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# **Bowery Farming collaborates with Arkansas scientists to develop super spinach**

By John Lovett

U of A System Division of Agriculture

## Fast facts

* Bowery Farming grows pesticide-free produce, hydroponically
* *Pythium* resistance one focus of Arkansas Agricultural Experiment Station researchers
* Spinach lines under development for outdoor and indoor farming

(748 words)

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FAYETTEVILLE, Ark. — Bowery Farming, the national vertical farming giant, has a new agreement with the University of Arkansas System Division of Agriculture to support research for developing spinach varieties that are bred for high-quality indoor production and to thrive in Bowery’s proprietary growing system.

Scientists with the Arkansas Agricultural Experiment Station, the research arm of the Division of Agriculture, are conducting the research in partnership with scientists at Bowery’s research and development facilities. Bowery Farming states it is the largest vertical farming company in the United States in terms of retail footprint.

Bowery Farming sells pesticide-free leafy greens and herbs at more than 1,100 U.S. grocery stores and major e-commerce platforms, including Walmart and Whole Foods Market. This year, the New York City-based company launched two varieties of strawberries, offered in their Strawberry Discovery Duopack. Bowery Farming is also expanding its geographic reach across the U.S. with a new indoor “smart farm” in Bethlehem, Pennsylvania, with robotics, artificial intelligence and other technology to manage the farm systems.

Bowery Farming will soon launch farms in the Atlanta and Dallas metro areas.

“The agreement between Bowery Farming and the Division of Agriculture highlights our dedication to improving modern agriculture using advanced breeding technologies,” said Jean-François Meullenet, senior associate vice president for agriculture-research and director of the Arkansas Agricultural Experiment Station. “Collaborations like this exemplify the kind of public-private research partnerships the Arkansas Agricultural Experiment Station has conducted for decades as part of our land-grant mission.”

The renewable agreement with Bowery Farming supports the evaluation of high-yield breeding lines and studies that identify genetic markers in spinach for resistance towaterborne pathogens*,* such as *Pythium,* as well as other beneficial traits for growing spinach indoors*.*

*Pythium* is a fungus-like pathogen that can cause rot and damping-off, destructive diseases in both field and hydroponics production.

“In Arkansas, we are very good with our spinach program, going over 50 years now,” said Ainong Shi, associate professor and vegetable breeder for the department of horticulture.

Shi said the Division of Agriculture’s long history and expertise in spinach breeding led to initial contact with Bowery Farming in 2020.

Jim Correll, Distinguished Professor of entomology and plant pathology, is behind much of the spinach research with the experiment station and will work with Shi on the *Pythium*-resistance project. Correll successfully developed a spinach line resistant to white rust in previous research and has been developing molecular markers in spinach with a focus on Downey mildew-resistant genes.

Haizheng Xiong, a program associate in the department of horticulture who is also on Shi’s team, said they select promising spinach lines from lab and greenhouse studies and then outdoor test plots before evaluating them for indoor hydroponics. In addition to disease resistance, smooth leaf texture is a desired trait for easier washing, Xiong said. Other desired traits include taste, color, nutritional components, leaf shape, growth speed and yield, Shi noted.

A large part of the research for Xiong and Shi includes molecular breeding — genetic mapping and genome selection of different spinach and arugula lines. Field studies are conducted at the Milo J. Shult Agricultural Research and Extension Center in Fayetteville and the Vegetable Research Station near Kibler. With information from lab and field studies, the researchers expect to get a more detailed genetic map of the plants and find a *Pythium*-resistant line.

Shi noted that molecular breeding includes marker-assisted selection and genomic selection. This breeding process is not considered gene-editing or genome-editing and does not result in genetically modified organisms (GMOs), he said.

## Hydroponic testing

The screening of spinach and arugula lines in indoor hydroponic systems will be carried out by Ryan Dickson, assistant professor of greenhouse and controlled-environment horticulture.

“*Pythium* is one of the main factors limiting the production of spinach hydroponically, and targeted breeding efforts for *Pythium* resistance as well as better performance in indoor farming systems is a logical next step,” Dickson said. “Identifying spinach and arugula lines with true resistance to *Pythium* would be a huge achievement and game-changer for the industry.”

Bowery Farming and the Division of Agriculture have a framework in place to deal with any inventions that result from this research.

Dickson’s program conducts applied research for greenhouse and controlled-environment industries, with a major focus on improving root zone health for crops grown hydroponically and in soilless growing media. In addition to research on mitigating water-borne diseases, like *Pythium*, Dickson’s team conducts research related to root zone nutrient and pH management, irrigation and water quality, and evaluation of new soilless and sustainable growing media.

To learn more about Division of Agriculture research, visit the Arkansas Agricultural Experiment Station website: [https://aaes.uada.edu/](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Faaes.uada.edu%2F&data=04%7C01%7Cfmiller%40uark.edu%7C5cd2aea2b12c4dfceb9c08d942da0e9d%7C79c742c4e61c4fa5be89a3cb566a80d1%7C0%7C0%7C637614326581623988%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=aepGh27NgEgSYv9mb8nggzA%2BaUdOhXMw7e6sspVov8c%3D&reserved=0). Follow us on Twitter at [@ArkAgResearch](https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Ftwitter.com%2FArkAgResearch&data=04%7C01%7Cfmiller%40uark.edu%7C5cd2aea2b12c4dfceb9c08d942da0e9d%7C79c742c4e61c4fa5be89a3cb566a80d1%7C0%7C0%7C637614326581633943%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=nH1djoLMIYNT7ERwtQMektp5RVjEjY1B93nJK%2BhyjJE%3D&reserved=0).

## About the Division of Agriculture

The University of Arkansas System Division of Agriculture’s mission is to strengthen agriculture, communities, and families by connecting trusted research to the adoption of best practices. Through the Agricultural Experiment Station and the Cooperative Extension Service, the Division of Agriculture conducts research and extension work within the nation’s historic land grant education system.

The Division of Agriculture is one of 20 entities within the University of Arkansas System. It has offices in all 75 counties in Arkansas and faculty on five system campuses.

The University of Arkansas System Division of Agriculture offers all its Extension and Research programs and services without regard to race, color, sex, gender identity, sexual orientation, national origin, religion, age, disability, marital or veteran status, genetic information, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.

## About Bowery Farming

Founded in 2015, Bowery Farming is on a mission to democratize access to high-quality, local, safe, and sustainable produce. Bowery builds smart indoor farms near cities, growing fresher, pesticide-free Protected Produce with bold flavor in precisely controlled environments, 365 days a year. At the heart of the farm is the proprietary BoweryOS, which integrates software, hardware, sensors, AI, computer vision systems, machine learning models, and robotics to orchestrate and automate the entirety of its operations. As a result, each farm creates far less waste and uses a fraction of the water and land compared to traditional agriculture.

Based in New York City, Bowery is the largest vertical farming company in the United States, serving major e-commerce platforms and more than 1,100 grocery stores in the Northeast and Mid-Atlantic regions, including Albertsons Companies (Safeway and Acme), Amazon Fresh, Giant Food, Walmart, Wakefern, Weis, Whole Food Markets, and specialty grocers, with produce that’s harvested year-round at peak freshness, delivered within days of harvest.

Bowery has raised more than $497 million in equity funding from leading investors, including Fidelity Management & Research Company LLC, Temasek, GV (formerly Google Ventures), General Catalyst, GGV Capital, First Round Capital, and individuals including Jeff Wilke, as well as some of the foremost thought leaders in food, including Tom Colicchio, José Andrés, and David Barber of Blue Hill.

For more information visit: <https://boweryfarming.com/>.

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