

Brett Young DefendR Rated Disease Resistance – Clubroot Update

Clubroot (CR) is a costly canola disease that growers in Western Canada need to be aware of and understand the recommended management practices for. The latest research confirms continued spread of the disease throughout the canola-growing areas of Alberta, Manitoba, Saskatchewan and North Dakota. Many new pathotypes are present in the intensive CR areas of Alberta where the disease was first identified in Western Canada; however, new pathotypes have also been identified in Manitoba and North Dakota. Interestingly, surveys in these areas often show high levels of CR incidence on varieties with only first-generation CR-resistance genes. This may be a by-product of too often relying on the protection provided by genetic resistance and ignoring the need for sufficient crop rotation. It has already been well documented in intensive CR areas that short canola rotations are a serious factor in aggravating disease incidence and are creating conditions for new CR pathotypes to emerge. New pathotypes are able to quickly increase to serious levels because most canola varieties being grown do not provide protection against them.

Two levels of CR management are at the forefront of concern for growers, agronomists and canola breeders:

(1) CR is quickly becoming a concern for most areas of Western Canada and North Dakota and growers, many for the first time, are including the CR resistance profile of a variety in their selection decisions; (2) Growers in intensive CR areas must consider the likelihood of encountering new pathotypes that will overcome first-generation resistance. These fields require closer management strategies and can include a variety of measures like employing new varieties and extending the time between canola crops in rotation.

Pathotype Identification

The discovery of new pathotypes capable of overcoming first-generation CR resistant varieties has generated a significant amount of research to (a) characterize these pathotypes, and (b) identify new sources of genetic resistance. One result of this research is the development of the Canadian Clubroot Differential (CCD) set. It consists of 13 brassica hosts capable of differentiating the 36 unique pathotypes currently found in Western Canada. The naming of pathotypes is now based on the combination of a number (2, 3, 5, 6, 8) from the Williams' Differential set with a letter (A through Z) from the Canadian Clubroot Differential set. Identification of new pathotypes continues and it is believed that of the 36 pathotypes currently recognized, as many as 19 can overcome first-generation resistance genes.¹

Primary Pathotypes of Concern: 3A, 3D and 3H

The identification of new CR pathotypes during the last number of years shows that the most significant strains, at least in terms of numbers of fields affected, are generally variants of the previous pathotype 3, and within the new naming system are identified as 3A, 3D and 3H. 3H is the most predominant pathotype found outside the major CR risk areas; however, while less predominant, the challenge with 3A and 3D is that they are both capable of overcoming first-generation resistance. So, while most growers need to be aware of 3H as it is the most common pathotype, the selection and spread towards different pathotypes able to overcome first-generation resistance is also a concern.

New Pathotypes Capable of Overcoming Genetic Resistance

Other new pathotypes such as 8E are also reportedly overcoming the first-generation resistance found in many commercial varieties. The 3A and 3D pathotypes, however, are by far the most frequently reported CR pathotypes where varieties are showing susceptibility. These new pathotypes, thus far, are primarily a concern only for growers around Edmonton, AB (see distribution map, Fig. 1) and specific, isolated areas of Southern Manitoba and north-central North Dakota. Adopting varieties with next-generation CR resistance and appropriate cultural practices will be key for growers in areas where risk of a new CR pathotype emerging is high.

