

A. Inspection and Identification of Clubroot

1. Clubroot Field inspections will be conducted by the Agricultural Fieldman or by other inspectors appointed by the Local Authority within the municipality.
2. Clubroot inspections will be done in a random manner. Every township will be subject to inspection annually.
3. All inspections will be done in accordance to proper surveying protocol, see Schedule "A".
4. Clubroot survey methods, reporting form and calculation of disease incidence will follow standard protocols as recommended in the Alberta Clubroot Management Plan.
5. All properties issued a notice will be inspected annually to ensure the conditions of the notice are adhered to. All properties with expired Clubroot notices will be inspected annually for the presence of Clubroot.
6. Landowners and tenants will be notified by the Agricultural Fieldman if evidence of Clubroot is found on his or her land.
7. Positive identification of Clubroot shall only be obtained by a laboratory test.

B. Clubroot Notification

1. If land is verified positive for Clubroot, the landowner will be notified in writing with a legal notice in accordance with the Province of Alberta Agricultural Pests Act.
2. All fields verified as being positive for Clubroot shall not be seeded to canola or other host crop for the period of three years (one in four year canola rotation – no canola for three years).
3. Survey results and legal locations of infested fields must be made available to land renters, landowners, adjacent landowners and any other parties with a genuine commercial interest, under provisions of the Alberta Agricultural Pests Act and the Pest and Nuisance Control Regulation (section 10).

C. Appeal and Penalty

1. A person who has an interest in land as an owner or occupant and feels personally aggrieved by a notice issued by an inspector under Section 12 of the Agricultural Pests Act may appeal to the Local Authority within ten days after service of the notice.
2. If a host crop is sown on land that has Clubroot and a notice has been issued on this property restricting the growth of host crops, the host crop shall be destroyed.

D. Best Management Practices

1. Use clubroot-resistant varieties when growing canola in areas where the disease is established. Alternate growing clubroot-resistant varieties with different sources of resistance.

2. Use long rotation breaks (three years or more) between canola crops. Although crop rotation will not prevent the introduction of clubroot to clean fields, it will lower subsequent disease severity and reduce other diseases, such as blackleg. Canola growers in high risk situations (confirmed clubroot in the field or area) should follow traditional canola rotation recommendations (one canola crop every four years) using clubroot-resistant varieties. The one in four-year rotation recommendation using resistant varieties is designed to slow down resistance breakdown, which has been documented in other parts of the world.
3. Volunteer canola and cruciferous weeds must be controlled in infested fields to prevent more than three weeks of growth to avoid the production of new resting spores on these host plants.
4. Practice good sanitation (cleaning and disinfection) of machinery and equipment to restrict the movement of potentially contaminated soil. This approach will also help reduce the spread of other diseases, insects and weed seeds. Resting spores can be spread via contaminated soil. Moderate to high infestations will leave high spore concentrations in soil on field machinery, thus sanitation is very important in these situations. All producers should follow the practice of cleaning soil and crop debris from field equipment before transport from all fields. Cleaning equipment involves knocking or scraping off soil lumps and sweeping off loose soil.
 - a. For risk averse producers or for fields with heavy infestations, additional cleaning steps will slightly decrease the risk of spread, but these steps involve considerably more work and expense:
 - i. After removal of soil lumps, wash equipment with a power washer, preferably with hot water or steam.
 - ii. Finish by misting equipment with weak disinfectant, for example, a 1 to 2 per cent active ingredient bleach solution. Use of a disinfectant without first removing soil is not recommended because soil inactivates most disinfectants.
 - iii. Seed an area to grass near the field exit to clean off equipment more effectively.
5. Use direct seeding and other soil conservation practices to reduce erosion. Resting spores can also readily move in soil transported by wind or water erosion. Reducing the amount of tillage on any given field will reduce the spread of the organism within the field and to other fields.
6. Minimize vehicle and equipment traffic to and from fields.
7. In situations where fields are lightly infested only near the current access, create a new exit at another distant edge of the field if possible.
8. Scout canola fields regularly and carefully. Identify causes of wilting, stunting, yellowing and premature ripening – do not assume anything!
9. Avoid the use of straw, hay or greenfeed, silage and manure from infested or suspicious areas. Clubroot spores may survive through the digestive tracts of livestock.
10. Avoid common untreated seed (including canola, cereals and pulses). Earth tag on seed from infested fields could introduce resting spores to clean fields. The effect of current seed treatment fungicides on resting spore viability on seed is currently being studied.

