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Root rot pathogens deliver a one-two punch to pea fields

Pea fields take a bigger yield hit when both aphanomyces and fusarium root rots are present

by Jennifer Blair AF staff / Medicine Hat

Two root rot pathogens are teaming up to wreak havoc in Alberta's pea fields. "Before 2016, I thought that we were just dealing with fusarium root rot in the brown soil zone, but 2016 completely changed that hypothesis," said Syama Chatterton, plant pathologist with Agriculture and Agri-Food Canada. "We saw a lot of aphanomyces root rot down in southern Alberta, and we're seeing a fairly large yield penalty from aphanomyces that we don't often see if there's only fusarium present." These two different species working together makes this a "really complex disease to deal with," said Chatterton, who spoke at the Farming Smarter conference last month. Chatterton's research team has been surveying for pea root rots for the past four years, but it wasn't until they moved to DNA testing that they found a difference between the different pathogens that devastate pea crops across the province. "When we started out in 2013, we actually didn't know what was causing the problem," said Chatterton. "Aphanomyces and fusarium root rots occur as a complex and can be very difficult to distinguish." DNA testing has made that easier, but in the field, distinguishing between fusarium and aphanomyces can be tricky. "If you're seeing plants that have a characteristic yellowing and stunting of the shoots, it's a good indicator that you're dealing with aphanomyces, whereas oftentimes we see that plants in the field that have fusarium root rot can look fairly healthy," said Chatterton. "Having said that, when we go to the field and start collecting roots, the symptom expression is really not as clearcut. It's actually really difficult to tell just by looking at the roots." But based on the past four years of field surveys, it's a safe bet that fusarium is present wherever aphanomyces is, she added. "We found that fusarium species were present in all the fields that we tested," said Chatterton. "Usually, if we're finding aphanomyces, we're finding fusarium as well." In 2014 — a "very, very wet year" — 83 per cent of the fields tested in the black soil zone were positive for aphanomyces, followed by 56 per cent in the dark-brown soil zone and 34 per cent in the brown soil zone. "In the Peace, we didn't actually find any fields that were positive. That was good. It hadn't reached up that far north," she said. "But in 2015, which was a really dry year, there were a lot less fields testing positive for aphanomyces. But we did find it in 50 per cent of the fields we tested in the Peace, indicating that it had reached that far north." Chatterton didn't know what to expect in 2016, given the "wacky weather," but a "fairly high" number of fields tested positive for aphanomyces last year. "It was at 56 per cent in the brown soil zone, which was the highest we had seen yet," she said. "Root rots are, unfortunately, fairly widespread, but we do see they have less of an impact in dry years." Predicting the risk Right now, Chatterton is working to develop a tool that will predict root rot risk (aside from looking at the weather forecast). "The idea is that you can take a soil test, quantify the amount of inoculum you have present in the soil, and know if you have a low, medium, or high risk," she said. "The step that we're working on right now is trying to understand how much inoculum causes how much disease." In a recent series of greenhouse tests, Chatterton added

aphanomyces' oospores (or long-lived resting spores) to sterilized, 'clean' soil to determine at what level disease would begin developing. She then compared those thresholds to those of 'raw' soils that have other pathogens, like fusarium, present. The presence of fusarium "complicates the whole issue." "You need about 100 oospores per gram of soil in the dark-brown soil zones to cause severe disease, whereas in the brown and the black you need about 750 oospores per gram of soil," said Chatterton. "However, if you add fusarium into the mix, particularly in the brown soil zones, we see that the incidence of disease is increasing to about 100 oospores per gram of soil in all soil types to cause disease." And the impact on pea yields could be significant, she added. In a Lethbridge field trial, there were "fairly good yields" when only fusarium was present, with yields ranging from 2,000 to 4,000 kilograms per hectare. But yields dropped to between 1,000 and 3,000 kilograms per hectare when aphanomyces was present as well. "There does seem to be an interaction between aphanomyces and fusarium that causes more disease." But while it may soon become easier to predict root rot with this tool, managing the disease is a different story. "The No. 1 risk factor is crop history, and that's particularly for ones who have had a field that has had about four to five cropping cycles with a susceptible host," said Chatterton, adding peas and lentils are most susceptible to root rots. "Long rotations between susceptible pulse crops are currently our only control option."
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