Lac La Biche County

Policy

TITLE: CLUBROOT MANAGEMENT AGREEMENT

POLICY NO: ENV-63-006

RESOLUTION: 21.571

EFFECTIVE DATE: June 23, 2020

DEPARTMENT RESPONSIBLE:
ENVIRONMENTAL SERVICES

NEXT REVIEW DATE: August 3, 2024

POLICY STATEMENT:

Lac La Biche County recognizes that Clubroot is a serious soil-borne disease of canola, mustard and other crops in the cabbage family and supports the principle to control the spread of Clubroot, which is a designated pest under the Agricultural Pest Act of Alberta. Owners and or Lessees of lands affected by Clubroot will be required to enter into a management agreement with the County to manage the disease

"Original Signed"
Chief Administrative Officer

August 11, 2021
Date

"Original Signed"
Mayor

August 12, 2021
Date

SPECIAL NOTES/CROSS REFERENCE: Procedure ENV-63-006

AMENDMENT DATE: August 3, 2021

Lac La Biche County

Procedure

TITLE: CLUBROOT MANAGEMENT AGREEMENT

PROCEDURE NO: ENV-63-006

EFFECTIVE DATE: June 23, 2020

DEPARTMENT RESPONSIBLE:
ENVIRONMENTAL SERVICES

NEXT REVIEW DATE: August 3, 2024

PROCEDURE:

1. At the beginning of each growing season, before May 1st, the Agricultural Fieldman will send written communication to farmers and farmland owners about field inspections on their properties and the basis for the inspections.

2. Field inspections will be conducted on all susceptible crops within Lac La Biche County by the Agricultural Fieldman, a designate or by an inspector appointed by Lac La Biche County Council, and inspections will be done in accordance with the Agricultural Pests Act.

3. Designated inspectors are to follow sampling techniques and established protocols for entering private lands. Inspectors entering fields for clubroot testing will wear disposable boot covers or footwear that can be disinfected using a bleach solution. Boot covers will be changed and properly disposed of, or bleach disinfectant applied upon entry and exit of every new field.

4. Any portion of a field with susceptible crops may be inspected, with focus on the entrances and exists. Sampling will be done in an M or W-shaped pattern at entrances and exits to a maximum 200 feet into the field, in addition to lowlands, homesteads, and/or garden sites on the property.

5. Positive identification of Clubroot (from either soil or plant sample) shall be obtained by an approved laboratory test using both qualitative and quantitative analyses.

6. When a field has been verified positive for Clubroot, the landowner will be notified as per Schedule "A" *Notification to Landowner of Clubroot*" and be required to enter into agreement with the County as outlined in the Clubroot Management Agreement. Adjacent landowners, Alberta Agriculture & Forestry, Farm Credit Canada, Agricultural Financial Services Corporation, and contracted parties (Custom sprayers, utility companies, agronomists, agricultural clients buying products or receiving services from affected field) may also be notified. Lac La Biche County employees may also be given the location of affected lands. Release of information in these situations is at the discretion of the Chief Administrative Officer and/or designate.

7. As part of the Clubroot Management Agreement, landowners or leaseholders with verified clubroot on their property will require the services of a Professional Agrologist (PAg) or Certified Crop Advisor (CCA). The Agricultural Fieldman or designate will provide names and contact information of all eligible and willing Professional Agrologists or Certified Crop Advisors in the region to affected farmers.

8. The PAg or CCA is expected to work with the affected Landowner/Producer on sound agronomic practices that will reduce the clubroot spore levels, and maintain records of implemented practices.

9. Lac La Biche County will cost share eligible PAg or CCA sign-off fees with landowners, in a 60:40 ratio (County: Landowner), up to a total of $2000 a year per affected farm operation and subject to funds availability. The Manager of Environmental Services may review this cost sharing arrangement on case by case basis.

10. All fields with verified positive clubroot will be sampled annually by Lac La Biche County's Agricultural Fieldman, a designate or an inspector appointed by Lac La Biche County Council, until such a time as the spore levels are negligible. Lac La Biche County will cover the cost of the clubroot soil sampling and laboratory quantitative analysis.

11. In addition to the Clubroot Management Agreement, all landowners and/or occupants of the land will have the responsibility to follow the Clubroot Best Management Plan as set out by Alberta Agriculture and Forestry to reduce the spread of the disease with the movement of soil and equipment.

