



PennState
Huck Institutes of
the Life Sciences

Plant Institute

Plant Institute Fall 2025 Retreat Report

"Unlocking the Power of Collaboration"

September 26, 2025

Shaver's Creek Environmental Center

Prepared by The Penn State Plant Institute Leadership Team



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Overview

The Penn State Plant Institute hosted its 2025 Retreat, themed "**Unlocking the Power of Collaboration**," at Shaver's Creek Environmental Center on September 26, 2025. The event focused on fostering inter- and transdisciplinary collaboration, identifying key research priorities and innovation areas, forming new research teams, and building an inclusive plant science community across the Commonwealth Campuses. Moderated sessions encouraged faculty creativity and alignment with the Huck Institutes of the Life Sciences' strategic priorities and the Institute's plant-specific goals. Interactive workshops and networking opportunities helped participants to outline collaborative projects and actionable steps to advance plant science research and education at Penn State.

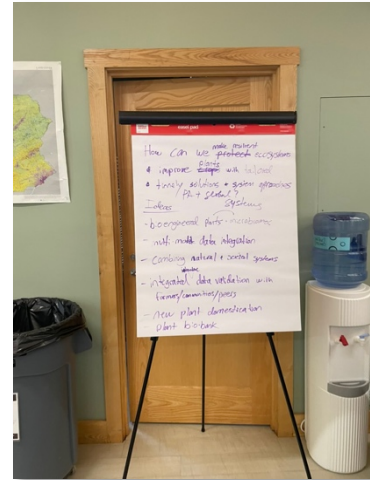
The event brought together **36 participants**, including faculty, graduate students, postdoctoral researchers, and staff, representing a highly interdisciplinary group from **three campuses**: University Park, Penn State Schuylkill, and Penn State Altoona. Attendees spanned **three colleges** and **ten departments**, including the College of Agricultural Sciences (Plant Science; Plant Pathology and Environmental Microbiology; Entomology; Ecosystem Science and Management; Food Science; Agricultural Economics, Sociology and Education; Veterinary and Biomedical Sciences), the College of Health and Human Development (Biobehavioral Health), and the Eberly College of Science (Biology). Key research institutes and administrative units were also represented, including the Huck Institutes of the Life Sciences, the Institute of Energy and the Environment (IEE), the Institute for Sustainable Agricultural, Food, and Environmental Science (SAFES), Penn State Global, the Penn State Corporate Engagement Center, the Global Teach Ag Network, the World Campus and the Southeast Agricultural Research & Extension Center. This diverse participation underscores the Plant Institute's collaborative and global nature, reflecting Penn State's commitment to advancing plant science through integrated research and innovation.

Session 1 and 2: Exploring Big Questions

The morning sessions focused on discussing the Huck Institute's strategic research priorities in relation to our strengths in Plant Science. Participants engaged in moderated small-group and plenary discussions to explore "Big Questions" and to identify significant interdisciplinary research challenges. Each group mapped ideas to Huck and Plant Institute objectives and presented short pitches of their top research concepts. The session concluded with the identification of four high-priority research and education thrusts well aligned with Huck's strategic priorities.

Priority Research Questions for Future Research

1. How can plants adapt and thrive in extreme environments and in space?
2. What factors drive pathogen evolution and spread, and how does climate change shape these dynamics?
3. Can we protect native species and manage invasive plants by applying advanced genetic and ecological approaches?
4. How do plant–soil–microbiome interactions influence sustainability, resilience, and overall ecosystem health?
5. What integrated and timely strategies can safeguard ecosystems while improving plant performance?



Recommended general strategies

1. Apply approaches at regional and global scales
2. Combine biological, ecological, and technological innovations
3. Leverage multi-modal data integration for predictive insights
4. Develop diverse plant biobanks for future research
5. Validate solutions through collaboration with scientists, farmers, and communities

Opportunities to Position Penn State as a Global Leader in Plant Sciences

1. Public education

"Science to skills": translate science to enrich the public audience and create jobs/skills

2. Biodiversity/Conservation

Encourage stewardship and protection of federal lands/conservation by training the next generation of scientists to be literate in conservation and biodiversity, and work in government.

