residues. Extreme precipitation events tended to decrease efficacy of residual herbicides when combined with a cereal rye cover crop, however the loss of efficacy was greater in the more soluble herbicide Outlook. Overall, both Dual and Zidua remained effective across precipitation treatments, especially when no cover crop was present.

IMPLICATIONS AND FUTURE RESEARCH

Understanding how extreme weather scenarios impact weed control will be critical to designing integrated weed management strategies that are climate resilient. Our research shows that the integrating cover crop surface residues with residual herbicides did not improve weed control when extreme precipitation events occurred and may have lowered weed control efficacy in certain scenarios (e.g. when more soluble residual herbicides were used, such as Outlook). This research highlights the importance of evaluating integrated approaches across a range of environmental conditions and weather scenarios. However, it is important to note that even within our extreme rain treatments, we still saw that residual herbicides remained overwhelmingly effective. Pigweed control exceeded 80% with Zidua and Dual, yet foxtail control, especially when using cereal rye cover crops, was inconsistent. With both Outlook and Dual, we saw greater loss of efficacy with greater intensity of extreme rainfall (5x1) compared to greater frequency (2.5 x 2), and this was exacerbated when combined with cereal rye surface residues. We will repeat this research in 2025 to determine if our results vary across years.

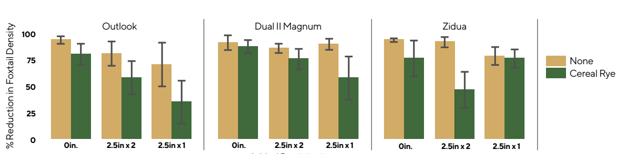


Figure 2. Group 15 herbicide effects on the % Reduction in Pigweed seedlings density (a metric of control) in response to cover crop (cereal rye or none) and added precipitation treatments ("0"= ambient rainfall, no added precipitation; "2.5x2"= 2 events of 2.5 inches of precipitation added per event); "5x1"= five inches of added precipitation in a single day event). Bars represent means and standard errors.

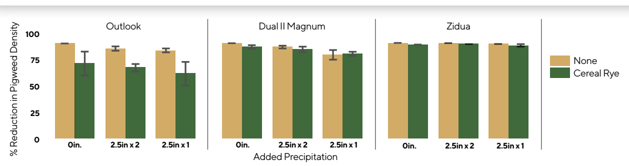


Figure 3. Group 15 herbicide effects on the % Reduction in Foxtail seedlings density (a metric of control efficacy) in response to cover crop (cereal rye or none) and added precipitation treatments ("0"= ambient rainfall, no added precipitation; "2.5x2"= 2 events of 2.5 inches of precipitation added per event); "5x1"= five inches of added precipitation in a single day event). Bars represent means and standard errors.

Using Data-Driven Knowledge for Profitable Soybean Management Systems

Funded by the North Central Soybean Research Program: *Principal researchers and co-investigators:*

Penn State Team: *Dr. Paul Esker, Extension Plant Pathologist and Professor; Miranda DePriest, Computational Scientist; Tyler McFeaters, Extension Program Specialist; and Dr. Santosh Sanjel, Postdoctoral Scholar*

University of Wisconsin Team: *Dr. Shawn Conley, Extension Soybean Specialist, and Professor; Dr. Spyros Mourtzinis, Data Scientist.*

Project collaborators from Iowa, Michigan, Minnesota, Nebraska, North Dakota, and Ohio.

FUNDED AMOUNT: $100,000

(Pennsylvania portion only, North Central Soybean Research Program)

RESEARCH SUMMARY

This project aims to improve the use of big data in soybean production and provide valuable field management tools to maximize profit and yield. Spatiotemporal data are collected from individual fields, providing insight into the timing and distribution of over 100 soybean stressors. This information is then linked to records on management practices, yield, weather data, and satellite imagery, allowing for the development of sophisticated yield outcome models. This data is collected and protected through the Open Crop Manager platform, developed in collaboration with the Penn State Institute of Computational and Data Science.