12. Any land sown to a host crop after receiving a notification from Lac La Biche County as per Schedule "A" will receive a written notice as per the Agricultural Pest Act and the crop in question may be destroyed.

"Original Signed"
Chief Administrative Officer

August 12, 2021
Date

SPECIAL NOTES/CROSS REFERENCE: Policy ENV-63-006

AMENDMENT DATE: August 3, 2021

LAC LA BICHE COUNTY

CLUBROOT MANAGEMENT AGREEMENT POLICY ENV-63-006: SCHEDULE I

CLUBROOT MANAGEMENT AGREEMENT

Clubroot is a soil-borne disease that affects cruciferous plants such as canola, mustard and other crops in the cabbage family, including broccoli, cabbage, Brussels sprout, kale, cauliflower, radish and turnip. Clubroot is a designated pest under Alberta's Agricultural Pests Act.

This Clubroot Management Agreement is for developing a proactive management plan for clubroot-infested fields. The aim is to reduce or keep spore levels low and to minimize yield loss due to the disease.

The strategies identified in this Clubroot Management Agreement are considered the minimum that should be done to reduce spore levels, minimize yield loss and decrease the spread of disease to adjacent fields. Additional management strategies stated on Alberta's Clubroot Management Plan (Schedule B) should be considered whenever possible. The County reserves the right to implement additional measures if the bare minimum outlined in this agreement is not implemented and send notification to adjacent landowners (Schedule A).

Location & Ownership Information

Date:				
Landowner's Name:				
Renter's Name (if applicable):				
Agrologist Name:				
Field's Legal Land Location	**Symptoms Observed?**		**Polymerase Chain Reaction confirmed pathogen?**	
	YES	NO	YES	NO

Part 1: Crop Rotation

Crop rotation reduces spore levels in the soil, thereby reducing the disease severity. A minimum of a four-year rotation is required. The longer the rotation, the lower the number of spores and disease pressure/severity. County or its authorized agents will conduct annual sampling to determine if rotation period requires modification based on spores count.

Indicate which crop rotation interval will be followed from the list below:

☐ Four-year crop rotation (three-year brassica crop break)-***Minimum***

☐ Longer than a four-year rotation

☐ Perennial forage crop for more than three years

☐ Chem fallow

☐ Other strategies (please specify): _____

_____

Part 2: Variety Selection

Select all the strategies that will be used:

☐ Grow only clubroot-resistant varieties in fields with clubroot symptoms – ***Minimum***

☐ Use of clubroot resistant varieties in all canola fields

☐ Rotate clubroot varieties with multi-genetic varieties

☐ Seed canola first before other crops as early seeding can reduce clubroot effect

☐ Seed fields with known Clubroot history last

☐ Other strategy (please specify): _____

Part 3: Weed Management

Kindly select all the weed management strategies that will be used:

☐ Control volunteer crops, including canola, camelina, mustard – ***Minimum***

☐ Control cruciferous weeds such as stinkweed, shepherd's purse, wild mustard, *etc*. throughout all rotations – ***Minimum***

☐ Implement herbicide rotation program for canola, eg: rotate Liberty, Truflex, Roundup & Clearfield canola systems.

Part 4: Small Clubroot Patch Management

Select all the applicable strategies to control the disease if in a small patch, less than 100 m^2 (1076 ft^2):

☐ Hand pull and safely dispose of all clubroot infected plants – ***Minimum***

☐ Lime soils in infected patches to increase soil pH to at least 7.5

☐ Use DNA-based soil test to monitor clubroot spore levels

☐ On infected field(s), seed known clubroot areas last

Part 5: Reducing Soil Movement

Clubroot spreads through soil movement. Indicate all the ways that soil movement will be minimized:

☐ Use of soil conservation practices, such as zero till or minimum tillage – ***Minimum***

☐ Seed grass in field entrances to reduce spore or as an area for cleaning equipment

☐ Create separate entrance and exits away from existing field entrances

☐ Remove large clumps of soil from equipment

☐ Require others (industry) to implement a biosecurity protocol, including vehicle cleaning, use of disposable boot covers – ***Minimum***

☐ Wash and sanitize equipment with bleach

☐ Visit fields with known clubroot history last and fully clean equipment afterwards.