3. Human Health

Take leadership at the frontiers of phytochemicals and microbiomes in fighting chronic diseases

4. Use of plants to produce bioproducts

Leverage Penn State's excellence in plant biology, materials science, and medical innovation to develop solutions for human health

Key Technical Approaches to Accelerate Impact

1. Multi-omic prediction of phenotype under abiotic stress
Themes: Future Foods, Engineering Resilient Ecosystems
What it takes: pangenome, single-cell/spatial transcriptomics; LAT, graph/causal ML
2. Defining "better" cultivars under climate volatility (explicit trait tradeoffs)
Themes: Future Foods, Engineering Resilient Ecosystems
What it takes: optimization linking phenotype, water/nutrient use, and yield stability
3. Network-level target discovery
Themes: Future Foods, Health for Life
What it takes: interoperable pipelines (genomics to phenomics), high-throughput editing/RNAi
4. Translating symbiotic signaling across species (e.g., AMF modules into maize)
Themes: Engineering Resilient Ecosystems
What it takes: pathway mapping, signaling components
5. Protecting our forests by utilizing approaches like gene editing, plant domestication, and native plant reinforcement
Themes: Engineering Resilient Ecosystems
6. Developing biocontrol products utilizing phages and other predator microbes to control pathogens moving with climate change
Themes: Engineering Resilient Ecosystems

Expanding Plant Research Beyond Model Systems and Research Scaling

Current Focus: Faculty at Penn State conduct research on genes and molecules in model plant systems and in non-model plants.

Integration Opportunity: Applying insights from detailed model-organism studies to non-model systems can create a broader, integrated research pipeline that advances both areas.

Leveraging Core Facilities: Penn State's core facilities should support multi-omics projects, especially in non-model systems that may reveal:

- Unique genes and metabolic pathways with potential applications in biomedicine and nutrition.

- Novel traits that drive plant science innovation and strengthen Penn State's research leadership.

Strategic Impact: Research on non-model systems underscores their value to human health and society, connects plant science to critical issues such as climate change and environmental challenges, and strategically positions Penn State as a leader in addressing global agricultural and ecological needs.

Focus Areas Identified for discussions during Sessions 1 and 2

1. Public Education and Science Communication
2. Plants and One Health
3. Systems Approaches to Resilience and Gene Discovery
4. Bioeconomy and Biomaterials

Session 3 and 4: Strategic Perspectives from Industry and Academia

To broaden the discussion and incorporate University-wide and industry perspectives, two guest speakers offered critical context for aligning research priorities, followed by an engaging dialogue with participants.

- **Dr. Christina Grozinger**, Director of the Huck Institutes, discussed strategic priorities, Commonwealth research resources, and upcoming funding opportunities.
- **Dr. Tom Slewinski** (Bayer Crop Science; Penn State alumnus) spoke about university–industry partnerships, emphasizing the importance of aligning academic research with current industrial needs and challenges in the U.S. agricultural sector.

Session 5 and 6: Transforming Ideas into Action

In the afternoon, participants formed interdisciplinary discussion groups to develop new project concepts and define the alignments with Huck priorities and other programs. Two rounds of facilitated conversation yielded four new research and education themes for further development.

Four Teams for Continued Discussion

1. **Plant Institute Science Communication Program: A Comprehensive Learning Environment**

This initiative seeks to create a structured approach to public education about plants and agricultural technologies. Objectives include developing a Commonwealth Campus engagement network, expanding public participation in science, assessing barriers to outreach, and curating resources for education and communication. Aligned with the **Plant Institute's** Goal for Public Education, **Penn State Arboretum**, and **Global Teach Ag Network**.

Discussion Leaders: Daniel Foster and Robert Witowski

2. **The Plant Section of the Huck Biobank: A New Discovery Hub**

This project will establish a comprehensive repository of plant materials and associated data accessible to researchers globally. The effort aligns with the **Huck Biobank Project**, **One Health Penn State**, and the **SAFES Institute**.

Discussion Leaders: Josh Kellogg

3. **AI-Based Systems Approach to Multigenic Traits in Maize Roots: Designer Roots**

This project focuses on developing more bioresilient plants by identifying multigenic traits that influence root system resilience in maize. The work builds on decades of research leadership within the **Center for Root and Rhizosphere Biology (CRRB)**.

