

Clubroot of Canola- Demands Attention of Peace Region’s Producers

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Clubroot is soil borne disease of cruciferous crops and weeds and is caused by *Plasmodiophora brassicae*, a protist pathogen that induces gall formation on infected roots of susceptible plants. Recently, clubroot was found in multiple fields in Big Lakes County, MD of Greenview and one field each in Northern Sunrise County, Birch Hills County and MD of Peace. Clubroot of Canola was found in Canada for the first time in 2003 and within 6 years seed companies released the



first Clubroot resistant (CR) variety. But by 2013, patches of severe clubroot were showing up in the fields planted to CR varieties and as of 2018, 104 fields are confirmed to have clubroot pathotypes that overcome the most common CR varieties on the market in Canada. Genetic resistance can be very effective tool for farmers to use but these resistant traits need help from multi-pronged approach to keep clubroot spore count low in field. High spore level increases disease levels. High spore levels also increase

the risk that virulent pathotype will reach economically damaging level. By keeping spore count low in the field, farmers can protect the effective life span of CR genes. Take following five steps to keep spore count low.

1. DELAY ARRIVAL OF CLUBROOT TO A FIELD.

The best strategy for clubroot is “It is easier to manage clubroot disease when you don’t have it”. Clubroot is soil borne disease and heavily infested areas can have millions of spores per gram of soil. Preventing the introduction of clubroot is about preventing soil movement onto and around the farm. To achieve this goal, take the following actions; **a) Knock dirt off equipment.** Rough cleaning of equipment removes 90-95 % of soil and spores. Washing with compressed air or pressure washer brings that up to 99 %. **b) Think Biosecurity.** When buying used equipment or hiring custom operators, check that machinery is clean before it arrives on farm. Farmers can demand the same inspection of machinery digging pipelines or installing oil and gas infrastructure on their land. **c) Keep tools, boots and tires clean.** While this may represent a very small amount of soil movement, people such as agronomists and crop inspectors should park their vehicle not in the field and must use booties or bleach bath for boots. **d) Reduce Erosion.** Wind and water erosion of soil will move clubroot spores, reduced tillage will reduce erosion of infested soil. **e) Entry and Exits.** Consider planting a small square of permanent grass at field entry points, providing a non-host crop area for soil to drop. Another idea is to have a separate field exit, also grassed, so the machinery leaves an infested field from an area likely to have less clubroot spores.

2. SCOUT EARLY AND OFTEN

Clubroot is now found across the canola growing region of Canada and lately has been found in number of Peace region municipalities. Dig up plants and look for galls in all canola fields. You can go to clubroot.ca to see what small galls look like. If uncertain, send plants to lab for DNA tests. Random searches for galls in high risk areas of a field will improve the chance of finding patches that are small enough to manage. High risk areas, where infection is most likely, include field entrances and low, moist areas where soil runoff can deposit spores.

3. CONTAIN CLUBROOT PATCHES.

Clubroot patches identified early enough and small enough can be managed in various ways to reduce the clubroot spore load in these patches and prevent clubroot from spreading beyond that patch. Patch management techniques include **a) Rouge**. If the patch is small enough, pull up all the plants that have galls. Then cut off galls and burn them. This is an immediate and effective way to destroy those galls. **b) Lime**. Increasing soil pH in areas with clubroot can reduce clubroot severity. Brassica vegetable growers around the world have been using lime for decades for this purpose. The increase in pH has the bonus of increasing availability of other key nutrients. Targeting small early identified patches is preferred because trucking the required rates of lime can be expensive. When considering a lime source, look for high concentration of Calcium Carbonate (CaCO_3) or hydrated lime ($\text{Ca}(\text{OH})_2$) per tonne and consider purity of source. **c) Reduce Tillage**. Because a single gall produces millions of spores and decomposing gall will release spores into the surrounding soil, tillage will disperse the spores to a larger area than if soil is left undisturbed. **d) Grass**. Seed the patch to a non-host grass such as ryegrass that can fill in quickly and tie up the soil to prevent wind and water erosion. With the patch in place, farmers will need to control host weeds, which include volunteer canola, flixweed, shepherd's purse, stinkweed and mustard. Leave the patch until soil surveys indicate spore levels are very low or zero. **e) Fumigation (or Solarization)**. According to one study, clubroot spore numbers can be reduced by fumigating soil (with Vapam) and covering the patch with film. Just the film covering may work by capturing heat and creating a hot zone to kill clubroot spores.

4. ROTATE CROPS

Evidence from three crop rotation in Canada (two in Quebec and one in Alberta) crop rotation between two host crops is an important tool to manage clubroot spores in the field. The greater number of years of break between two host crops will lessen the amount of clubroot spores in soil. One study in the UK indicated that rapeseed crop grown on clubroot infested fields in one in three rotation has 63 percent of the yield potential of the non clubroot infested field. This result improves to 65 percent for one in four rotation, 74 percent for one in five and 80 percent for one in eight. The Alberta Clubroot Management Plan recommends 1 in 4 year rotation using clubroot resistant varieties.

5. GROW CR VARIETIES AS SOON AS CLUBROOT IS IN THE AREA.

The Canadian recommendation is for farmers to use clubroot resistant (CR) varieties as soon as clubroot arrives in the area. The CR trait will prevent most infection, which will help to keep spore counts low in fields that already have lower counts. With fewer resting spores in the soil, the risk of building up virulent pathotypes is reduced. Its better to rotate CR varieties resistant to different type of pathotype. Specialists do not recommend growers use CR varieties in isolation. Rotation and weed control are other tools required to reduce spore build up.

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