Aphanomyces Root Rot in Peas

Aphanomyces root rot, caused by *Aphanomyces euteiches,* is the most destructive pea disease in Western Canada. Aphanomyces is an oomycete pathogen, also called a water mould. Dormant, resting oospores of this disease are incredibly resilient and can survive in soil for more than 10 years. Genetic resistance is not available and control options are limited.

SYMPTOMS

Above-ground, peas will yellow from the base of the plant upwards. Plants will wilt and die prematurely. Below-ground, roots will be rotting. Initial Aphanomyces infections begin as browning of lateral roots that then spreads to pinch the taproot. Most of the time, Aphanomyces co-infects with Fusarium root rots, causing blackening at the point of seed attachment. Root rot severity is much worse when Aphanomyces and Fusarium co-infect.

Source: Syama Chatterton, AAFC-Lethbridge

Aphanomyces and Fusarium root rots often co-infect.

SCOUTING

Aphanomyces requires soil moisture to infect plant roots and infection can occur throughout the growing season. Typically, symptoms will show up in June and July around two to three weeks after a good rain.

Scout drains, water runs, low spots, approaches and headlands. Dig up yellowing plants and look for root rot symptoms. Infection is more common on heavier-textured soils with poor drainage or in compacted areas.

PLANT AND SOIL TESTING

If Aphanomyces is suspected, soil or root samples may be submitted for DNA testing for confirmation. Soil samples may be taken any time of year and should be collected from the four-to eight-inch depth.

Diagnostic labs may provide presence/absence confirmation or may provide a severity estimate from soil samples (Table 1). Soil samples may be collected from high-risk areas of the field that hold water to determine if Aphanomyces is present. General representative soil samples may also be taken before returning to a field with peas to determine the risk of Aphanomyces root rot development in-crop.

Table 1. Diagnostic labs for Aphanomyces testing

Diagnostic Lab	Plant Samples?	Soil Samples?
20/20 Seed Labs	Yes	Yes (+/-)
A&L Canada Labs	Yes	Yes (low, med, high)
AFL Agriculture & Food Lab	Yes	Yes (low, med, high)
BDS Labs	Yes	Yes (+/-)
Discovery Seed Labs	Yes	Yes (+/- and low/high)
Quantum Genetix	Yes	Yes (+/-)
SGS BioVision	Yes	Yes (+/-)

Soil sample results will be returned as positive (+) or negative (-) and some labs may also offer an indication of the level of oospores found in the sample (low, medium or high).

SURVEILLANCE IN MANITOBA

Pea fields are surveyed annually for root, foliar and stem diseases through a collaborative effort by Agriculture and Agri-Food Canada – Brandon, Manitoba Pulse & Soybean Growers and Manitoba Agriculture. As part of this surveillance, soils are collected from pea fields and tested for Aphanomyces (Table 2). On average, 86% of fields tested from 2019-2023 were confirmed to have Aphanomyces present in the soil.

Table 2. Percent of fields infected with Aphanomyces root rot.

2019	2020	2021	2022	2023
83%	91%	89%	98%	70%

CROP ROTATION

If Aphanomyces is confirmed in a field, the best management option is to extend the crop rotation break between crop hosts to a minimum of six years, but preferably eight. If high oospore levels exist (if it was wet the last time peas were grown), a break of 10 or more years may be necessary. Maintain good records of pea crop rotation history and frequency. Note the severity of root rot and soil moisture conditions the years peas were grown to determine how long of a break to take between susceptible crop hosts.

Crop hosts include peas, lentils, cicer milkvetch, vetches and clovers. Weed hosts to be aware of are shepherds purse, chickweeds, field pansy, vetches and clovers. Aphanomyces isolates that infect pea are weakly pathogenic or non-pathogenic on dry beans and alfalfa and these crops are considered variable hosts.

Non-host or resistant legume crops that may be included in the rotation without risk of increasing disease levels include soybeans, faba beans, lupins, sainfoin and birdsfoot trefoil.

OTHER MANAGEMENT OPTIONS

High soil moisture is a major contributing factor to the severity of Aphanomyces. Planting peas on lighter-textured and well-drained soils will help mitigate infection.

Seed treatments are registered for suppression of early-season Aphanomyces infection (*INTEGO Solo, Rancona Trio, Zeltera Pulse*). These provide roughly three weeks of protection after seeding , helping plants get established, but will not provide season-long protection.

Genetic resistance to Aphanomyces is controlled by many minor genes in the plant to provide partial resistance. Breeding lines with partial resistance do exist but are not yet commercially available.

Mustard and oats have shown promise in having bio-fumigant properties in greenhouse trials, but so far, they have not been able to replicate those results in the field.

Since root rot infections are much worse when Fusarium co-infects, consider Fusarium management as well. Research indicates that pea varieties vary in their susceptibility to *Fusarium avenaceum* infections.

First-time pea field (L) vs. a pea field with pea rotation history and severe Aphanomyces root rot infection (R).