Discussion Leaders: Ruairidh Sayer, Jesse Lasky

4. **Medical Applications of Plant Biomaterials: Sustainable Health**

This team will explore plant-derived biomaterials for medical applications, integrating plant science with bioengineering and health disciplines. The project aligns with the **Center for Biorenewables**, the **Center for Biodevices**, and the **One Health Microbiome Center**

Discussion Leaders: Charlie Anderson

Potential funding sources:

- DOE BER Bioenergy Research Centers (2027)
- NSF Global Centers
- Bezos Earth Fund (Summer 2026)
- NIH Biomaterials for Biomedical Applications:
<https://www.nibib.nih.gov/labs-at-nibib/center-for-biomedical-engineering-technology-acceleration-beta>
- Industry partners for cellulosic biomaterials

Next Steps

The Plant Institute will coordinate follow-up meetings for each discussion group to refine research objectives, identify funding opportunities, and discuss proposal development. Plant Institute will support team and proposal development by providing access to Huck and the Office of the Vice President for Research resources. Researchers interested in joining one of these interdisciplinary teams are encouraged to contact **Dr. Mark Guiltinan** at mjg9@psu.edu or the group discussion leaders.

Session 7: Planning for FY25/26 Activities and Summary of Feedback Survey

The session featured brief reports on FY24/25 activities presented by leaders of individual working groups, including Siela Maximova (Director for Partnerships), Cameron Cedeno (Membership and Commonwealth Campus Liaison), Evelyn Kulesza (President of the Plant Institute Scholars), Jessica Walnut (Coordinator of Innovation Initiative), Mark Guiltinan (on behalf of the Science Communication team), Robert Witkowski (joint activities with Penn State Arboretum), and Daniel Foster (joint activities with Global Teach Ag Network).

A survey was conducted to gather feedback on proposed activities for FY25/26, as well as input on the Plant Institute newsletter and retreat. The survey achieved a 47% response rate (17 of 36 attendees), indicating strong engagement. Respondents expressed high enthusiasm for future Plant Institute activities, particularly research showcases, guest speaker webinars, research retreats, activities supporting collaborations with industry, student scholar events, and faculty networking lunches.

Key feedback themes included:

1. *Inclusion & Accessibility:* Commonwealth Campus faculty requested hybrid options and travel stipends to overcome distance barriers.
2. *Faculty Engagement:* Concerns about low faculty turnout led to suggestions for faculty-only retreats.
3. *Communication:* The newsletter was well received, with recommendations for funding spotlights, herbarium events, and a bi-monthly schedule.
4. *Enhancements:* Ideas included academic/career development opportunities, interdepartmental networking, international exchanges, industry seminars, and community engagement events.

Overall conclusion: The Plant Institute is successfully fostering engagement and inclusivity, but must address geographic barriers, improve faculty participation, and balance graduate student development with faculty collaboration needs. Complete survey results are included in Appendix 2. The retreat feedback was overwhelmingly positive, with

participants valuing networking, collaboration, and the inclusive atmosphere. Suggested improvements included offering State College as a meeting venue, multiple brainstorming rounds, and travel support for remote participants.

Representative Quotes from Participants:

"It was extremely helpful to meet other folks and find common interests so we can potentially collaborate in the future."

"The retreat was very helpful to connect people across the larger Penn State network."

"The retreat had an incredible atmosphere and felt very inclusive and productive. My best takeaway was how positive everyone was in open discussions and how we all want to advance PSU's plant sciences further."

"It make me feel optimistic about the future and was a nice change of pace from my usual day-to-day. My most important takeaway was the industry perspective: the barriers to working in an industry job, and that there are industry people that are interested in working together with academics".

"It was a very positive experience. The facilitators did a great job providing structure and keeping us on schedule. Shaver's Creek is an awesome venue for that type of event. The food and snacks were also excellent. I appreciated the opportunity to meet such a diverse group of folks interested in plant sciences. Thank you to all who were involved!"

"I appreciate how open Plant Institute Leadership was for including Commonwealth Campus faculty"

"I think it was an absolutely amazing opportunity for the graduate students, a great opportunity for them to think outside their boxes, there is a clear strength in engagement between the Institute and the graduate students, but I worry about the lack of faculty engagement at the retreat."

