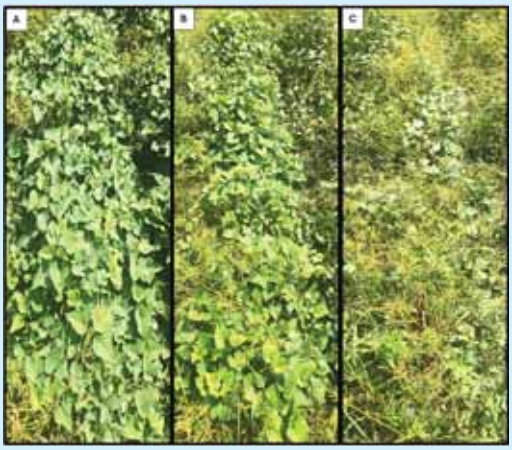

Performance of two USDA, ARS, U.S. Vegetable Laboratory sweetpotato breeding selections for semi-erect to erect plant habit (A and B) and a commercial cultivar with a spreading plant habit (C) grown under organic production practices at 60 days after planting. Plots received mechanical cultivation 2 weeks after planting and no hand weeding.

He's Breeding Better Sweetpotatoes

If there were a Super Bowl for sweetpotatoes, Dr. Phillip Wadl's would be in the running. The USDA Agricultural Research Service (ARS) research geneticist is breeding sweetpotatoes to compete with weeds and resist insect and nematode pests while improving other traits as well.

"Every year, we improve weed tolerance and insect resistance while incorporating better root traits, skin color and flesh color," says Wadl. "We're also breeding in more diversity in colors, such as yellow and purple varieties."

Wadl conducts research at the U.S. Vegetable Laboratory in Charleston, S.C. He leads breeding efforts to improve sweetpotatoes in a program that's nearly 75 years old. He's also an active participant in the National Sweetpotato Collaborators Group, which is open to anyone interested in sweetpotato research and includes university and non-profit researchers and growers.

"Sweetpotato breeders can enter germplasm into the research trials," says Wadl. "Participants grow material under local production practices to assess performance in multiple environments. This year, there are 8 to 10 sites across the country from South Carolina to California."

Wadl's weed competitive varieties were selected for upright growth instead of the more common on-ground vining. He reports there are around 20 varieties with an erect growth habit in the ARS sweetpotato germplasm repository and another 50 with semi-erect growth.

"We're looking for very vigorous growing plants that quickly cover the bare soil within a row to reduce weed competition," says Wadl. "The goal is for them to quickly fill in the row and yet be easy to cultivate. Not many did that when we started our breeding objective."

Wadl has one advanced breeding line that he thinks has potential for commercial release, pending further evaluation. "We have others we're now evaluating," he says.

Developing a competitive cultivar is detailed, time-consuming work that can span years. In the case of his weed competitive cultivars, Wadl has one chance per growing season to evaluate. He screens seedling plots at about 6 to 8 weeks to identify competitive individuals and then evaluates these further in replicated plots.

Wadl is also working on incorporating root-knot nematode resistance. Advanced selections are grown for 8 to 10 weeks in a greenhouse under controlled conditions, dug up, and the roots are washed and assessed for root galling and reproduction by counting nematode eggs. They're also screened for resistance to ground-dwelling insect pests such as wireworms, sweetpotato flea beetles, white grubs and the sweetpotato weevil. This process takes about 2 mos.

"We try to combine resistance for all these pests into one breeding line. We're looking for improvement with significantly higher or at least comparable resistance levels to material currently produced in the U.S."

Wadl encourages interested FARM SHOW readers to get involved. A good starting point is the 2024 Southeast U.S. Vegetable Crop Handbook. It lists sweetpotato cultivars with recommendations by states in the Southeast, planting dates, pest resistance, fertility, plant bed, nutrients and more. Not limited to sweetpotatoes, it's a comprehensive 365-page vegetable growing guide with extensive information that's not regionally specific.

For those serious about sweetpotato research, Wadl suggests contacting the U.S. Sweet Potato Council and the local extension service. "The National Clean Plant Network is also a good resource for sweetpotato propagation material for bona fide growers," says Wadl.

