Research lab rides wave of growth in pulse crops

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Bright Agindotan, manager of the Regional Pulse Crop Diagnostic Laboratory, holds a sample of chickpeas infected with a fungus called botrytis on Friday, June 15, 2018, at Montana State University in Bozeman. Credit: MSU Photo by Adrian Sanchez-Gonzalez

Like a farmer scanning the horizon for coming changes in weather, in 2014 Mary Burrows looked to the future of Montana agriculture, and what she saw prompted her to start the Regional Pulse Crop Diagnostic Laboratory at Montana State University.

It was a prescient decision. That year, farmers planted about 702,000 acres of pulses—dried leguminous crops that include peas, chickpeas and lentils. Just three years later, they planted more than double that acreage.

Burrows, a professor in MSU's Department of Plant Sciences and Plant Pathology, anticipated the change, "but the exponential growth has been pretty surprising," she said.

More and more farmers, Burrows said, are seeing the benefits of planting pulses, which require little soil moisture, provide a cover crop that prevents weeds and fix essential nitrogen into the soil. In lieu of a traditional crop rotation that requires fallowing fields of wheat, a longtime staple of Montana agriculture, many farmers are instead getting extra income by pairing wheat with pulse crops.

But the benefits have come with new costs. "Pulse crops are really susceptible to a lot of diseases," Burrows said. Luckily, "many diseases can be prevented using integrated pest management, including using clean seed."

In 2014, no lab in the U.S. specialized in diagnosing pulse crop diseases. MSU's Schutter Diagnostic Lab, which identifies a variety of plant problems, was struggling to apply its expertise to the uptick in pulses.

"We established the pulse lab because we had a number of diseases and nobody in the region with the capability to quickly identify them," Burrows said.

In starting the lab, MSU had wide support from the U.S. Department of Agriculture's National Institute of Food and Agriculture, industry groups including the U.S. Dry Pea and Lentil Council and the Northern Pulse Growers Association, the Montana Department of Agriculture and others, Burrows said.

Pulse pathogens include a variety of bacteria, fungi, viruses and nematodes, which are tiny, worm-like parasites. Often, pathogens don't immediately reveal themselves but become a problem in future generations of plants.

"Some seeds look healthy, but have disease," said Bright Agindotan, assistant research professor in the plant sciences and plant pathology department and manager of the pulse crop lab.

Bright Agindotan demonstrates diagnostic equipment at the Regional Pulse Crop Diagnostic Laboratory on Friday, June 15, 2018, at Montana State University in Bozeman. Credit: MSU Photo by Adrian Sanchez-Gonzalez

Over the past four years, with a few relatively small grants and funding from the Farm Bill, the facility has expanded its capabilities with advanced equipment that can, for example, quickly determine a pulse sample's genetic makeup.

"We look at what you can't see with your own eyes," said Muhammad Mahathar, a senior majoring in microbiology who works part-time in the lab.

If diseases go unchecked, they can reduce yields, undercut a grower's ability to sell seed and cut off avenues for export. According to the Montana Department of Agriculture, the state's export of pulse crops grew from $8 million in 2010 to more than $160 million in 2016. Many countries require certification that pulse products are free of nematodes and other pathogens, Agindotan said.

If significant levels of specific nematodes or other quarantined pathogens are widely discovered in Montana, Burrows said, a country like India could decide to decline the state's imports entirely. "(The lab) is a really valuable resource for protecting the industry from trade barriers," she said.

This year, Agindotan received a sampling of chickpeas that had a high concentration, about 17 percent, of Ascochyta blight, a fungus that can decimate the crop. Much of it showed resistance to a commonly used fungicide, and he quickly contacted the grower to advise an effective alternative. The incident demonstrated the importance of catching a disease early and working with the farmer to develop a strategy, he said.

"Just like when you go to the doctor, the first step is to diagnose the disease," he said. "Then you can treat it."

Last year, the lab received more than 1,900 samples, mostly from around

Montana. Agindotan and others also travel the state to proactively find diseases that are just beginning to get a foothold. In 2016, for the first time in the state, they found Aphanomyces, a root rot whose spores can persist in soil for as long as 20 years. Lab personnel are now educating farmers about prevention of the disease, and are researching the best way to manage it in Montana.

According to Burrows, it's unclear whether the tide of pulse crops will continue to rise in Montana. Currently, the low price of wheat is helping to bolster pulses. Because farmers have seen the benefits of the crops and gained experience growing them, the levels may never never drop back to 2014 levels, she said.

Today, MSU's diagnostic lab, which serves Montana as well as six surrounding states, remains the only one in the U.S. that specializes in pulse crops.

"It has proven its value," Burrows said.

Provided by Montana State University