Appendix 1: Penn State Plant Institute Fall Retreat Agenda

Friday, September 26, 2025

Shaver's Creek Environmental Center

Goals:

- Inspire collaboration and future initiatives
- Identify key research questions and innovation areas
- Develop research teams and plans for funding
- Build a strong, inclusive plant research community

8:30-8:50 AM | Welcome

- **Shaver's Creek welcome** - Stacey Budd, Program Coordinator
- **Opening remarks** - Dr. Mark Gultinan, Plant Institute Director

8:50-10:15 AM | Exploring Big Questions

Small group discussions (according to table assignments):

- **Round 1 (10 min):** Ice melter + individual research area sharing
- **Round 2 (35 min):** Identify 4-5 big questions (brainstorming)
- **Round 3 (30 min):** Map questions to Huck Institutes themes and Plant Institute objectives, prioritize top 2-3.

10:15-10:30 AM | Morning Break

Strategic networking time - participants encouraged to visit other tables

10:30-11:00 AM | Plenary: reporting outcomes from the group discussions

- **Presentations** from the individual groups: each group (table) to give a 2-minute pitch of their top questions, followed by open discussion.

11:00-11:30 AM | Huck Thematic Areas and the Plant Institute

Christina Grozinger, Director, Huck Institutes

- Overview presentation
- Q&A focused on priorities and funding opportunities

11:30-12:15 PM | Industry Perspective

John Peterson, Director of Corporate Engagement, Penn State

- Introductory remarks

Tom Slewinski, Bayer Crop Science

- Big questions from the industry viewpoint
- 5-minute structured Q&A with pre-submitted questions
- Brief discussion on industry-academia partnership opportunities

12:45-1:45 PM | Transforming Ideas into Action Plans

- **Self-selection to themed tables** (5 min) - based on morning themes
- **Research objective development** (25 min):
- **Team formation** (20 min) - identify PI, co-PIs, and committed participants
- **Next steps planning** (10 min) - concrete follow-up actions and timeline

2:00-3:30 PM | Action Plan

- Research pitch presentations (~10 min/group + 5 min Q&A)

3:30-4:15 PM | FY25/26 Institute Activities

- Introduction of key working groups within the Plant Institute.
- Review of FY24/25 Activities
- Brainstorm session for future activities and events
- Call for leadership team members
- Retreat closing remarks

Appendix 2: Survey Results

Overall Response & Engagement

Response rate: 47% (17 of 36 attendees), which is a strong result for an academic survey, indicating solid engagement.

Preferences for Future PSPI Activities

1. Research Showcase - High enthusiasm
2. Guest speaker webinars - Very popular
3. Research generation retreats (like this one) - Strong support for continuation
4. Student Scholars events - High interest
5. Faculty monthly lunches - Popular networking opportunity

Key Themes in Feedback

1. Inclusion & Accessibility Concerns
 - Commonwealth Campus (satellite campus) faculty feel distance barriers
 - Strong request for Zoom/hybrid options to include remote participants
 - Commonwealth faculty appreciated feeling welcomed, but need travel stipends
2. Faculty Engagement Problem
 - Several respondents were surprised by the low faculty turnout
 - Suggestion for a faculty-only retreat to maximize participation
3. Communication Strengths
 - Newsletter is well-received (mostly "Very informative" or "Somewhat informative")
 - Suggestions: Add funding spotlights, herbarium events, consider bi-monthly instead of monthly
4. Proposed Enhancements
 - Academic/Career Development:
 - Connect Commonwealth/Extension faculty with grad students interested in teaching careers
 - Monthly research lab spotlights
 - More frequent brainstorming sessions for grants/papers
 - Collaboration:
 - Interdepartmental networking (engineering, stats, etc.)
 - International student exchange opportunities
 - Industry connections (more seminars)
 - Community Engagement:
 - Community tabling events with extension
 - Themed plant sales
 - Herbarium resource leveraging

5. Retreat Feedback - Very Positive

Attendees valued:

- Networking and finding collaborators
- Inclusive, productive atmosphere
- Industry perspectives (barriers and collaboration opportunities)
- Brainstorming session structure
- Shaver's Creek venue

6. Suggestions for improvement:

- Consider the State College location for better faculty attendance
- Multiple brainstorming table rotations
- Travel stipends for distant participants

