

# Charles F. Colvin V

University Park, PA 16802 • (484)-366-3758 • ccolvinmmiv@gmail.com

## Education

The Pennsylvania State University—University Park, PA  
Schreyer Honors College Scholar

Expected Graduation: May 2026

**B.S. in Plant Sciences** (Concentration in plant genetics and biotechnology)

Minor: Agronomy

**GPA: 4.00/4.00**

Honors Thesis (In progress): Flavonoid-Mediated Resistance in Maize: Exploring Herbivore Mortality, Microbial Disruption, and Microbiome Methods

**Relevant coursework:** Chemistry, Entomology, Genetics, Molecular Biology, Plant Breeding, Plant Pathology, Statistics

## Experience

**Crop-to-Food Innovation REEU** - Schnable Lab, University of Nebraska, Lincoln, NE 06/2025—08/2025

- Contributed to projects in quantitative genetics and high-throughput genotyping of maize and sorghum, focusing on genotype-by-environment interactions affecting agronomic traits
- Analyzed RNA-seq data from large-scale experiments evaluating plant responses to abiotic stresses (e.g., cold, drought, heat), with an emphasis on linking gene expression variation to yield, flowering time, and plant height
- Supported field-based data collection and phenotypic analysis as part of collaborative, multi-environment trials
- Contributed to the design and execution of experiments aimed at identifying expression-based predictors of complex trait variation in controlled and field conditions

**Chopra Maize Genetics Lab** - Penn State University, University Park, PA 09/2022—Present

- Employ genetics, breeding, and molecular laboratory techniques to assist in development and evaluation of high-flavonoid maize breeding lines for insect resistance, ornamental value, and nutritional benefits
- Utilize molecular and bioinformatic techniques such as RT-qPCR, metabarcoding and metabolomics to understand flavonoid induction in maize mutants and evaluate the impact of flavonoids on the microbiomes of insect pests
- Create and present award-winning presentations and posters at conferences, exhibitions, and public events
- Independently obtained over \$22,000 in external funding

**Undergraduate Research Fellow** - American Society of Plant Biologists, University Park, PA 05/2024—08/2024

- Selected as one of ~20 students nationwide for the competitive ASPB Summer Undergraduate Research Fellowship to conduct independent research in plant biology
- Investigated the impact of maize flavonoids on insect-associated and leaf microbiomes to support development of insect-resistant maize lines
- Utilized molecular biology, metabarcoding, and microbial ecology techniques including DNA extraction, PCR, DADA2, and QIIME2 for community analysis
- Presenting findings at the 2025 ASPB Plant Biology Conference, networking with leading plant scientists and early-career researchers from around the world

**IoT4Ag Precision Agriculture REU** - Sharma Lab, University of Florida, Gainesville, FL 05/2023—08/2023

- Conducted research in a precision water management lab focusing on optimizing crop water usage and environmental sustainability through the integration of sensor technology and AI/ML approaches
- Specialized in remote sensing and vegetative indexes, utilizing machine learning to develop an algorithm to accurately predict corn yields and leaf nitrogen levels using reflectance data captured by drone imagery
- Facilitated comprehensive data collection and analysis for large scale research and extension field trials
- Publication in progress (Das et al., expected 2025)

**Grower's Assistant** - Robin Hill Organics, Malvern, PA 05/2019—08/2020

- Worked on organic vegetable and cut-flower production in field, high tunnel, and greenhouse settings
- Planted, maintained and harvested a variety of fruit and vegetable crops
- Employed organic methods of production and integrated pest/disease management strategies

## Publications

- Chatterjee D, **Colvin C**, Lesko T, Peiffer M, Felton G, Chopra S (2025) Plant defense against insect herbivory: Flavonoid-mediated growth inhibition of *Helicoverpa zea*. Plant Stress. <https://doi.org/10.1016/j.stress.2025.100738>
- Das S, **Colvin C**, Acharya B, Bhambota S, Vaddevolu UBP, Capasso J, Sharma V (2025) Development of Machine Learning Models to Determine Leaf Nitrogen Content of Maize. Computers and Electronics in Agriculture. (IN REVIEW)
- **Colvin C**, Chatterjee D, Lesko T, Panek B, Singh G, Gil-Polo M, Stanley A, Peiffer M, Felton G, Bruns M, Chopra S. Flavonoid-mediated shifts in *Spodoptera frugiperda* gut microbiota reveal potential antifeedant mechanism. (IN PREP)
- **Colvin C**, Chatterjee D, Gil-Polo M, Bruns M, Roman-Reyna V, Chopra S. Refined 16S rRNA amplification method for minimizing chloroplast and mitochondrial interference in plant microbiome studies. (IN PREP)
- **Colvin C**, Chopra S. Stress signaling networks: The diverse roles of flavonoids in plant resilience and microbial interactions. (IN PREP)