CAO Approval: Original Signed	Date: January 22, 2015
Review Cycle: Every three years	Next Review Date: January 22, 2018

Form A



ASB CLUBROOT SURVEY FORM

Surveyor Name: _____

Date: _____

Municipality: Flagstaff County

Legal Land Location _____

Size of the Field (acres) _____

Date Surveyed _____

Land Owner _____

Name of Tenant _____

Survey Results

Strictly according to protocol (sample 10 plants at each of 10 sites using W pattern)

Sample site	GPS coordinates	Number of infested plants
1 (nearest access)		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Positive Sites /10 _____

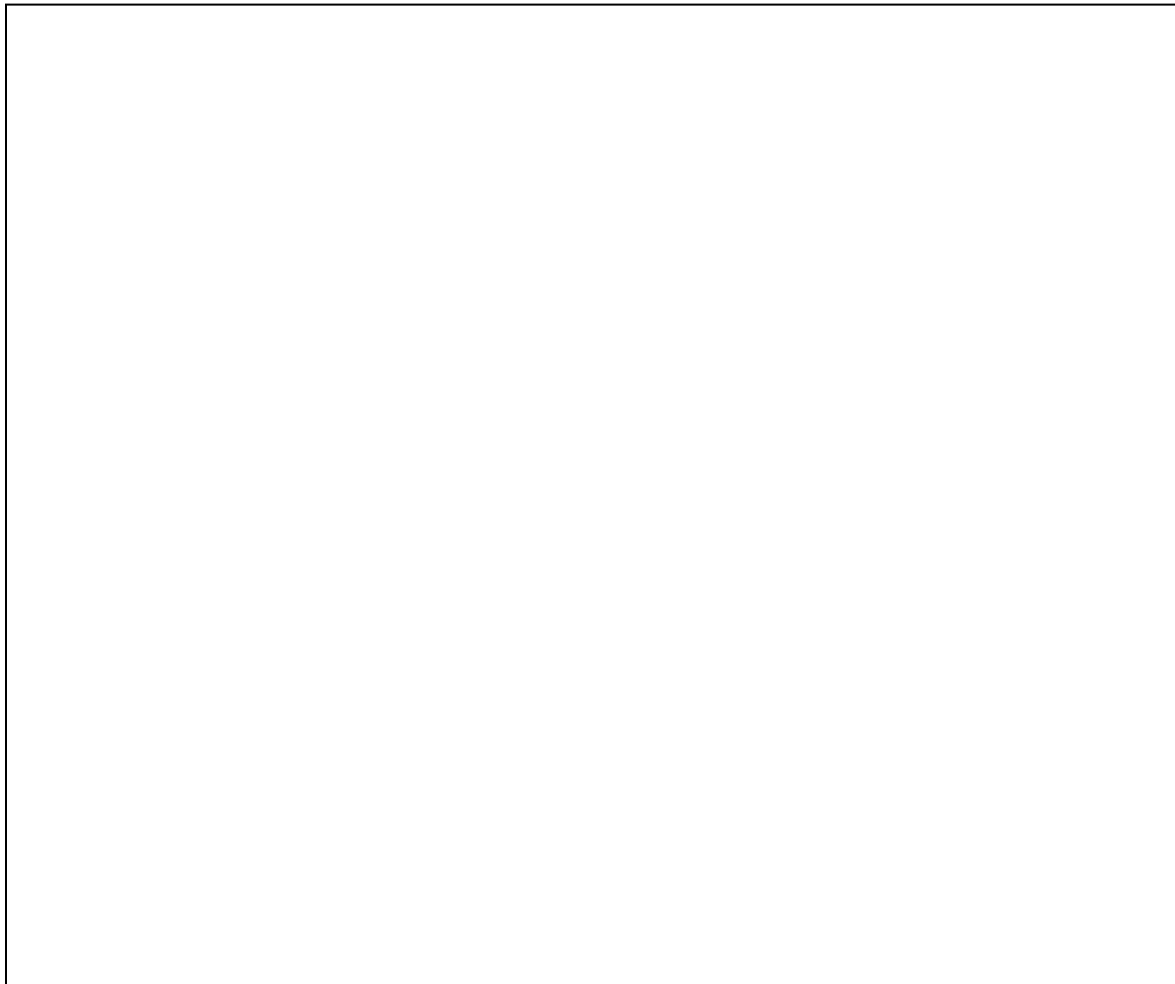
Lab test confirmation _____

Additional comments

Optional – draw map of field and landmarks with sampling points (on back of page)

Surveyor signature _____ Date _____

Indicate roads and field access, sample points, and landmarks.



Clubroot of Crucifers – Surveying Protocol

Introduction: Clubroot is a serious soil-borne disease of crucifers (canola, mustard and vegetable crops such as cabbage, broccoli, cauliflower, turnip and radish) caused by the fungus-like organism *Plasmodiophora brassicae*. Disease development is favored by wet and acidic soil conditions. The pathogen is mainly spread by movement of soil and infected plant material, as well as by run-off water.

Symptoms: The pathogen infects the roots of susceptible hosts, causing the formation of club-shaped galls or swellings that restrict the uptake of water and nutrients by the plant. Above-ground symptoms include yellowing, stunting, premature ripening and wilting of plants under moisture stress.