☐ Minimize traffic in fields, especially during wet conditions

☐ Discourage recreational vehicles from infected crossing fields with signage, fencing and gates

Part 6: Disclosure of Clubroot Infestation and Biosecurity Management

☐ Notification of all occupants, renters and easement holders who have access to the land – ***Minimum***

☐ Notification and disclosure to contracted and/or other parties (Custom sprayers, utility companies, agronomists, agricultural clients buying products or receiving services from affected field, etc) who have access to the land that clubroot is present – ***Minimum***

☐ Disclosure that clubroot is present when the land is sold or rented to other parties – ***Minimum***

Part 7: Ongoing Clubroot Scouting and Monitoring

☐ Continued scouting and soil testing in fields where clubroot or the clubroot pathogen has been detected to monitor pathogen (spore) levels and visible symptoms on plants

☐ Continued scouting in adjacent fields and other fields rented or owned

Part 8: Declaration

I_____(Landowner/Renter) declare that I have completed the above to the best of my ability and will adhere to the required clubroot management strategies, as a minimum, to reduce or keep Clubroot spore levels low. I also authorize Lac La Biche County Environmental Services and/or the Agricultural Service Board to enter the infected field for sampling, scouting, monitoring, installation of scientific devices and for any other purposes related to this agreement compliance. I understand that the County or its authorized contractors will sample my field annually to determine status of the disease. I also understand and agree that if I fail to implement the terms of this agreement, the County is empowered by the Agricultural Pests Act to use any available tool to minimize Clubroot spore count and spread of the disease.

Landowner/Renter's Signature:_____Date: _____

Agrologist/CCA Signature:_____Date: _____

Agricultural Fieldman's Signature:_____Date: _____

Please return this agreement to Lac La Biche County's Environmental Services office within 30 days of receiving your Clubroot notification letter. For further information regarding this matter please contact the Agricultural Fieldman at (780) 623-6366.

Schedule "A"

NOTIFICATION TO LANDOWNER OF CLUBROOT

DATED THIS_____day of_____, 20_____

Name:_____

MAILING ADDRESS: _____

Dear: _____

This letter is to serve as notification that Clubroot, which has been declared a "Pest" under the

Agricultural Pests Act, has been found on the property:_____.

As a result, Lac La Biche County requires you to complete and implement the County's Clubroot Management Agreement ***as per the Agricultural Pest Act, Pest and Nuisance Control Regulation.***

Please be aware that the Clubroot is a very serious crop disease and all landowners within this municipality must be very diligent in their management practices to keep this disease controlled.

I have included a copy of Lac La Biche County's Clubroot Management Agreement and a copy of the Provincial Clubroot Best Management Practices for your review.

If you have any questions, please do not hesitate to call me at 780-623-6366.

Sincerely,

Agricultural Fieldman

c.c. Renter/Leasee (*if different from the Landowner)*

Adjacent Landowners

Schedule "B"