## Grants and Funding

- 2024-2025 College of Ag Sciences Undergraduate Research Grant: \$3,000
- 2024 PSU Erickson Discovery Grant: \$3,500
- 2024 American Society of Plant Biologists (ASPB) Summer Undergraduate Research Fellowship: \$6,700
- 2024 College of Ag Sciences Summer Undergraduate Research Grant: \$4,000
- 2023-2024 College of Ag Sciences Undergraduate Research Grant: \$3,000
- 2023 NASA Pennsylvania Space Grant: \$1,800

## Leadership and Community Engagement

### Spark Program Panelist (2025)

- Invited by Penn State's Undergraduate Research and Fellowships Mentoring Office to speak on a panel advising 1st to 3rd year students on undergraduate research and applying for competitive fellowships (e.g., Erickson Discovery Grant, Udall Scholarship)

### Floral Design Coordinator, TEDxPSU (2025)

- Led the design and arrangement of floral decorations for the post-conference event, enhancing the atmosphere of a high-profile \$80,000 event attended by several hundred guests

### Presenter, Penn State Agricultural Progress Days (2024)

- Organized and led the lab's participation in the 2024 event, which brought over 40,000 farmers, policymakers, and extension agents together to learn about the latest agricultural research and technology
- Developed an informational booth, video presentation, TV docuseries feature, and multiple live talks to share my research with the public.

### Presenter, "Science U" Biotechnology Summer Camp (2024)

- Introduced high school students to plant genetics research, inspiring interest in careers at the intersection of agriculture and biotechnology

### Volunteer, Penn State Student Farm (2023)

- Cultivated vegetable transplants for local residents and engaged in educational outreach on sustainable agriculture and food security

### Founder and Grower, Backyard Food Bank Organic Garden (2016-present)

- Cultivate a 1,300 sq. ft. organic vegetable garden, donating over 400 lbs. of fresh produce to local food banks over the past nine years

## Oral Presentations

### Flavonoids in Maize: Enhancing Crop Resilience and Human Health

- Herb Society of America Philadelphia Unit Meeting, January 8, 2025. Chester Springs, PA

### Investigating the Insecticidal Properties of Maize Flavonoids Against Fall Armyworm (*Spodoptera frugiperda*)

- Northeast Integrated Pest Management Research Update Conference, December 10, 2024. Northeastern Integrated Pest Management Center. Ithaca, NY.

### Breeding for Adaptation: Maize and Sorghum Genetics

- Penn State Ag Progress Days, August 14–15, 2024. Russell E. Larson Agricultural Research Center. Pennsylvania Furnace, PA.

## **Flavonoids in Maize: Unraveling Pigments and Microbial Mysteries**

- NASA Pennsylvania Space Grant WISER/MURE/FURP Research Symposium, November 29, 2023. Penn State University. University Park, PA.

## **Poster Presentations**

### **Flavonoid-Based Pest Resistance in Maize: A Microbial Perspective**

- Penn State Undergraduate Exhibition, April 16, 2025. Penn State University. University Park, PA.
- Penn State Plant Institute Research Symposium, April 15, 2025. Penn State University. University Park, PA.
- Penn State Interdisciplinary Environmental Research Symposium, April 4–5, 2025. Penn State University. University Park, PA.
- Blooms and Shrooms Mycology and Natural Sciences Research Symposium, March 28, 2025. Penn State University. University Park, PA.
- Gamma Sigma Delta Research Expo, March 27, 2025. Penn State University. University Park, PA.
- Undergraduate Research at the Capitol–Pennsylvania, March 25, 2025. Pennsylvania State Capitol. Harrisburg, PA.

### **Beyond Pigments: A Microbial Tale of Flavonoid-Induced Phyllosphere Changes in Maize**

- One Health Microbiome Symposium, May 30–31, 2024. Penn State University. University Park, PA.
- Huck Life Sciences Symposium, May 17, 2024. Penn State University. University Park, PA.

### **From Metabolites to Microbes: Paving the Way for Sustainable Maize Crop Improvement**

- Penn State Undergraduate Exhibition, April 17, 2024. Penn State University. University Park, PA.
- Eberly College of Science Sustainability Expo, April 6, 2024. Shaver's Creek Environmental Center. Petersburg, PA.
- Penn State Interdisciplinary Environmental Research Symposium, April 5–6, 2024. Penn State University. University Park, PA.
- Gamma Sigma Delta Research Expo, March 27, 2024. Penn State University. University Park, PA.

