

## Root Rot Complex Affecting Soybean and Pulse Crops: Symptoms and Management Options

Root rots are caused by multiple fungal and fungal-like organisms and the host range can vary widely, making root rot complex important for most crops and crop rotations. Favourable conditions for root rot include moist-wet soil and other environmental conditions that cause plant stress and reduce growth, such as cool temperatures or nutrient deficiency. Root rot pathogens are soil-borne, attacking plant roots. Many pathogens can attack plants at all growth stages. Generally speaking, symptoms include poor emergence and root development, yellowing, discolored roots as well various lesions on root or stem tissue near the soil line. It can be very difficult to distinguish root rot pathogens from one another, however, it can be helpful in determining the best management strategy. There are no in-crop management options, so prevention is key.



**Left:** Root rot symptoms in soybean: pinched hypocotyl, poor root development  
**Top:** Caramel coloured pea roots (left) affected by *Aphanomyces* compared to healthy roots (right). Source: CDC Saskatoon

PATHOGEN	HOSTS	OPTIMAL ENVIRONMENT	SYMPTOMS	MANAGEMENT*
<i>Pythium spp.</i>	Wide host range including pulses, cereals, canola, alfalfa	Cold, wet soil	Water-soaked lesions on hypocotyl or cotyledons. Diseased plants easily pulled from soil because of rotted roots. Considered a “water mould”.	<ul style="list-style-type: none"> <li>• Fungicide seed treatment</li> </ul>
<i>Rhizoctonia solani</i>	Wide host range including pulses, cereals, canola, alfalfa	Warm, moist to wet soil	Reddish-brown lesions on the hypocotyl at the soil line, or on root extending upwards. Lesion remains firm and dry.	<ul style="list-style-type: none"> <li>• Fungicide seed treatment</li> </ul>
<i>Fusarium spp.</i>	Wide host range including pulses, cereals, canola, alfalfa	Warm, dry to moist soil	Brown or pink vascular tissue in roots and overall discolored roots. No external decay visible above the soil line. Compromised root system results in wilting and leaf death.	<ul style="list-style-type: none"> <li>• Fungicide seed treatment</li> <li>• Partial resistance</li> </ul>
<i>Phytophthora sojae</i>	Soybean only	Warm, wet soil	Most economically important as it affects soybean at all stages. Water-soaked stems on seedlings or dark brown lesions on lower stem and wilted leaves later in the season.	<ul style="list-style-type: none"> <li>• Genetic resistance</li> <li>• Fungicide seed treatment</li> <li>• Crop rotation</li> </ul>
<i>Aphanomyces euteiches</i>	Field pea, lentil, dry bean (soybeans are more resistant)	Wet soil	Distinguishing feature is caramel coloured roots. Considered a “water mould”.	<ul style="list-style-type: none"> <li>• Crop rotation (1 in 7 years)</li> <li>• Fungicide seed treatment (Intego Solo only)</li> </ul>

\* Proper field selection for pulse crops (well-drained, light textured soils not prone to water-logging) and clean seed are important prevention strategies for all root rots