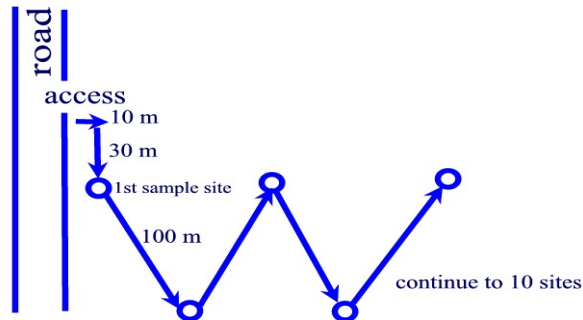
Equipment and Materials Needed:

Clipboard	Pocket Knife	5% bleach solution	Disposable boot covers
Record sheets	Paper bags	Plastic tray or pail	GPS unit
Hand trowel			

Survey Procedure: Scout for clubroot by visually inspecting canola / mustard / cole crop roots for galls. As symptoms may take 6-8 weeks to develop, they are most detectable later in the

summer (late July or August). Do not drive into field or access, but park on the road whenever possible.

1. Put on new disposable boot covers. Survey the field in a 'W' pattern, sampling 10 plants at each of 10 equally spaced sites along the arms of the W. Begin 30 m to the right of the field access, 10m from field edge and allow 100 m between sampling points.



2. At each sample site, dig up roots from 10 plants and shake off excess soil. Examine roots for presence of galls. Record sample site GPS location and findings on form. At fields where infection is found or suspected, collect 5-10 root specimens, by cutting off stems and placing roots in a paper bag labeled with field location. Retain sample for submission to lab for confirmation (if needed), or to Dr. Strelkov for pathotype identification (if requested).
3. Prior to leaving potentially infested field, discard disposable boot covers into garbage bag and incinerate later. If boot covers were not used, remove clumps of soil from boots, and then wash in plastic tray with 5% bleach solution (in order to prevent disease spread). Disinfect sampling tools with bleach solution.