ALBERTA CLUBROOT MANAGEMENT PLAN

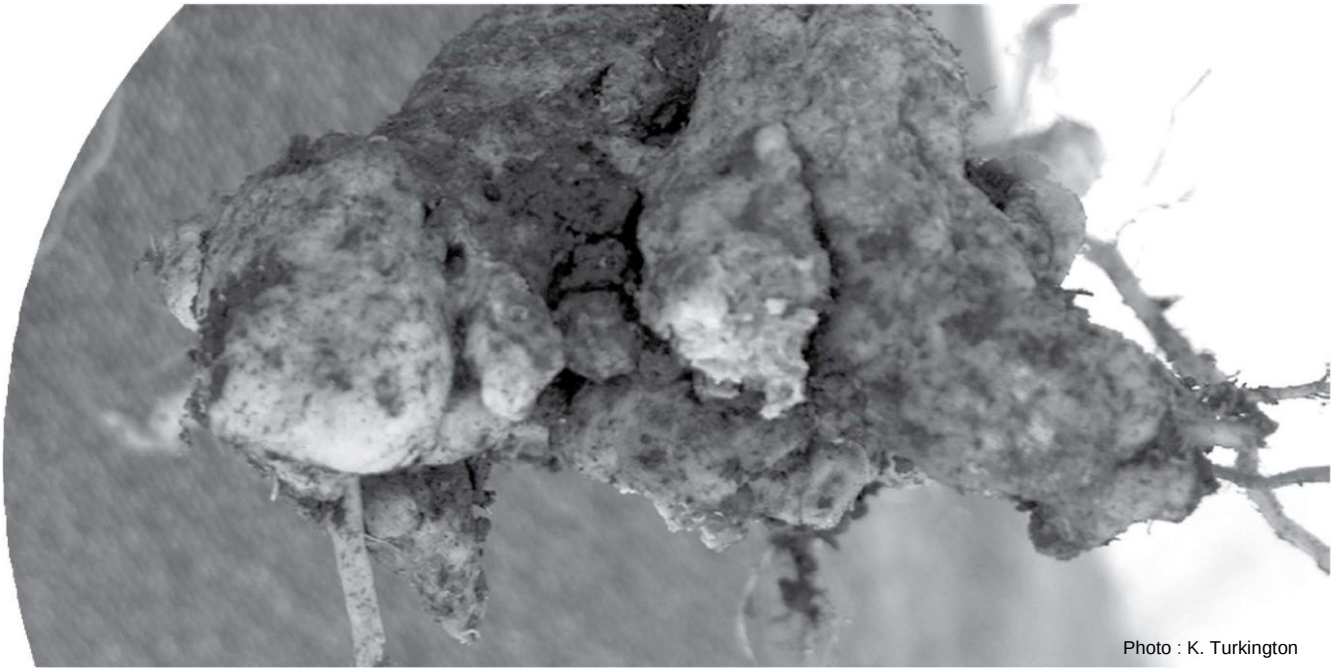

Photo : K. Turkington

Developed by:

Alberta Clubroot Management Committee

Revised August 2014

Government

Alberta

AGDEX 140 / 638-2

Clubroot Disease Overview

What is it?

Clubroot is a serious soil-borne disease of canola, mustard and other crops in the cabbage family. Cole crop vegetables, for example, broccoli, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, kale, kohlrabi, radish, rutabaga and turnip, are susceptible to clubroot, as are many cruciferous weeds, for example, wild mustard, stinkweed and shepherd's purse.

What does it look like?

As the name of this disease suggests, roots of infected plants may exhibit a club-like appearance; however, overall symptoms will vary depending on the growth stage of the crop when it becomes infected.

Infection at the seedling stage can result in wilting, stunting and yellowing symptoms by the late rosette to early podding stage, while premature ripening or death can be observed in canola or mustard plants nearing maturity. Plants infected at later growth stages may not show wilting, stunting or yellowing, but may still ripen prematurely, and seeds may shrivel, thus reducing yield and quality (oil content).

Can any other diseases or disorders be confused with clubroot?

Above ground symptoms of clubroot may be confused with drought, nutrient deficiencies or other diseases, so suspect plants should be carefully dug from the soil to check for typical clubroot galls on the roots. Swellings of unknown origin called hybridization nodules are occasionally seen on canola roots and can be confused with young clubroot galls. These nodules are more spherical and firmer than clubroot galls and do not decay when mature as clubroot galls do. Exposure to phenoxy herbicides can also result in swellings on lower stems and roots of canola, mustard and cole crop vegetable plants, but these malformations usually lack the large size and lobed appearance of typical clubroot galls.

What causes it?

Clubroot is caused by a microscopic, soil-borne plant pathogen called *Plasmodiophora brassicae*. The clubroot pathogen is classified as a Protist, a group of organisms with characteristics of plants, fungi and protozoans. The life cycle of the clubroot pathogen is illustrated in the Alberta Agriculture and Rural Development factsheet *Clubroot Disease of Canola and Mustard*, Agdex 140/638-1, available online.

Where was clubroot first found in Alberta?

Clubroot was first reported on broccoli, cabbage and cauliflower in a few home gardens in the Edmonton area in the mid 1970s. The first economically important infestation in Alberta was observed on Chinese cabbage in a market garden near Edmonton in 2001. Clubroot was first detected in canola in Alberta in Sturgeon County northwest of Edmonton in 2003.

Where did it come from?

The original source of the clubroot infestation in Alberta is unknown, but it may have been

accidentally introduced by early settlers who may have brought infected vegetables with them from other areas of Canada or the United States where clubroot was already established.

