

# Clubroot

## *Plasmodiophora brassicae*



Clubroot is a disease of cruciferous crops including canola and mustard, caused by the soil-borne pathogen *Plasmodiophora brassicae*. Clubroot is found in many countries around the world where cruciferous crops are grown. In Canada clubroot has been found in most provinces, including Alberta where it was first discovered affecting canola in the Edmonton area in 2003.



Very severe clubroot on canola.  
Photo courtesy of Kelly Turkington

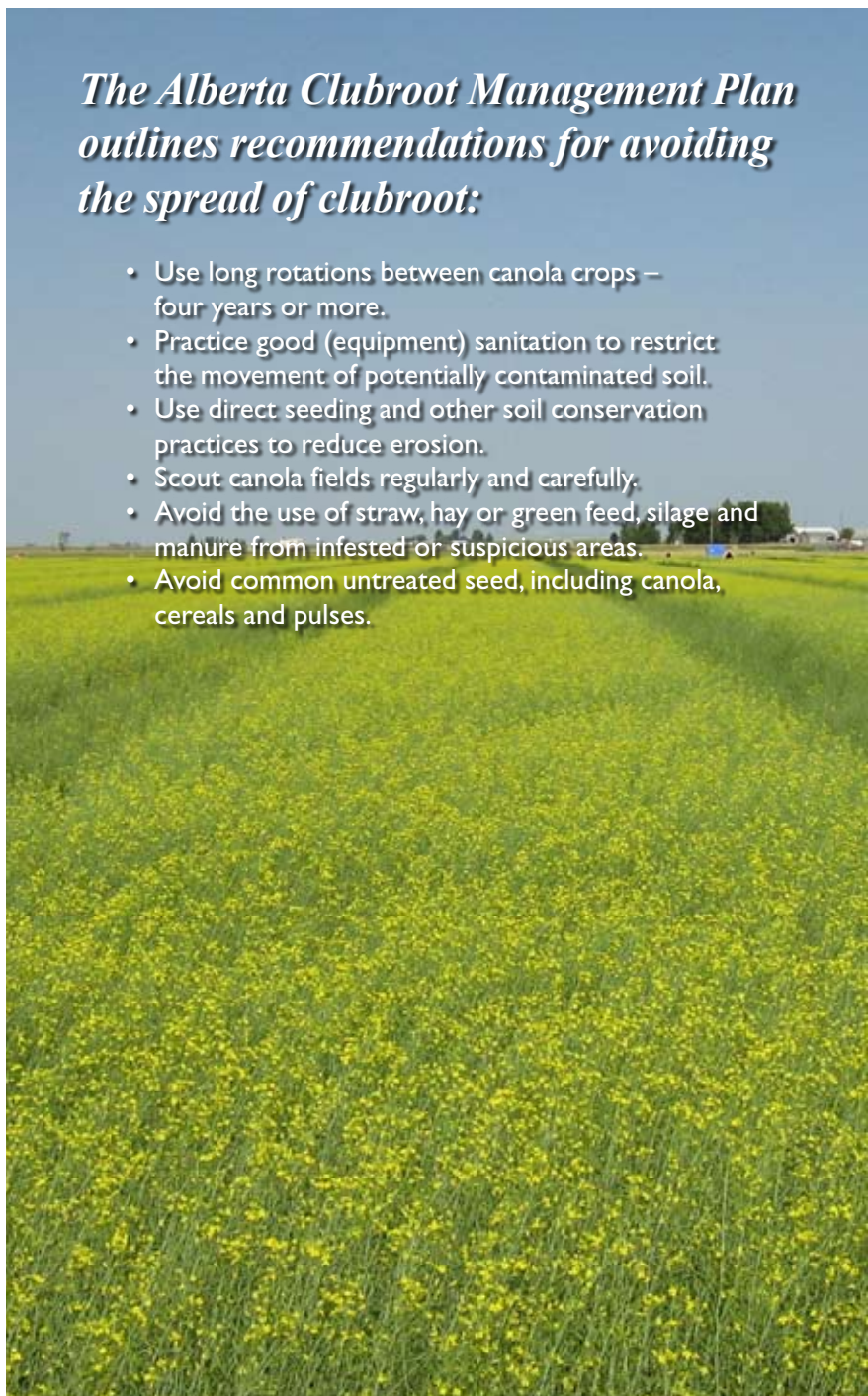
The most obvious symptom of clubroot infection is gall formation on roots. Root galls restrict the flow of nutrients and water to the plant which can result in premature ripening and yield loss. The easiest