Overall Conclusions from the Survey

The Plant Institute is doing well with engagement and inclusivity, but faces a critical challenge with faculty participation. The retreat format works well for those who attend, but the Institute needs to address:

1. Geographic barriers (hybrid options, travel funding)
2. Faculty recruitment/attendance strategies
3. Balancing graduate student development with faculty collaboration needs

Primary concern: Low faculty attendance at the retreat

Appendix 3: Retreat Introductory Slides



Institute Mission: Growing Scientific Excellence for a Better World

The Penn State Plant Institute cultivates a vibrant ecosystem of plant-focused innovation, collaboration, and impact. Our research, education, and outreach mission spans diverse disciplines, uniting students, staff, postdocs, and faculty across the entire Penn State system.

Transdisciplinary Excellence:

Fostering plant-focused research, education, and outreach across the Penn State system.

Transdisciplinary Innovation

Advancing interdisciplinary science through cutting-edge facilities, collaboration, and stakeholder engagement.

Visibility & Engagement

Promoting plant science achievements to the public, policymakers, and global partners.

Inspiring the Next Generation

Empowering future plant scientists through education, mentorship, and career exploration.

Strategic Synergy

Aligning with existing programs to maximize efficiency and collective impact.

¹
<https://www.huck.psu.edu/institutes-and-centers/plant-institute>



Build the Plant Institute Community

Engage members across all Penn State campuses, including faculty, postdoctoral researchers, students, and staff. Foster a collaborative, inclusive environment and support student career development.

Support Plant Institute Members

Support interdisciplinary research: seed grants, large project development, facility access, and industry partnerships. Deliver value through services, events, and networking.

Disseminate Knowledge Through Public Education

Offer seminars, workshops, and new articles for audiences of all ages. Partner with the Penn State Arboretum and Extension to expand public education efforts.

Promote the Plant Institute

Develop a strong internal and external presence through a website, social media, outreach materials, and strategic partnerships across Penn State and beyond.

Penn State Plant Institute: Executive Committee

Charles Anderson, Professor and Associate Head of Research and Faculty Success, Department of Biology

Philip Bevilacqua, Distinguished Professor of Chemistry and Biochemistry and Molecular Biology

Carolee Bull, Professor of Plant Pathology and Environmental Microbiology

Erin Connolly, Professor and Head, Department of Plant Science

Daniel Cosgrove, Eberly Family Chair Professor, Biology

David Hughes, Professor of Entomology, Dorothy Foehr Huck and J. Lloyd Huck Chair in Global Food Security

The-hui Kao, Distinguished Professor of Biochemistry and Molecular Biology

Jonathan Lynch, Emeritus Professor, Department of Plant Science

Hong Ma, Professor of Biology, Huck Chair in Plant Reproductive Development and Evolution

Siela Maximova, Research Professor of Plant Biotechnology, Director, Latin America and Caribbean, Penn State Global

Cristina Rosa, Associate Professor of Plant Pathology and Environmental Microbiology

Penn State Plant Institute: Leadership Teams

Partnerships: Coordinate membership and foster collaboration across Penn State units, the Office of Corporate Partnerships, and external organizations.

Siela Maximova, Director for Partnerships

John Peterson, Director of Corporate Engagement Center

Cameron Cedeno, Membership and Commonwealth Campus Liaison

Strategic Research Initiatives: Advance high-impact, interdisciplinary research and education projects

Hong Ma, Faculty Lead

Plant Institute Scholars: Support the growth of young Penn State scientists and collaborate with Institute members to advance its mission.

Evelyn Kulesza, President and Event Planner

Jessica Walnut, Treasurer

Science Communication: Newsletter, website, social media campaign

Elsa Sanchez, Faculty Lead

Elsa Chen, Web and Social Media Representative

Sci Comm Team: College of Communications

Allison Zvarick, IT Lead and Communications Lead

Public Education :

The Arboretum at Penn State: <https://arboretum.psu.edu/>

Robert Witkowski, Arboretum Representative

Global Teach Ag Network at Penn State: <https://global-teach-ag-network.mn.co/>

Melanie Miller Foster, Associate Teaching Professor of International Agriculture

Daniel Foster, Innovation Specialist/Agricultural Teacher Educator