Why is it of concern?

Most varieties of canola, mustard and cole crop vegetables currently being grown in Alberta are highly susceptible to clubroot. This disease is capable of significantly reducing yield and quality, and may destroy a crop if infestation levels are high. Swedish researchers found that infestations in canola fields nearing 100 per cent affected plants caused about 50 to 80 per cent yield loss, while infestations of 10 to 20 per cent led to 5 to 10 per cent yield loss. These results are similar to sclerotinia stem rot infection in canola, where a general rule of thumb is that estimated yield loss is half of the percentage of infected stems. A few cases of total crop loss, that is, not worth combining, have been reported in central Alberta.

How long can it persist in the soil?

The resting spores of *P. brassicae* are extremely long lived and may survive in soil for up to 20 years according to Swedish research. Similar persistance is being reported in Alberta. Resting spore longevity is a key factor contributing to the seriousness of the clubroot disease, especially under short crop rotations. Clubroot is not a phytosanitary issue affecting international trade of canola or mustard.

How can it be spread?

In Alberta, clubroot is being spread mainly through soil infested with resting spores. Infested soil can be carried from field to field by farm machinery, especially tillage equipment, and can also be moved by wind and water erosion. Seed of various crops, as well as hay and straw, can also become contaminated with resting spores via dust or earth tag when they are grown in clubroot-infested fields.

What is being done about it?

In spring 2007, clubroot was added as a declared pest to Alberta's *Agricultural Pest Act*. This Act is the legislative authority for the enforcement of control measures for declared pests in Alberta. Annual surveys of canola, mustard and/or cole crop vegetables have been carried out to determine the location of infested fields in the main production areas for these crops. An annual incidence map is published on Alberta Agriculture's website (www.agriculture.alberta.ca). Researchers from many agencies, including the University of Alberta, Alberta Agriculture and Rural Development, and Agriculture and Agri-Food Canada, have many active research projects on clubroot. Private breeding programs have released clubroot-resistant canola varieties for western Canada.

What is the current state of clubroot in Alberta?

By the end of 2014, clubroot was present in 30 municipalities in Alberta, mainly in central Alberta as shown in the 2003 - 2014 map showing infested municipalities: go online to http://www1.agric.gov.ab. ca/$department/deptdocs.nsf/all/prm14661. Clubroot has the potential to spread to and become established in many of the traditional canola-growing areas of western Canada.

In 2014, the first Alberta case of a pathogen shift to overcome current variety resistance was confirmed from diseased areas of a field planted to a resistant variety (observed in 2013).

Clubroot Management Plan Objective

The objective of the Clubroot Management Plan is to minimize yield losses due to clubroot and reduce the further spread and buildup of clubroot in canola, mustard and market garden vegetable fields in Alberta.

Regulatory Status

Alberta's *Agricultural Pests Act* (APA) is the legislative authority for the enforcement of control measures for declared pests in Alberta.

The Minister of Alberta Agriculture and Rural Development is responsible for this Act; however, enforcement is the responsibility of provincial municipalities. Agricultural Fieldmen are responsible for enforcing pest control measures in their respective municipalities.

Clubroot was added as a declared pest to the APA in April 2007.

Pest inspectors may be appointed by the local municipality or by the Minister of Agriculture and Rural Development. For a contact list of Agricultural Fieldmen and assistants in Alberta, check online at: http://www.aaaf.ab.ca/aaaf-directory.html. Agricultural Fieldmen are pest inspectors under the *Agricultural Pests Act*. Inspectors have the power to enter land at a reasonable hour, without permission, to inspect for pests and collect samples.

The owner or occupant of land has the responsibility of taking measures to prevent the establishment of any pest on land, property and livestock and to control or destroy all pests in the land or property.

Control measures for clubroot are specified in this management plan. It is important to understand that these control measures represent an acceptable standard that is to be applied in all municipalities across the province. Municipalities can enhance the standard within their own jurisdictions.

Factors Favouring the Spread of Clubroot in Alberta

Resting spores can be spread from field to field via contaminated soil on agricultural, petroleum industry and construction equipment and machinery. Soil tillage equipment represents the greatest risk of spreading the disease as soil is frequently carried on shovels, discs, openers, frames and tires. Clubroot surveys in Alberta have found that most new infestations begin at or near the field access, which indicates that contaminated equipment is the predominant spread mechanism.