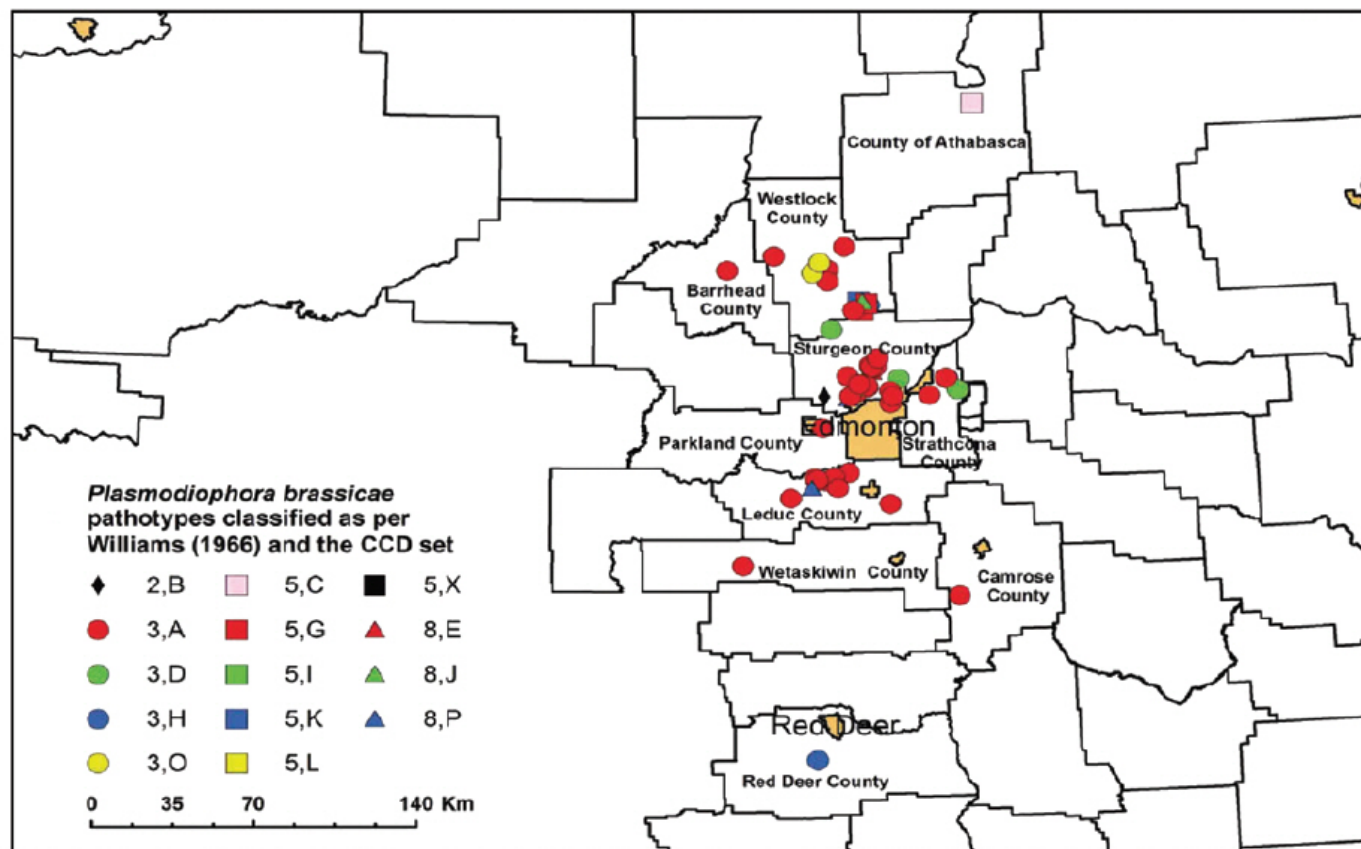
First-Generation Resistance

First-Generation Clubroot resistant varieties tend to be varieties that can trace their resistance genetics to a resistance profile similar to the European-bred, winter canola variety "Mendel". These varieties are typically resistant to pa (per the Williams differential set which are equivalent to pathotypes 2F, 3H, 5I, 6M and 8N on the CCD set).

Next-Generation Resistance

There is no standard industry definition but in general next-generation Clubroot resistant varieties include first-generation resistance genes but should also contain additional resistance genes that may provide protection against n 3A, 2B, 3D, 8E, 5G, 5K, 3O and 5X. Consult the supplier of the variety for specific resistance profile information.

Figure 1. Distribution of the CR (*Plasmodiophora brassicae*) populations characterized in Strelkov et al. 2018 study.



Source: Strelkov et al 2018.

BrettYoung's 6076 CR: Broad Resistance with a Multigenic Approach

Concurrent with the identification of new pathotypes, breeders have been identifying and incorporating new sources of resistance into the latest canola hybrids. This includes the stacking of multiple sources of resistance to CR in varieties like 6076 CR. This variety has resistance to the older pathotypes that were first identified on the Prairies (2F, 3H, 5I, 6M, 8N) and also to most newer pathotypes, including: 2B, 3A, 3D, 3O, 5G, 5K, 5X and 8E .

Recommended CR Management Practices:

- Scout fields to detect presence of disease symptoms
- Soil test to detect presence of pathogen spores
- Sanitize equipment properly
- Extend canola crop rotations to reduce spore load in soil
- Control canola volunteers and weeds that act as CR host plants
- In areas of higher risk, use first-generation resistant hybrids prior to infestation to delay the accumulation of CR spore loads that cause symptoms
- Use next-generation resistant hybrids with a minimum three-year rotation in fields with high levels of infestation

Growers in Manitoba, Saskatchewan and other areas not impacted by pathotype 3A can prevent the accumulation of spores for as long as possible by using resistant varieties such as 6090 RR, 4187 RR , BY 6204TF, BY 5105CL and BY 5125CL (all resistant to pathotypes 2F, 3H, 5I, 6M and 8N on the CCD set) . 6076 CR is recommended for areas where incidence of resistance breakdown is suspected.

Visit BrettYoung.ca/6076 for further information on 6076 CR and its **DefendR** rated, triple-layered disease resistance package.

¹ Strelkov et al. Plant Pathology Group, University of Alberta.