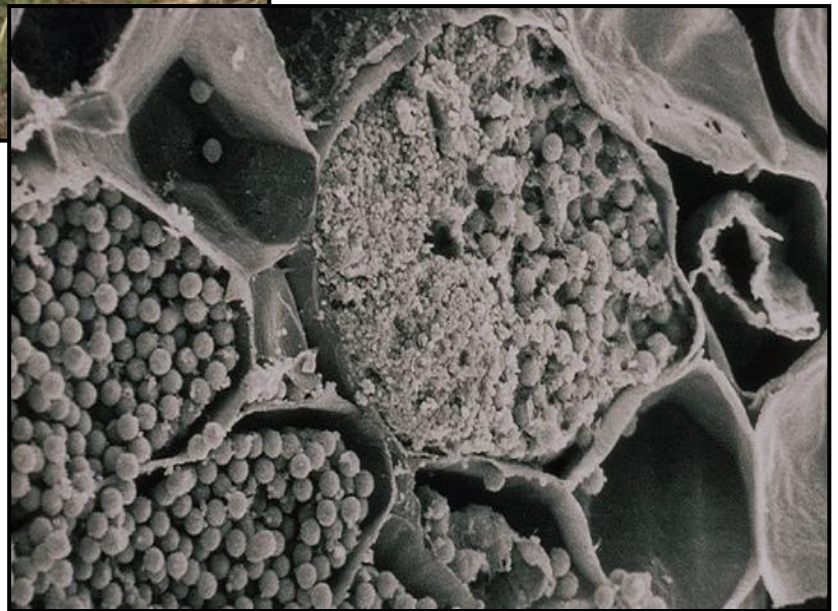


FIELD GOOD AGRONOMICS LTD. CLUBROOT PROTOCOL



DEVELOPED FEBRUARY 2019

FIELD GOOD AGRONOMICS LTD. CLUBROOT PROTOCOL

PURPOSE OF PROTOCOL:

The purpose of this protocol is to minimize the risk of introduction and spread of clubroot disease to ensure canola will continue to be a sustainable crop in the Field Good Agronomics Ltd. (FGA) trading area.

This will be accomplished through 1. education about this disease; 2. monitoring of canola and related crops; 3. development of preventative management plans and; 4. development of remedial management plans with our customers and partners.

1. EDUCATION

Plant disease occurs through a complex relationship between pathogen, host crop, and the environment (Figure 1).

We will provide farmers, their on-farm staff and other partners of FGA a greater understanding of this disease triangle. This will be the basis upon which various management practices to interrupt one or more of the 3 components of the disease triangle will be presented.

FGA will provide clubroot education through:

- Offering grower information meetings
- Offering individual consultation with each customer, including their on-farm staff and custom operators if requested
- Including clubroot information on the Field Good Agronomics Ltd. website www.fieldgoodag.ca.

2. CROP MONITORING

Early detection is critical to stay ahead of clubroot. FGA will conduct regular field scouting to watch for early symptoms of clubroot. Farmers and their on-farm employees should also watch for unusual patches whenever they are in their fields. Areas of crop wilting, stunting, yellowing and/or premature ripening could be indicators of clubroot. These symptoms can be found as early as the late rosette stage and continue until harvest.

Often, clubroot is introduced near field entrances, low spots, along water runways, old yard sites and old bin yards. As such, particular attention should be paid to these areas in addition to other odd patches occurring randomly in a field.