Other secondary methods of spread could include movement of soil with water or wind and as soil attached to seed (earth tag), hay, straw or greenfeed.

Resting spores are extremely long lived, with a half-life of about 4 years, but may survive in soil for up to 20 years. The longevity of the resting spores is a key factor contributing to the seriousness of the disease, especially under tight canola rotations.

All land users, including growers, custom agricultural services, oil and gas industry operators, construction and transportation companies, recreational vehicle users, etc., need to continue their diligence in removing potentially contaminated soil from vehicles, machines and equipment prior to leaving fields. The removal is crucial to prevent the movement and introduction of clubroot to clean fields and to reduce the widespread distribution of spores within infested fields. Widespread resting spores and frequent exposure to resistant varieties will accelerate changes in the pathogen populations to strains that are not controlled by resistance in current clubroot-resistant canola varieties.

Management Plan Rationale

Clubroot in Alberta is managed through a proactive program that utilizes and prolongs the durability of clubroot-resistant canola varieties in combination with continuing efforts to prevent the further spread of this pathogen in the province. The program includes both an industry/public awareness program and a disease management plan.

The long-term goal of this management plan is to minimize canola yields losses through the judicious use of resistant varieties and to reduce the further spread of clubroot in Alberta.

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 when they become available.
2. Although crop rotation will not prevent introduction of clubroot to clean fields, the practice will lower subsequent disease buildup and severity and reduce other diseases, such as blackleg. Crop rotation will not eradicate the clubroot pathogen from the soil. 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 1 in 4 year rotation recommendation using resistant varieties is designed to slow down pathogen population shifts to strains not controlled by current resistant varieties and allow time for new resistance sources to be bred into canola. A pathogen population shift to a strain not controlled by clubroot-resistant canola has now been documented in Alberta and has occurred many times in other parts of the world in canola and cole crops.

3. Growing a clubroot-resistant variety in fields without known clubroot but in areas where the disease is prevalent can help slow the establishment of the disease. Since there would be low spore numbers when clubroot does get introduced to the field, this approach should not significantly induce changes in the strains to those that are not controlled by the variety resistance. The greatest pressure to alter the pathogen strains is frequent exposure (rotation length) of the same resistance to high soil spore populations (distinct clubroot patches have occurred in the field).
4. 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.
5. 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. The most critical step in cleaning equipment is physical dirt removal – knocking or scraping off soil lumps and sweeping off loosesoil.
    - For risk averse producers or with heavy infestations, additional cleaning steps will slightly decrease the risk of spread, but will involve considerably more work and expense:
        - After removal of soil lumps, wash equipment with a power washer.
        - Finish by misting equipment with disinfectant. Recommended products include 1 to 2 per cent active ingredient bleach solution (UFA carries 12 per cent sodium hypochlorite in
          5-gallon pails or 45-gallon drums), or HyperOx or EcoClear. The use of a disinfectant

without first removing soil is not recommended because soil inactivates most disinfectants. A twenty to thirty minute wet period is necessary for good efficacy.

- Disinfectant footbaths can be an effective first line of defense in a biosecurity program. However, footbaths are not able to completely eliminate biosecurity risks in all situations. Disposable foot coverings should be utilized where possible and in combination with a foot bath to more fully minimize biosecurity risks associated with soil-borne diseases like clubroot.

6. Seed and establish an area with grass near the field exit. A well-sodded grass will retain soil removed during equipment cleaning without creating a mudhole after washing and thus will reduce the re- introduction of infested mud to wheels when moving from this area to the exit. The grass area will not be susceptible to clubroot if volunteer canola and mustard weed species are controlled.
7. 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.
8. Minimize vehicle and equipment traffic to and from fields.
9. 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.
10. Scout canola fields regularly and carefully. Identify causes of wilting, stunting, yellowingand premature ripening – do not assume anything!
11. 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.
12. 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 fungicideson resting spore viability on seed is currently being studied.

