WHITE MOULD IN DRY BEAN: IF YOU CAN'T BEAT IT, AVOID IT

Partial Physiological Resistance is now a key criterion for dry bean breeding in Alberta, along with existing priorities such as yield potential and early maturity.

White mould can devastate bean production. Healthy plants like this, are the goal of breeding efforts.

Dry bean varieties that feature lush canopies, grow close to the ground or lodge during the growing season make things easy for white mould. If conditions are also cool and wet, as this disease prefers, a significant infection becomes even more likely.

That's why, with funding from the Canadian Agricultural Partnership AgriScience Program, Dr. Parthiba Balasubramanian is placing more emphasis on finding bean cultivars that grow in a way that makes it harder for white mould to grab on. This trait is known as Partial Physiological Resistance (PPR).

"This is a different aspect of resistance to white mould and one we're focusing on more as part of the current Pulse Cluster funding," said Balasubramanian, Lethbridge-based Dry Bean Breeder with Agriculture and Agri-Food Canada. "When pods are held slightly above the ground, hopefully not touching the soil surface, that helps avoid white mould and of course makes harvest easier too."

When bean plants resist lodging, he explains, the plant creates a micro-climate that is not conducive for the pathogen. With healthy air movement through the canopy, the plant surface stays dry, making it less likely that white mould sclerotia will germinate to produce spores.

"We have started screening bean germplasm lines for Partial Physiological Resistance to white mould," Balasubramanian said. "We have identified suitable lines and we've been using those lines as parents in our breeding program."

A help, not a solution

Balasubramanian is quick to point out that *Partial* Physiological Resistance – noting the emphasis on partial – won't solve growers' white mould worries overnight. In years when conditions are borderline conducive, however, it certainly couldn't hurt.

"A good example would be 2010," Balasubramanian said. "The entire growing season was cool and wet, so the disease pressure was extremely high. And so avoidance, as a strategy, was simply not enough to keep the disease pressure low."

He's also taking on white mould from another direction. Some dry bean germplasm lines are able to regulate their pH level so they can tolerate infection. When spores land on the plant, it initiates infection. At that point, the pathogen releases oxalic acid but the plant neutralizes or pushes back on the infection.

That's not to say that physiological (partial) resistance to white mould is Balasubramanian's only breeding consideration. Yield potential and early maturity are just as important as ever.

In fact, Alberta's 2019 harvest experience is a reminder that even though researchers can get their plots planted and harvested early, growers aren't always so fortunate.

"Growers can only plant beans when they can get to it," Balasubramanian said. "We go as soon as the land is ready, and that was May 10 in 2019, so we were able to get all our plots harvested before the rain and snow came. For us, it was more like a normal growing season. But it underlines just how important early maturity continues to be."