



Saskatchewan
Ministry of
Agriculture



F A C T S H E E T

Clubroot of Canola

PRODUCTION

Clubroot is a soil-borne disease caused by a microbe, *Plasmodiophora brassicae*. Clubroot affects the roots of cruciferous field crops such as canola, mustard, camelina, oilseed radish, taramira, as well as cruciferous vegetables such as arugula, broccoli, brussels sprouts, cabbage, cauliflower, Chinese cabbage, kale, kohlrabi, radish, rutabaga and turnip. Cruciferous weeds (such as stinkweed, shepherd's purse, wild mustard) can also serve as hosts.



Clubroot galls on canola
Photo courtesy Saskatchewan Ministry of Agriculture

Symptoms

Clubroot alters root hormone balance, increasing root cell division and growth, resulting in galls.

Deformed roots are less able to absorb water and nutrients, leading to stunting, wilting, yellowing, premature ripening and seed shrivelling.

The cause of suspicious above-ground symptoms can be confirmed by digging up plants to check roots for galls (see photo).

Clubroot affects canola yield and quality to a similar degree as other diseases affecting water and nutrient uptake, and its impact depends on soil conditions and the growth stage of the crop when infection occurs.

Clubroot is of particular concern where it is already established, due to the fact that the disease can cause devastating yield losses and control options are limited. In areas where it has not yet occurred, clubroot is also of concern because the disease can spread into clean fields through movement of soil contaminated with resting spores.

Spread of Clubroot

- Infected roots will eventually disintegrate, releasing resting spores into the soil that may then be transported by wind, water, animals, manure, shoes, clothing, vehicles, tires or earth tag on agricultural or industrial field equipment.
- Resting spore numbers will decline over time when non-host crops are grown, but a small proportion can survive in soil up to 20 years.
- Clubroot is primarily a soil-borne disease; it does not infect seed but it may be found in soil attached to seed or other plant parts.

Clubroot is a declared pest in Saskatchewan under *The Pest Control Act*.

		Level of Risk for Clubroot		
		Low		High
Importance of Risk Factor ↑ Very Important ↑ Important	Good crop rotation with canola no more than once every 4 years.	Sometimes grow canola every 2 to 3 years.	Have grown canola 2 or more years in a row.	
	Sanitation procedures are regularly followed.	Some sanitation procedures in place.	No sanitation procedures.	
	You scout crops regularly for disease and have not seen clubroot symptoms.	You sometimes scout crops and investigate unusual symptoms.	You rarely scout crops or investigate unusual symptoms.	
	Regardless of soil conditions, clubroot risk will be lowered with sanitation and good crop rotations.	Dry years may reduce disease High soil pH will not prevent clubroot.	Wet years may increase disease Low soil pH may increase clubroot.	

Best Practices for Prevention and Management
(from The Clubroot Management Plan – www.agriculture.gov.sk.ca)

- Plant susceptible crops no more than once every four years. Crop rotation will restrict clubroot development by limiting the increase of clubroot resting spores and preventing the increase of clubroot inoculum.
- Restrict movement of potentially contaminated soil on vehicles and equipment.
 - Cleaning steps may include removal of crop debris and soil and washing of equipment with a power washer using hot water or steam and misting with disinfectant (one to two per cent bleach), followed by an additional rinse with water.
- Scout crops regularly and carefully for plant diseases and signs of clubroot.
- Clubroot spores may survive livestock digestion. Avoid use of straw, hay, green seed, silage and manure from infested or suspect areas.
- The risk of spreading clubroot through contaminated seed or plant material is much lower than through transporting contaminated soil on field equipment and vehicles. However, avoid seed with earth tag from infested areas to prevent introduction to clean fields.

Scout canola fields regularly and stay alert for suspicious stunting, wilting, yellowing and premature ripening. Check the roots for clubroot galls.



Premature ripening of canola in Alberta
Photo courtesy Saskatchewan Ministry of Agriculture

For more information:

- Visit the Saskatchewan Ministry of Agriculture's website at www.agriculture.gov.sk.ca; or
- Visit www.clubroot.ca; or
- Contact the Agriculture Knowledge Centre at 1-866-457-2377 or e-mail aginfo@gov.sk.ca; or
- Visit your local Regional Services Office.

Suspect samples can be submitted to:
The Crop Protection Laboratory
346 McDonald Street
Regina, SK, S4N 6P6
Phone: 1-306-787-8130.
(mail, courier or drop off samples in person)