

# Aphanomyces: We're Not a Fan

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**'PEAS HATE WET FEET,'** no argument there. One of the reasons saturated soils are so troubling for this crop is the devastating effects of Aphanomyces root rot. This root disease relies on soil moisture to reach pea roots and prefers warm soils.

Above ground, peas will be yellowing, stunted and necrotic. Below ground, roots will be unhealthy, decaying and nodules will be absent. You will see these symptoms popping up more commonly in June and July in the areas of the field that are accumulating water – along drains and water runs, in low spots and at field approaches and headlands where compaction has impacted drainage.

Thick-walled oospores, the resting spores of Aphanomyces that reside in the soil and on crop residues, are the challenge. They are extremely resilient and can lie dormant for more than 10 years in the soil. Right now, the only real solution we have is to draw oospore levels down in the field over time by taking an extended break between pea crops (six-year break minimum, but eight years preferred). This ensures that peas will remain profitable in that field.

Along with peas, other Aphanomyces hosts we want to avoid during that

	Dry Soil	Wet Soil
Cool Soil	<ul style="list-style-type: none"> <li><b>Rhizoctonia solani</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Rhizoctonia solani</b></li> <li><b>Pythium spp.</b></li> </ul>
Warm Soil	<ul style="list-style-type: none"> <li><b>Fusarium spp.</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Aphanomyces euteiches</b></li> <li><b>Fusarium spp.</b></li> </ul>

There is a root rot for every temperature and soil moisture. Aphanomyces root rot prefers warm, wet soils.

break period are lentils, dry beans, alfalfa, clovers, vetches, chickweeds and shepherd's purse. To take advantage of other nitrogen-fixing legume crops during this break period, soybeans, faba beans, lupins, sainfoin and birdsfoot trefoil are non-host/resistant legume options to work into the rotation.

### THE SITUATION IN MANITOBA

We now have disease prevalence results (the percent of pea fields infected with Aphanomyces) for Manitoba due to disease surveillance efforts by Dr. Yong Min Kim and his team at Agriculture and Agri-Food Canada in Brandon, in collaboration with Manitoba Agriculture, Manitoba Pulse & Soybean Growers and

Dr. Syama Chatterton at AAFC-Lethbridge (Figure 1).

Something to be aware of with these results is that while Aphanomyces was detected in a startling amount of pea fields (virtually every field in 2022), the molecular method the lab uses to confirm this root rot in the soil is highly sensitive. So, a positive detection for Aphanomyces may not indicate that the disease occurred at great enough levels in the field to cause a yield impact on the crop. Dr. Kim and his lab are working on fine-tuning this assay to tease out the relationship between inoculum level and detection level.

The number of fields infected with Aphanomyces follows the trend of May to July accumulated rainfall. Years with

A field where, on the surface, peas are yellowing, stunted and necrotic, and their roots are unhealthy, decaying and nodules will be absent.

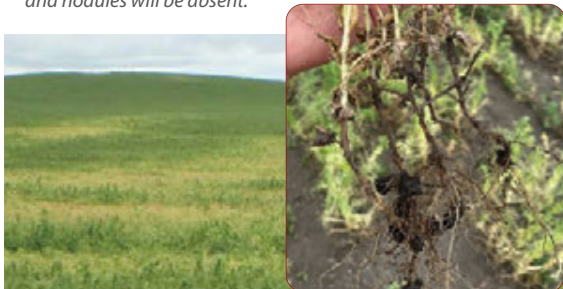


Photo Credit – Laura Schmidt

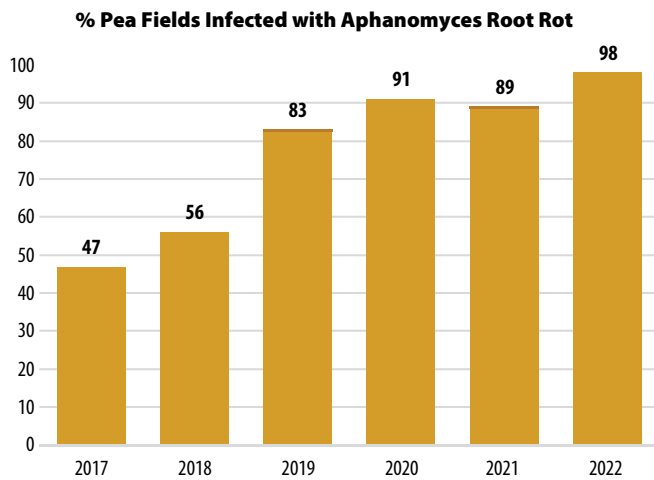


Figure 1. Prevalence (percent of fields infected) of *Aphanomyces* root rot in pea fields surveyed across Manitoba from 2017 to 2022.

the greatest amount of disease, 2020 and 2022, were also years with the most early summer moisture. It's important to keep note of those wet pea years since that will impact the disease load in a given field. A longer break between pea crops may be necessary if the previous peas were wet and had more root rot pressure.