Responsibilities

Alberta Agriculture and Rural Development (ARD)

- Pest Surveillance Branch of ARD will coordinate the Alberta Clubroot Management Plan and do the following:
  - provide regulatory consultation and training
  - prepare and provide technical information on clubroot control recommendations and variety resistance stewardship to inspectors and others in the field
  - assist in educating the agriculture industry, oil industry and general public about clubroot and the threat it represents to Alberta
  - inform other industry sectors, such as the agricultural retail industry, environmental companies, custom applicators, petroleum, construction and transportation industries, and

landscaping companies, about equipment sanitation requirements to reduce clubroot spread within and between municipalities

Agricultural Service Boards (ASB)

- ASBs will provide support and resources to the Agricultural Fieldmen in carrying out their duties. The Agricultural Fieldmen will do the following:
  - actively survey for clubroot if canola or mustard is being grown in their municipality – follow-up surveys on infested land should be conducted to monitor for resistance breakdown in newly introduced resistant canola varieties
  - provide recommendations and information to farmers on clubroot prevention and management, especially the stewardship of variety resistance
  - enforce control measures as necessary to meet the objectives of the Alberta Clubroot Management Plan
  - maintain records of infestations and provide information on infested land locations to potential land renters, landowners, oil and gas companies and other parties with a financial interest, under provisions of the *Agricultural Pest Act* and the Pest and Nuisance Control Regulation (Section 10)
  - assist in educating the Alberta agriculture industry about clubroot and the threat it represents to Alberta

Landowners/Occupants

- take measures such as vehicle and equipment sanitation as well as proper crop rotation to prevent the establishment of clubroot on their land and to minimize the spread of clubroot to other land or property
- grow resistant varieties when clubroot is present or is known to be present in the area and follow a four-year rotation to deter resistance breakdown
- observe and follow all management practices to meet the objectives of the Alberta Clubroot Management Plan

Agricultural Retail and Service Industry (pesticide/fertilizer retailers, custom equipment leasing, consulting agronomists, Canola Council of Canada, etc.)

- take measures such as equipment cleaning and disinfection to prevent the establishment of clubroot and to minimize the spread of clubroot to other land and property
- assist in educating the agriculture industry about clubroot, the threat it represents to Alberta, and the value of extended rotations for minimizing variety resistance breakdown

Custom Equipment Operators

- take measures such as equipment sanitation to prevent disease establishment and to minimize the spread of clubroot to other land and property
- assist in educating producers and others in the agriculture industry about clubroot and the threat it represents to Alberta's canola industry

Energy (Oil, Gas, Pipeline, Seismic), Construction (Earthmoving, Landscaping) and Transportation (Trucking) Companies Operating on Agricultural Land

- take measures to prevent disease establishment and to minimize the further spread of clubroot to other land and property – examples of such measures include the following:
  - clean equipment when leaving infested sites or areas
  - remove/stockpile topsoil on leases with clubroot before moving other equipment on-site
  - avoid equipment traffic during wet conditions in infested areas
- prepare and follow clubroot protocols for staff and contractors – for example, in 2008, the CanadianAssociation of Petroleum Producers published best management practices for clubroot disease (http://www.capp.ca/getdoc.aspx?DocId=139848&DT=PDF)
- assist in educating the petroleum, construction and transportation industries about clubroot and the threat it represents to agriculture in Alberta

Researchers

- conduct research to increase understanding of clubroot biology and management
- communicate research findings to extension personnel and other stakeholders
- serve as scientific advisors to the Clubroot Management Committee
- make recommendations to producers and the agricultural service industry, as needed,

based on scientific knowledge and experimental evidence

Clubroot Management Committee

- provide a forum to represent the interests and views of the agriculture and oil and gas industries in Alberta and western Canada regarding the management of clubroot
- recommend management strategies for clubroot for inclusion in the Alberta Clubroot Management Plan
- assist in educating the agriculture, oil and gas industries in western Canada about clubroot and the threat it represents to canola and cole crop production
- evaluate and revise the Alberta Clubroot Management Plan as required

Additional Resources

Clubroot Disease of Canola and Mustard, Agdex 140/638-1, Alberta Agriculture and Rural Development

Clubroot of Crucifers Control Strategies, Agriculture and Agri-Food Canada, Horticulture

Clubroot Management Committee Contact List – attached

Clubroot Management Committee Contact List

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Alberta Clubroot Management Plan

Developed by:

Alberta Clubroot Management Committee Revised August 2014

AGDEX 140/638-2

RV08/14/200