The current platform collects the following types of information:

- **Scouting reports:** Geo-referenced field condition surveys record information such as the growth stage, population counts, and the presence of different stressors and their severity. Images can also be collected with individual reports, allowing for the creation of a comprehensive image database.
- **Production surveys:** Field management practices and yield outcomes are recorded, including information on agronomic, fertility, and pest management tactics. The platform also enables the collection of product and market prices, providing valuable information to improve economic profit analyses.

FINDINGS

In 2024, 2,072 scouting observations were collected across 84 fields in Pennsylvania. Since 2022, we have collected 10,039 observations from 305 fields in 10 states. An additional 2,155 images of different stressors and beneficial insects were also collected in 2024, which brings the overall database to 10,658 images since 2022. We are developing algorithms for remotely identifying stressors, which we hope to add to the Open Crop Manager.

What does this data enable us to explore? Using multiple locations and years, we can explore unique temporal and spatial patterns at different scales (Figures 1 and 2). In partnership with the USB-funded “Bean Binoculars” project, we also shared 186 images as test cases for real-time tracking of stressors across the U.S.

We also completed developing and testing a new mobile app to accompany the online data platform, successfully creating the infrastructure for recording accurate georeferenced scouting reports This feature will allow users to collect high-quality data when offline. The app version of Open Crop Manager will be available before the start of the 2025 planting season.

To learn more about our data collection efforts and the Open Crop Manager platform, please visit open-crop.vmhost.psu.edu. If you’re interested in contributing data to the project, please contact Paul Esker at pde6@psu.edu or Shawn Conley at spconley@wisc.edu.

Figure 1. Temporal disease progress for the top 10 diseases in Pennsylvania in 2024. Disease severity was measured on a 1–10 scale.

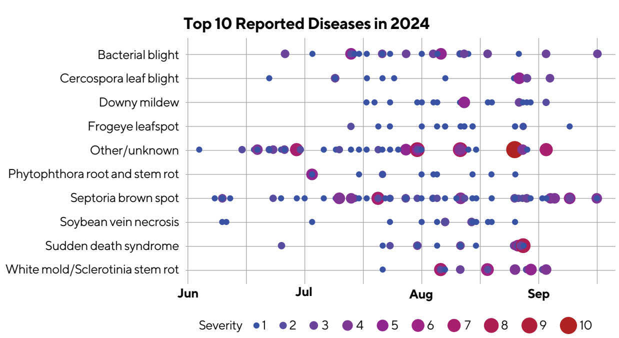
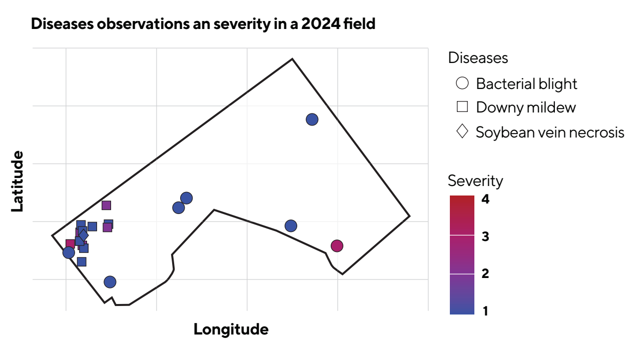


Figure 2. A field map illustrates the spatial location and disease severity of different stressors.



Development and Expansion of Disease Management Decision-Making Tools Across Multiple Soybean Regions

Principal Researcher and Co-Investigators: Dr. Paul Esker, PSU Extension Plant Pathologist and Professor; Dr. Alyssa Collins, PSU Extension Plant Pathologist and Associate Research Professor; and Tyler McFeaters, Education Program Specialist

FUNDED AMOUNT: $15,000

(Atlantic Soybean Council and North Central Soybean Research Program)

RESEARCH SUMMARY

Soybean farmers in Pennsylvania question the need to spray foliar fungicides each growing season. While some growers routinely spray annually, they still question the return on investment. Furthermore, research across different growing regions will help improve and validate soybean disease forecasting systems.

