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Labelling Clubroot Resistance in Canada

Introduction

Clubroot remains one of the largest threats to canola crops in Canada and varietal resistance is a cornerstone of clubroot management. Initial resistance labels used since 2009, however, did not account for the complexity of pathogen populations. With the emergence of new pathotypes that can overcome initial resistance, it is crucial for the industry to update resistance labels to identify the primary pathotypes that the new resistance is effective against.

Clubroot pathogen

Clubroot disease is caused by a fungus-like protist called *Plasmodiophora brassicae*, which can survive in soil for years in the form of resting spores. New pathotypes have been identified using the Canadian Clubroot Differential set (CCD); there are currently 47 pathotypes reported in Canada, with new pathotypes being found almost yearly. Sometimes multiple pathotypes can be found within a single clubroot gall, further complicating resistance deployment.

Clubroot resistance

Clubroot resistance (CR) helps the plant prevent or reduce the development of galls on canola roots, alleviating disease impact and limiting inoculum buildup in the soil. Unfortunately, major-gene resistance is not effective against all pathotypes, and some sources of resistance have broken down in the field due to the rise of pathotypes not controlled by these genes. As more CR genes are bred into canola cultivars to combat the increasingly diverse *P. brassicae* populations, rotating clubroot-resistant cultivars with different CR genes may become crucial for sustainable clubroot management.

Clubroot resistance labels

The current clubroot resistance (CR) labelling system classifies canola cultivars as either resistant or susceptible, with resistant cultivars showing less than 30% disease levels compared to a susceptible check. If there is no CR label, growers assume the cultivar is susceptible. However, the current labels do not specify newly introduced CR functions against the additional *P. brassicae* pathotypes that have been reported recently. In the field, pathotypes can shift dramatically within a few years of using a resistant cultivar. In response to this evolving pathogen population, some canola seed brands have begun identifying which pathotypes their cultivars resist, while others have started labelling the sources of resistance.

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The Clubroot Steering Committee, a cross-industry group of experts, is proposing a new CR labelling program for the Canadian canola industry. These labels are voluntary for seed brands and are based on a variety's resistance to the predominant pathotypes in Western Canada, including 3A, 3D and 3H, as defined by the CCD set. More pathotypes may be added to the system as new ones become dominant across the Prairies. Currently, the system focuses on phenotypic resistance to these pathotypes and does not identify individual CR genes. The benefit of this labelling system is the creation of a harmonized standard for CR information on canola cultivars.

Importance of integrated clubroot management

Although varietal resistance is the key to clubroot management, other measures are also important in terms of help CR performance and longevity. For example, careful scouting to detect early field infestations and deploying effective resistant cultivars can mitigate clubroot impact to crops and inoculum buildup in soil. A diverse crop rotation with at least a two-year break between canola crops, effectively managing weeds, sanitizing equipment and minimizing soil movement will also help alleviate inoculum build-up in soil and spread. The Canola Council recommends “keep it low and local” to manage clubroot. Please visit clubroot.ca for more information.

Keep spores low

Crop rotation: Maintain a minimum 2-year break between canola (1-in-3 rotation).

Scout: Examine roots in every canola field during late summer/fall. Pay special attention to high-traffic and high-moisture areas. Soil testing may help identify spores before physical symptoms appear.

Grow CR: Early infestations can be missed for years while susceptible hosts multiply spores to catastrophic levels. Clubroot resistance (CR) should be grown on all canola acres as part of an integrated management strategy.

Control brassica weeds in all crops: Host weeds (like volunteer canola, stinkweed, flixweed, shepherd’s purse and mustards) should be controlled early to minimize gall formation and resting spore release.

Keep spores local

Biosecurity: Commit to a biosecurity plan to prevent the introduction and spread of spores on contaminated inputs and equipment. Communicate sanitation expectations with all relevant parties before field entry.

Reduce tillage: Minimize soil (and spore) movement within and between fields.

Patch management to keep spores low and local:

Manage clubroot patches separately from the rest of the field to reduce spore concentration and prevent spores from spreading.

- Mark the boundaries of the patch(es) with flags/GPS, then remove and destroy galls.
  - Apply lime until soil pH reaches at least 7.2
  - Control weeds in the patch
  - Seed a sod-forming grass to anchor soil
  - Avoid travel through known clubroot patches
- When spores are reduced to low levels, break the sod and return it to annual cropping with the rest of the field.

Visit **clubroot.ca** to learn more.

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