

# ADVANCING THE FIGHT AGAINST ROOT ROT IN PEAS & LENTILS



*Honey-brown discoloration of pea roots, characteristic of *Aphanomyces euteiches*. Other symptoms include yellowing and wilting of lower leaves, discoloration of roots - watery and honey-brown/caramel coloured, poor lateral root growth with minimal root hairs, and pinching of epicotyl stops at soil surface.*

*“I always get excited that the next line of research may lead to a breakthrough in figuring out this pathogen complex.”*

**Dr. Syama Chatterton**

New research is shedding light on how genetic resistance and management strategies might work together to deliver an effective one-two punch in the fight against root rot in pea and lentil.

An Agriculture and Agri-Food Canada (AAFC) project called *Breeding, physiology and agronomy to mitigate yield loss caused by root rots of pea* set out to evaluate how well pea lines developed in the United

States (U.S.) with partial resistance to *Aphanomyces* or *Fusarium* root rot performed under Canadian conditions.

“What we found is lines that are resistant to one pathogen were

not resistant to the other,” said lead investigator and AAFC plant pathologist Dr. Syama Chatterton.

That makes the task more challenging for breeders trying to develop pea and lentil lines with greater resistance to both pathogens in one plant. More challenging—but not impossible.

The varieties that demonstrated greater resistance have been singled out for in-depth analysis of the traits that might contribute to their disease resistance. While the analysis is still in progress, Chatterton believes it will lead to varieties with stronger genetic resistance in the years ahead.

Genetic resistance cannot do the job alone. Root rot is notoriously difficult to manage because it is caused by multiple pathogens that can survive in the soil for a long time.

“It takes all the tools in the toolbox to fight something that complex,” Chatterton explained. “Partially resistant cultivars of field peas and lentils are a good start, but once we have them, we need solid agronomic practices that maximize their effectiveness in the field and safeguard the levels of resistance we have developed so far.”

A second stage of the project looked exclusively at field peas to assess the impact of intercropping and crop rotation on test crops grown at six sites in Alberta, Saskatchewan and Manitoba.

From these studies, researchers learned that intercropping pea with canola, mustard, or oats did not reduce pea root rot disease severity—but did often result in higher pea yields compared to the pea monocrop. However, this did not occur at all sites or in all years, especially during dry years.

“We would like to test if intercropping will slow down the buildup of pathogens in the soil, but that is

more difficult to research,” Chatterton said.

Chatterton and her team also conducted a crop rotation study to find out whether a root rot tolerant pulse crop was a safe option for growers hoping to maintain a pulse within their cropping system. They found that soybean, faba bean, and chickpea were not colonized by *Aphanomyces euteiches*, but could be infected by some *Fusarium* species.

Including these pulse crops in a rotation with pea did not increase pea root rot severity, however, and in some cases provided a yield boost to the subsequent pea crop, which surprised Chatterton.

“Whether this is due to a residual nitrogen effect or to a reduction in pathogen inoculum is something we look forward to exploring in future research,” she said.

Another major finding confirms that extended rotations from pea are necessary to reduce root rot effects.

“At most sites, root rot severity and yield did not improve after a six-year break, which is the longest interval we were able to achieve with the study design,” she noted.

Root rot severity and yields were usually the worst in the wet years, highlighting that mid-June rainfalls are the biggest drivers of pea root rot.

Chatterton said she knows the frustrations of pulse growers dealing with pea and lentil root rot, and stressed that more and more experts across a range of fields, from genetics and precision agriculture to soil health, are joining the fight.

“Results from the in-depth analysis of the partially resistant plant material we collected will open up whole new avenues for research as we try to tease apart what makes a plant resistant, and why plants are resistant to one root rot disease and not the other,” Chatterton explained. “I always get excited that the next line of research may lead to a breakthrough in figuring out this pathogen complex. For now, we are figuring it out in small increments.”

*The Pulse Research Cluster includes Alberta Pulse Growers, Manitoba Pulse and Soybean Growers, Ontario Bean Growers, Saskatchewan Pulse Growers and Pulse Canada and is supported by the Agriculture and Agri-Food Canada AgriScience Clusters Program under the Canadian Agricultural Partnership.*

## Project

Breeding, physiology and agronomy to mitigate yield loss caused by root rots of pea

## Industry Funders

Alberta Pulse Growers, Saskatchewan Pulse Growers, Manitoba Pulse and Soybean Growers

## Cost

\$1,698,236.20

## Project Completion Date

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