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**Robotic berry picker, herbicide research among topics at Summer Blackberry Tour**

By Fred Miller

U of A System Division of Agriculture

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**Fast facts**

* Blackberry tour presented research and extension updates on blackberry programs
* More than 60 participants attended the tour at the Fruit Research Station
* Arkansas Blackberry Growers Association sponsored the tour

(948 words)

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CLARKSVILLE, Ark. — Do robots dream of electric blackberries?

Doubtful. But they may one day pick fresh blackberries for the rest of us if Renee Threlfall’s graduate students have anything to say about it.

The students have built a prototype robotic blackberry picker. It was displayed Wednesday during the Summer Blackberry Tour at the Arkansas Agricultural Experiment Station’s Fruit Research Station near Clarksville.

The Agricultural Experiment Station is the research arm of the University of Arkansas System Division of Agriculture, which hosted the tour. The event was sponsored by the Arkansas Blackberry Growers Association and featured research updates and blackberry management presentations by the division’s researchers and Cooperative Extension Service specialists.

More than 60 blackberry growers, industry members, students and representatives from the Arkansas Department of Agriculture attended the tour.

**Robots in the berries**

“Fresh market blackberries are mostly hand harvested to maintain the quality of this delicate fruit,” said Threlfall, research scientist for the experiment station. “Labor shortages and costs, and the slow speed of hand harvesting creates a bottleneck for fresh-market blackberry industry expansion and market-ready supply.”

Automated harvesting options like shaking the plants, cutting the stems or using rigid grippers are used for other fruits, Threlfall said. “These options are not feasible for harvesting fresh-market blackberries because they might cause quality issues like berry leakage or red drupelet reversion.”

Soft robotics offer a novel option for automatic harvesting by using compliant grippers of rubber or silicone, said Anthony Gunderman, a mechanical engineering graduate student who designed a robotic “hand.” These materials allow grippers to grasp and manipulate delicate objects, like berries, with complex and varying shapes.

The robotic harvesting research group is comprised of food science graduate student Andrea Myers and mechanical engineering students Gunderman and J.A. Collins. Their faculty advisors are Threlfall from the department of food science and Yue Chen, assistant professor of mechanical engineering.

They set out to determine how the human hand grasps and plucks the berries so they could design a robotic gripper that could mimic the movements, touch and pressure.

Myers said the student team collected the mechanical data on human hands by wearing gloves fitted with sensors that measured the movements, which fingers are used, and the force required to harvest blackberries without damaging them. The data was used to design and construct the robotic “hand” with tendon-driven, soft grippers.

The prototype was used to harvest blackberries from a commercial fruit farm at three fingertip pressures, Threlfall said. The robot-picked berries were evaluated for quality attributes essential for acceptable market-ready blackberries.

“The prototype demonstrated the feasibility of using robotic grippers to harvest fresh-market blackberries,” Threlfall said.

Gunderman said more research and development will be necessary to build a robotic harvester that can locate and differentiate ripe berries from unripe berries on the plant. “We’ll have to use technology that can recognize color bands of light,” he said.

Threlfall acknowledged the support and participation of Arkansas blackberry growers. “Our team looks forward to working with growers as research continues,” she said.

**Preemergent herbicide**

Matt Bertucci, assistant professor of sustainable fruit and vegetable production, described research on preemergent herbicide use in newly planted blackberries being conducted by his graduate assistant Kayla Knepp.

Weed control is important, Bertucci said, because weeds can interfere with crop production in a number of ways. They reduce yields by competing for light, water and nutrients. They also may release allelochemicals that stunt plant growth.

Weeds may also harbor insect or disease pests, Bertucci said, and can slow harvest or interfere with “U-pick” fruit farms.

“The relationship of weeds with crops is intrinsically antagonistic,” Bertucci said. “Weeds are undesirable plants trying to occupy the same niche and fighting for the same resources as crops.”

Preemergent herbicides typically control only germinating or very young seedlings, Bertucci said. “Timing is important. It must be applied before weeds emerge.”

Bertucci said the preemergent herbicide must be activated with 72 hours of application by 0.5 to 1 inch of rain or irrigation.

Post-emergent herbicides that kill weeds that are already growing offers limited options for newly planted blackberries, he said. So Knepp set up an experiment to determine what preemergent herbicides can be used without killing the berry plants. She set out to learn what effects the applications would have on the establishment and growth of newly transplanted blackberry plants in Arkansas and to generate data on weed control and crop response.

The information, Bertucci said, can be used for regional recommendations and applications for supplemental labels on herbicides used for blackberries grown in Arkansas and the southern region.

Knepp’s research was initiated this year and will continue in 2022. Six preemergent herbicides are being evaluated in test plots located on the Fruit Research Station near Clarksville and on the Milo J. Shult Agricultural Research and Extension Center in Fayetteville.

Knepp is also conducting container tests in a greenhouse that will permit evaluation of a larger number of preemergent herbicides, Bertucci said.

“Kayla is trying to answer questions about what is economically and culturally applicable for blackberry producers,” Bertucci said. “The results will provide data to better inform the industry.

**Full agenda**

The blackberry tour had a full schedule of indoor and field presentations for participants.

* Extension agricultural economist Ron Rainey described the Experience Arkansas Agriculture program.
* Extension horticulture crop specialist Amanda McWhirt talked about rotating cross-arm trellis training method updates.
* Ryan Dickson, assistant professor of horticulture, discussed substrate and long-cane blackberry production.
* Extension horticulture integrated pest management specialist Aaron Cato presented updates on broad mite research and management strategies.
* Experiment station fruit breeders John R. Clark and Margaret Worthington gave updates on the Division of Agriculture’s blackberry breeding program, winter weather damage and a new program in novel blackberry plants.

To learn more about Division of Agriculture research, visit the Arkansas Agricultural Experiment Station website: [aaes.uada.edu](https://aaes.uada.edu/). Follow us on Twitter at [@ArkAgResearch](https://twitter.com/ArkAgResearch).

To learn about Extension Programs in Arkansas, contact your local Cooperative Extension Service agent or visit [uaex.uada.edu](http://www.uaex.uada.edu/). Follow us on Twitter at [@UAEX\_edu](https://twitter.com/UAEX_edu).

**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.

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