*Aphanomyces* root rot is not new to Manitoba. It was first confirmed here in the 1970s. It is also not just a western Manitoba problem either. As pea acreage has expanded in Manitoba, survey efforts have extended to include central and eastern parts of the province. *Aphanomyces* is being detected in

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## REDUCING ROOT ROT RISK

Considerations	Higher Risk	Lower Risk
<b>STEP 1: Major Influencing Factors</b>		
Soil test for Aphanomyces	<input type="checkbox"/> Positive test result	<input type="checkbox"/> Negative test result
Environment the last time or times peas/lentils grown	<input type="checkbox"/> Above average moisture (wet)	<input type="checkbox"/> Below average moisture (dry)
Symptoms last time peas/lentils grown	<input type="checkbox"/> Patchy to whole field affected; late season lodging	<input type="checkbox"/> No symptoms; healthy field
<b>Action</b>	If one or more checked above = <b>HIGH RISK. Do not seed peas or lentils into the field.</b> Choose a different field, wait until soil test is negative, or field out of peas/lentils for at least 8-10 years.	<b>Consider Intermediate Risk Factors.</b>
<b>STEP 2: Intermediate Influencing Factors</b>		
Field Conditions	<input type="checkbox"/> Heavy texture with poor drainage <input type="checkbox"/> Field has compaction issues	<input type="checkbox"/> Lighter texture with good drainage <input type="checkbox"/> No compaction issues
# of times peas/lentils grown in past 20 years	<input type="checkbox"/> > 5x or unknown	<input type="checkbox"/> < 5x
Last time in peas or lentils	<input type="checkbox"/> ≤ 4 years	<input type="checkbox"/> ≥ 8-10 years
<b>Action</b>	If majority of checks in this column then consider field as <b>Intermediate Risk</b> - consider Minor Influencing Factors before planting peas or lentils into this field.	If majority of checks in this column then consider field as <b>Lower Risk</b> - consider Minor Influencing Factors to help reduce potential infections and severity.
<b>STEP 3: Minor Influencing Factors</b>		
Rotation - crops included	<input type="checkbox"/> Limited diversity (canola or wheat)	<input type="checkbox"/> More diverse and include oat and/or mustard
Rotation - managing Fusarium	<input type="checkbox"/> High residue levels infected with Fusarium from previous crop (cereals)	<input type="checkbox"/> Low or no Fusarium infected stubble from previous crop
Weed control - presence or absence of susceptible weeds (alternative hosts)	<input type="checkbox"/> Weeds have been out of control on the field with high levels of host weeds	<input type="checkbox"/> Field is relatively weed free going into pea/lentils
<b>Action</b>	<b>Intermediate Risk</b> - Consider Management Decisions (Table 3) prior to seeding to address minor influencing factors where possible or plan to seed peas and lentils in a different field.	<b>Low Risk</b> - Field is low risk for Aphanomyces infection but no guarantee of no risk. Consider Management Decisions (Table 3).

Agronomic Factors	Recommendations for Lowering Risk
Seed quality	Choose seed that is good quality and disease-free. Consider using seed treatments to manage disease on seed and protect against early infection by Aphanomyces. asfd
Varieties	Choose varieties that have tannins in seedcoat and varieties with improved Fusarium resistance where possible.
Nutrient levels	Consider a balanced fertility plan to ensure nutrients are available and easily accessible.
Pea leaf weevil risk	Identify risk of pea lead weevil in the field/area and use insecticide seed treatment to reduce damage.
Soil management	Address any compaction in the field and do not move heavy equipment across the field if it is higher moisture (including rolling under wet conditions).

# Aphanomyces Root Rot

## DISTRIBUTION

- Common throughout Manitoba
- Risk greatest in warm, wet soils and in fields with more pea history and tighter crop rotations

## SYMPTOMS

- Above-ground: crop yellowing and stunting
- Below-ground: if early, caramel, decaying lateral roots, if later, pinched taproots with poor root growth

## SCOUTING

- Look for root rot symptoms from June to July
- If suspected, send roots or soil for lab testing!

## MANAGEMENT

- Crop rotation break of 6 or 8 years between host crops (peas, alfalfa, dry beans, lentils, clovers and vetches)
  - If field conditions were wet the last time peas were grown, take a longer break
- Establish a strong pea crop (early seeding dates, good quality seed, balanced fertility, competitive varieties)



fields in those regions as well. It is quite troubling, because research has indicated that root rot severity is so much worse when *Aphanomyces* and *Fusarium* root rots occur together in the field – which they often do. We find *Fusarium* species infecting pea roots in every field we survey each year.

The first step to managing *Aphanomyces* root rot in peas is to confirm that it is present in your field. Plant root samples or soil samples (from the 4- to 8-inch depth) can be taken and submitted to diagnostic labs for testing. Soil samples are a great tool to use in the fall ahead of growing peas to determine if peas are a good choice for that field or if a longer break might be necessary before

returning that field to peas. To improve detection of this pest in the field, sample from low-lying areas like drains, water runs, low spots, approaches and headlands.

Saskatchewan Pulse Growers have a resource, *Reducing Root Rot Risk* (see image on left page), that contains a checklist to help decide when a field is suitable for a return to peas once *Aphanomyces* has been detected. It walks through major considerations like the environment and symptoms the last time peas were grown—are you starting with more disease carryover from the last pea crop? Then it considers the field conditions (drainage, soil texture) and field history like the number of pea crops

and the time since the last crop. Other minor factors can have an impact as well like controlling host weeds and the risk of *Fusarium* root rots.

Establishing a strong start for peas will help your crop be more resilient to disease pressures too. Use good quality seed, balanced fertility, competitive varieties and seed early.

Watch the full *Aphanomyces* root rot webinar on MPSG's YouTube channel at [www.youtube.com/@MbPulseGrowers](https://www.youtube.com/@MbPulseGrowers). ■