way to identify clubroot infection is to pull plants from the ground and inspect roots for the formation of galls. If galls are present and the plant is showing above ground symptoms consistent with clubroot, the root sample should be submitted to a plant pathologist or lab for confirmation.

“Clubroot can only spread through resting spores in the soil” (*Alberta Agriculture, AGDEX 140/638-2*). Clubroot spreads from field to field via soil containing resting spores, which most commonly occurs on equipment carrying infected soil. Canola seed has not been found to play a role in the spread of clubroot. Seed carrying significant “earth tag” could potentially carry resting spores, i.e. peas, potatoes, etc.

### *The Alberta Clubroot Management Plan outlines recommendations for avoiding the spread of clubroot:*

- Use long rotations between canola crops – four years or more.
- Practice good (equipment) sanitation to restrict the movement of potentially contaminated soil.
- Use direct seeding and other soil conservation practices to reduce erosion.
- Scout canola fields regularly and carefully.
- Avoid the use of straw, hay or green feed, silage and manure from infested or suspicious areas.
- Avoid common untreated seed, including canola, cereals and pulses.



# Clubroot and Pedigreed hybrid canola seed production

The majority of hybrid canola seed for the Canadian market is produced in Southern Alberta. Hybrid canola seed companies have been very active in addressing concerns raised by the spread of clubroot in North Central Alberta and although the risk of seed transmission is very low, seed companies are taking a proactive approach to ensure that fields where seed is produced do not contain clubroot. The efforts of these companies and specific conditions that help mitigate the risk posed by clubroot include:

## A FAVORABLE ENVIRONMENT

The environment in Southern Alberta is not ideal for the development of clubroot. “Daily temperatures between 19.5 and 23.5°C, high soil moisture and acidic soils favor infection” (Ag Canada, *Clubroot of Crucifers, Control Strategies*). In Southern Alberta the environment is not ideal for the development of clubroot as daily temperatures regularly exceed 23.5°C, soils are not acidic and soils are well drained.

## EDUCATION

Hybrid canola production agronomists and growers have been given technical information to help them increase their awareness of clubroot. A training session was conducted by Dr. Ron Howard and Provincial Oilseed Specialist Murray Hartman where agronomists were trained in clubroot identification and management techniques to avoid clubroot spread. Most seed companies have implemented their own internal clubroot training programs to ensure staff are aware of clubroot management practices. In May 2008 a clubroot management document was provided to hybrid canola seed growers in Southern Alberta outlining management practices for avoiding the spread of clubroot.

## FIELD MANAGEMENT

The Canadian Seed Growers Association (CSGA) *Circular 6-2005* requires that all fields of spring sown *Brassica napus* (Argentine canola), for Certified status, must **not** be seeded on land which has produced canola, rapeseed, mustard or oilseed radish during the preceding 3 years. This mandatory 4 year rotation is effective in reducing the development of most canola pests including clubroot.

## FIELD SURVEY

Hybrid canola seed companies participated in the most intensive clubroot field survey ever conducted in Canada. Hybrid canola seed production fields in Southern Alberta were surveyed for the presence of clubroot using an intensive method that required 300 plant samples per field. The survey required the inspection of the roots for galls and found no clubroot infected plants.

## ONGOING WORK

Seed companies will continue to work hard to ensure the security of the canola seed supply. Ongoing efforts include the further education of individuals participating in the seed production value chain, with the focus on eliminating the potential for spread of the disease. Significant resources are also being invested in the development of clubroot resistant canola varieties. Sources for resistance exist and it is estimated that varieties will be commercially available by 2011 or earlier.