### **Sugar to Pigments: Deciphering Sugar, Reactive Oxygen Species, and Flavonoid Crosstalk Using Maize Unstable Factor for Orange1**

- Environmental Chemistry and Microbiology Student Symposium, April 14–15, 2023. Penn State University. University Park, PA.
- Penn State Undergraduate Exhibition, April 12, 2023. Penn State University. University Park, PA.
- Gamma Sigma Delta Research Expo, March 30, 2023. Penn State University. University Park, PA.

## **Research Awards**

- 2025 Gamma Sigma Delta Research Expo: 2nd place undergraduate presentation
- 2024 WH Pierce Prize for Global Impact in Microbiology: One Health Microbiome Center-Presented by Applied Microbiology International
- 2024 Huck Life Sciences Symposium: 1st place Agriculture and Plant Biology presentation
- 2024 Penn State Undergraduate Exhibition: 1st place Health and Life Sciences presentation
- 2024 Gamma Sigma Delta Research Expo: 2nd place undergraduate presentation
- 2024 Penn State Sustainability Expo: 2nd place overall poster presentation
- 2024 Penn State Interdisciplinary Environmental Research Symposium (PIERS): 3rd place undergraduate presentation
- 2024 Penn State Undergraduate Exhibition: HM University Libraries Undergraduate Research Award
- 2023 Gamma Sigma Delta Research Expo: 1st place undergraduate presentation
- 2023 Environmental Chemistry and Microbiology Student Symposium (ECMSS): 2nd place undergraduate presentation
- 2023 Penn State Undergraduate Exhibition: HM University Libraries Undergraduate Research Award

## **Academic Awards**

- 2025 Penn State University Evan Pugh Scholar Award
- 2024 Penn State University President Sparks Award
- 2023 Penn State University President Walker Award

## **National Scholarships**

- 2025 Astronaut Scholarship
- 2025 American Society for Horticultural Science (ASHS) Scholars Award
- 2025 Corteva Undergraduate Enrichment Scholarship

- 2025 Udall Scholarship Nominee
- 2025 Oregon Nurseries Foundation: Mt Hood Chapter II Award
- 2024 Proven Winners® Ushio Sakazaki Plant Breeding Scholarship
- 2024 National Sorghum Foundation Bruce Maunder Memorial Scholarship
- 2024 Western Reserve Herb Society National Scholarship
- 2024 NaturaLawn of America Dan Collins Scholarship
- 2024 Oregon Nurseries Foundation: Clackamas Chapter Scholarship
- 2023 Foundation for Environmental Agricultural Education (FEAE) Scholarship

## **Regional Scholarships**

- 2025 Herb Society of America Philadelphia Unit Scholarship
- 2025 Philadelphia Society for Promoting Agriculture (PSPA) Fred Winter Memorial Scholarship
- 2025 Farm Credit Foundation for Agricultural Advancement Scholarship
- 2024 Herb Society of America Philadelphia Unit Scholarship
- 2024 Carrie T. Watson Garden Club Scholarship
- 2024 State Horticultural Association of Pennsylvania (SHAP) Scott Brown Memorial Scholarship
- 2024 Philadelphia Society for Promoting Agriculture (PSPA) Fred Winter Memorial Scholarship
- 2024 Pennsylvania Heartland Herb Society Scholarship
- 2024 Farm Credit Foundation for Agricultural Advancement Scholarship
- 2024 Garden Club of America: Katharine M. Grosscup Scholarship in Horticulture
- 2023 Michigan Vegetable Council: Vegetable Industry Scholarship
- 2022 Chester-Delaware County Farm Bureau Scholarship

## **School/Local Scholarships**

- 2024 Walter N. Peechatka Scholarship
- 2024 Rumbaugh Agricultural Leadership Scholarship
- 2023 PSU Ag Alumni Society Internship Award
- 2023, 2024 Robert Lamar Skeath Scholarship in Ornamental Horticulture
- 2022 Harry Hayward Academic Excellence Scholarship
- 2022, 2023, 2024 Academic Excellence Scholarship
- 2022, 2023 Rosemarie C. and Howard R. Peiffer Scholarship
- 2022, 2023, 2024 Thevaos Honors Scholarship

## **Organizational Memberships (Current)**

- American Society of Plant Biologists (ASPB)
- State Horticultural Association of Pennsylvania (SHAP)
- Penn State One Health Microbiome Center (PSU OHMC)
- Penn State Center for Root and Rhizosphere Biology (CRRB)
- Gamma Sigma Delta Agricultural Honor Society (PSU Chapter)
- Penn State Plant Institute
- Penn State Horticulture Club