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Power Line Monitoring System Prevents Wildfires

IND Technology CEO Alan Wong devised the idea for an above and below-ground Early Fault Detection (EFD) system about 20 years ago after hearing that the Human Genome Project had decoded a series of "junk" DNA.

"I thought power lines were similar with their types of interference," Wong says. "We knew so-called interference and noise were created by failing equipment like insulators cracking and dropping conductors. Whether overhead or underground, if we have a failing joint, it can explode catastrophically, start a wildfire, or injure and kill people."

The EFD detects power line issues before they trip the circuit with an accuracy of plus or minus 30 ft. over 3 miles. Like a smoke alarm, the unit monitors the entire power system, identifying small symptoms like a tree limb growing close to a line.

"We can stop a fire as the system sees the problem well before a conductor fails," Wong says. "Conductors have multiple tiny wires; if one breaks, we pinpoint it in real-time."

EFDs include hardware and software components. A data collection unit features a sensor, like an antenna, that points at the conductor or underground cable. A powerful high-speed processor pushes information to the cloud.

"The cloud is where the magic happens, where the data is correlated," Wong says. "We see outliers, locations and generating events."

Sensors are spaced at 3-mile intervals and listen to everything traveling through the lines, precisely triangulating where issues originate.

"It picks up everything from AM and FM radio and farm machines," Wong says. "We filter out 99 percent of the noise, and what's left behind is the gold nugget. We locate the source, see it on Google Maps, and find the potential problem 24/7."

Sensors are spaced at 3-mile intervals and listen to everything traveling through the lines, precisely triangulating where issues originate.

IND Technology has about 20 primarily Investor-Owned Utility customers in North America, plus U.S. co-ops and smaller electrical asset owners. Wong says the components are simple to install as nothing touches the power lines. IND may supervise the initial placements, but with a little practice, utility companies can install six to 10 units daily.

The EFDs are manufactured in Melbourne, Australia, and exported to the U.S.

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PoLoPo inserts a DNA sequence into the potato plant's genome. When appropriately expressed in the proper tissue and at the right time (their proprietary science), the plant grows as a typical potato, producing the target protein in the tuber.

Molecular Farming Transforms Potatoes Into Protein

PoLoPo, an Israeli molecular farming company, is turning potatoes into protein-producing bio-factories.

Its first protein target is ovalbumin or egg protein.

"There's an urgent need for a steady supply of egg protein at a stable price," says Maya Sapir-Mir, PoLoPo CEO. "Powdered egg protein is widely used in the food industry for functional reasons, like texture and stability, for enhancing nutritional value and extending shelf life. Food companies are dealing with price increases and supply chain disruptions, mainly because avian flu outbreaks have impacted the egg industry."

Sapir-Mir and company co-founder Dr. Raya Liberman-Aloni devised the idea several years ago after working together in postdoctoral research.

They chose the potato because of its climate resiliency, low cost, high yields and large storage organs.

Sapir-Mir explains that molecular farming modifies plant genetics, so plants naturally generate a higher-value ingredient or nutrient, such as a protein, pigment, sugar or fatty acid. PoLoPo inserts a DNA sequence into the potato plant's genome. When appropriately expressed in the proper tissue and at the right time (their proprietary science), the plant grows as a typical potato, producing the target protein in the tuber. The tubers are harvested, and the proteins are extracted using traditional processing lines before being dried into powder.

In May 2024, PoLoPo applied for a Regulatory Status Review in the U.S. They expect this to be granted by the end of 2024 when farming partners can begin growing the plants.

PoLoPo is currently completing testing and trials, talking to interested growers and processors, and actively looking for like-minded partners and service providers. They hope to work with potato experts, from seed/mini tuber producers to growers and processors interested in potato innovation and sustainability.

"We believe it's practical and will be cost-effective," Sapir-Mir says. "We're about to reach pilot scale, and prices will inevitably fall as we expand to commercial growing. One could argue that producing ovalbumin in plants is more practical, cost-effective, and certainly more efficient than raising and feeding millions of hens to produce this specific ingredient. And we won't have to break a single egg."

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