PURDUE AGRICULTURE

FROM CUTTING-EDGE RESEARCH TO RESILIENT AGRICULTURE SYSTEMS

Plant Sciences are a critical part of Purdue's future strategic initiatives. We're advancing plant science through cutting-edge technologies, phenotyping, data science, and interdisciplinary research. The initiative builds on Purdue's leadership to address global challenges in agriculture, nutrition, and ecosystem health.

Expanded facilities and advanced research capabilities strengthen the ability to measure, analyze, and improve plant performance in changing environmental conditions.

Advancing Research and Impact

Key efforts include:

- **New state-of-the-art greenhouse facilities**, featuring supplemental LED lighting, CO2 enrichment, temperature and humidity control, multiple irrigation options, and a direct connection to the **Ag Alumni Seed Phenotyping Facility**, enabling phenotyping across a wider array of research projects
- **Cross-disciplinary innovation**, including collaboration with the **Institute for Digital Forestry** (iDiF) to integrate advanced sensing, data analytics, and biological insight for scalable, real-world solutions
- **Strong extramural funding success**, eflected in the College of Agriculture securing $193M in external funding in 2024
- **Global research recognition**, with faculty named among Clarivate's Highly Cited Researchers, placing them in the top 1% worldwide

The Indiana Corn and Soybean Innovation Center was built with generous assistance from the Indiana Corn Marketing Council and Indiana Soybean Alliance.

Federal investments enable Purdue researchers to translate advanced genetics, phenotyping, and data-driven discovery into resilient crop varieties and management strategies that strengthen food security, sustainability, and agricultural competitiveness.

Davis Purdue Agricultural Center in Farmland, IN

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PURDUE AGRICULTURE

INNOVATION FOR THE FUTURE OF AGRICUTURE

The **Purdue College of Agriculture** (COA) advances sustainability through interdisciplinary collaboration, bringing together expertise in biological, environmental, engineering, and social sciences to address today's most pressing agricultural and environmental challenges.

This commitment drives strong partnerships across campus, including close collaboration with Purdue's **Institute for Sustainable Futures** (ISF), where COA faculty make up roughly 40% of affiliated researchers. Together, COA and ISF develop and implement research-driven solutions that enhance the environmental, economic, and social sustainability of agricultural systems in Indiana and beyond.

Federal investments support integrated, science-based innovations—from nutrient and water stewardship to biodiversity and climate resilience—that improve farm sustainability, protect natural resources, and strengthen rural economies through actionable decision tools.

Current ISF–COA initiatives include:

- **Environmental contaminants and agricultural health**, including statewide mapping and analysis of Per- and polyfluoroalkyl substances (PFAS) in water and land, assessment of agricultural and food system impacts, and leadership of the Indiana PFAS Research Network
- **Agrovoltaics for resilient rural systems**, integrating solar energy with agricultural land use to increase resilience to extreme weather and diversify farm income
- **Water quality and management in agricultural landscapes**, addressing water sustainability, hydrology, and the water–food–energy nexus

Additional areas of interdisciplinary collaboration include digital agriculture, international sustainability, community resilience, **One Health**, and support for large, complex research initiatives.

RISING STARS

Dr. Kurt Ristroph (Agricultural & Biological Engineering) develops scalable nanomaterial technologies that improve how agricultural inputs move within plants. Supported by USDA–NIFA, his work enables precise delivery of active agents to targeted tissues, increasing efficiency and sustainability.

Dr. Morgan Furze (Botany & Plant Pathology) studies plant ecophysiology, examining how trees and other plants store and allocate carbon under changing conditions. Her research combines physiology, ecology, and computational modeling to better predict plant resilience to environmental stress.

Dr. Karthik Sankaranarayanan (Biochemistry) uses computational modeling to optimize enzyme reactions used in pharmaceuticals, agrochemicals, and food production. He leads a $7.2M NSF Ideas Lab project to engineer high-temperature, compostable bioplastics in partnership with UC San Francisco, UC Berkeley, and Stanford.

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