In 2024, we conducted two uniform fungicide efficacy trials (UFT) at the Southeast Agricultural Research and Extension Center (SEAREC) in Manheim, PA, and the Russell E. Larson Agricultural Research Center (RELARC) at Rock Springs in Pennsylvania Furnace, PA. Fields were planted in bulk at SEAREC on May 2nd and at RELARC on May 21st. The trials consisted of a uniform protocol utilized across several universities and compared ten foliar fungicides applied at the R3 growth stage (pods are 3/16 inch long) and an untreated check. The experimental design was a randomized complete block design, and treatments were replicated four times. The plot size was four rows wide (30-inch rows) by 25 feet long. The trial at SEAREC was sprayed on July 31st and August 5th at RELARC.

Two spore traps were deployed on the edge of each field (Figure 1). One trap was placed approximately 3 feet above ground level, and the other at 5 feet. Batteries were replaced every 7-10 days, and new microscope slides were attached with fresh Vaseline to capture spores. Once microscope slides were collected from the field each week, they were kept refrigerated until they were sent to the University of Wisconsin for analysis to quantify the number of Cercospora sojina (causal agent of frogeye leaf spot) spores throughout the growing season.

Disease assessments were obtained from SEAREC by estimating the severity of the Septoria brown spot (0-100%) in four locations per plot. Disease severity was averaged per plot to assess the severity for each treatment. We used the Canopeo app to measure plot greenness (% cover) to determine if any plant health effects could be observed. Plots were harvested at SEAREC on October 14th and at RELARC on October 18th. Yield (bu ac-1), test weight (lb bu-1), and moisture (%) were recorded at harvest.

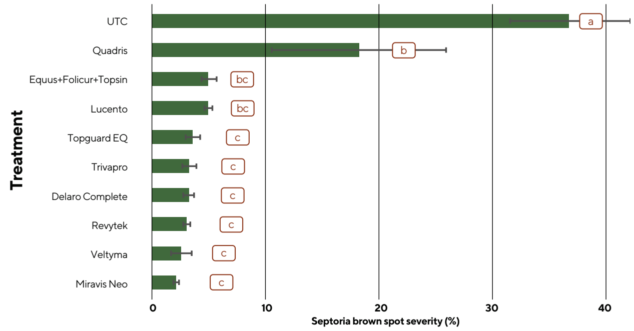
FINDINGS

Overall, low foliar disease severity was observed at each location. There was no evidence of frogeye leaf spot, but Septoria brown spot was found in the trial at SEAREC. The lower canopy of the untreated check had greater than 35% severity of Septoria brown spot. All treatments significantly reduced disease severity, with Miravis® Neo (Syngenta), Veltyma® (BASF), Revytek™ (BASF), Delaro® Complete (Bayer Crop Science), Trivapro® (Syngenta), and Topguard® EQ (FMC) performing among the best (Figure 2). At RELARC, Delaro® Complete (96%) and Quadris® (97%) had the greenest plant tissue from the Canopeo assessment compared to the Untreated Check (UTC= 94%). The highest yields were observed with Delaro® Complete (64 bu ac-1) and Revytek™ (64 bu ac-1) compared to the UTC (56 bu ac-1) when averaged across both locations.

The weather was a key driver of disease development in 2024. Intermittent droughts throughout the summer contributed to the lack of disease at both locations. In August and September, SEAREC received 8.63 inches (-1.46 inches lower than the 10-year average) of rain, and RELARC received 8.67 inches (-2.83 inches lower than the 10-year average). Results were similar to those of previous years when we did not observe extensive disease development in soybean canopies.

Figure 1. Spore trap at RELARC next to the Uniform Fungicide Trial

Figure 2. The soybean UFT at SEAREC showed significantly reduced Septoria brown spot for most treatments (UTC = Untreated Check, α0.05).



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