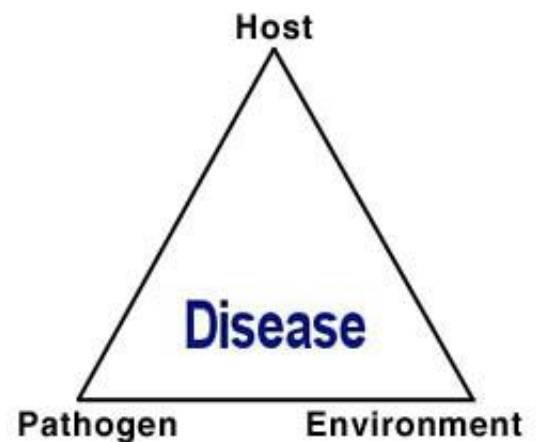


Figure 1. The Disease Triangle

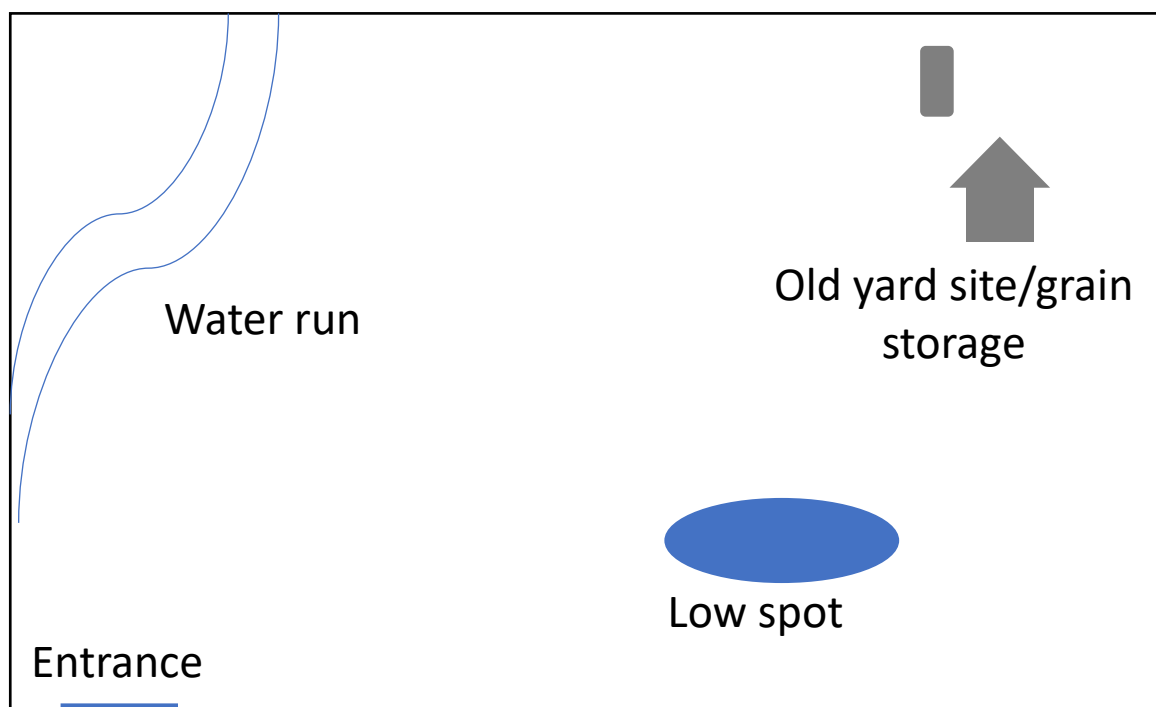


Figure 2. Areas of high risk for initial clubroot infection (courtesy SK Ministry of Agriculture)

3. PREVENTATIVE MANAGEMENT PLAN

The best clubroot management approach is to prevent its introduction and/or spread. A number of strategies are available to farmers to prevent clubroot introduction and spread. These include sanitation measures, crop rotation, use of resistant varieties, designated field entrances and exits, and cruciferous weed control.

Using these strategies, FGA will assist their farmer clients in designing a clubroot management plan for their farm.

When possible and reasonable, FGA will take the following steps to minimize introduction and/or spread of clubroot during its field scouting operations:

- Avoid using regular field entrances (eg. use ditches)
- Avoid parking vehicles in fields
- Minimize movement of trucks from field to field
- Schedule work to minimize crossing between farms in daily scouting routines
- Wash trucks and or ATVs with pressure washer at the end of the day when high levels of soil are present on vehicles
- During the day, knock off excessive soil on boots and scouting equipment

4. REMEDIAL ACTIVITIES

If suspicious patches are found, plants from these areas should be dug up using a trowel or spade and roots inspected for the presence of galls. If it is uncertain whether the disease is established FGA will collect samples and send them to a lab for DNA analysis.

If clubroot is confirmed, FGA will work with its farmer client to develop a plan to prevent further spread and remediate the problem. Preventative and remedial activities should be heightened when dealing with fields that are confirmed to have clubroot.

The initial patch(es) should be clearly marked in the field using GPS, flags, or other means. FGA will encourage its farmer clients to inform their neighbours of the presence of clubroot in their field(s). Strategies to prevent spread and remediate clubroot include those previously mentioned and patch management techniques such as infected plant removal, liming, and seeding perennial sod-forming grass.

Whenever possible, when dealing with fields that are confirmed to have high levels of clubroot, FGA will:

- Plan to scout affected fields at the end of the day so as not spread infected soils to other fields
- Wash trucks and/or ATVs with pressure washer and 2% sodium hypochlorite solution (bleach) after exiting the field
- Clean scouting equipment with 2% sodium hypochlorite solution (bleach) after exiting field
- Wear disposable boot covers or clean boots with 2% sodium hypochlorite solution (bleach) after exiting field
- Avoid going directly into known patches unnecessarily
- Monitor patches to see if problem is getting worse, better, or staying the same, which may include periodic soil testing for DNA analysis

5. SUMMARY

Clubroot is a threat to canola production in western Canada. However, many strategies are available to prevent clubroot from becoming the devastating disease it can be. FGA looks forward to working with their farmer clients to protect our canola growing area from clubroot and other pests.

Larry Durand MSc, PAg, CCA
Box 2138
Humboldt, SK S0K 2A0
Cell: (306) 231-6339
Email: larryfieldgood@sasktel.net

Stephanie Charlton MSc, PAg
Box 2138
Humboldt, SK S0K 2A0
Cell: (306) 231-5219
Email: stephaniefeldgood@sasktel.net