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UNDERSTANDING CLUBROOT RESISTANCE

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SaskCanola Saskatchewan Canola Development Commission

Manitoba Canola Growers

CLUBROOT RESISTANCE AND CLASSIFICATION

Clubroot resistant (CR) canola varieties are key tools used to delay clubroot establishment and manage clubroot disease on the farm. To prevent rapid genetic shifts in clubroot populations and subsequent loss of effective resistance in CR varieties, this valuable resource must be used judiciously in an integrated management approach, which includes practicing a diverse crop rotation with at least two years between canola crops, effectively managing weeds, sanitizing equipment and minimizing soil movement.

WHAT SHOULD YOU DO?

Clubroot disease affects canola and other crops in the Brassicaceae family. The two aspects of controlling this disease are careful prevention and proper management. In order to have the best chance at effective management in any field, the disease must be identified as early as possible through the use of regular, accurate and comprehensive scouting.

For proper management, an integrated management approach must be used.

1. PREVENT/ MINIMIZE SPORE BUILDUP

Use canola varieties with effective clubroot resistance

Practice a diverse crop rotation with at least two years between canola crops

Effectively manage Brassica weeds such as stinkweed, wild mustard and shepherd's purse, which can host the pathogen

Scout both susceptible and resistant canola varieties, especially at field entrances, high moisture areas and in premature ripening patches

2. PREVENT/MINIMIZE SOIL AND SPORE MOVEMENT

Limit tillage and other soil-spreading operations

Use cleaned and treated seed for all crops

Isolate the affected area when there is just a small patch in the field and minimize soil movement from the patch (seed to grass if possible)

Use a separate entrance and exit which are as far apart as possible for any infected or potentially infected fields

Effectively sanitize equipment, vehicles and cover boots/shoes

CLUBROOT RESISTANCE CLASSIFICATION

Individual companies substantiate their clubroot resistance claims to the Canadian Food Inspection Agency (CFIA) through standard testing procedures outlined in the Western Canada Canola/Rapeseed Recommending Committee guidelines and through other protocols that are deemed acceptable to the CFIA.

Varieties are compared to the susceptible check variety for clubroot infection and are assigned either resistant (R), intermediate (I) or susceptible (S) ratings.

	RESISTANT (R)	INTERMEDIATE (I)	SUSCEPTIBLE (S)
Classification	Less than 30% infection compared to susceptible checks in disease tests.	Between 30 and 50% infection compared to susceptible checks in disease tests.	More than 50% infection compared to a susceptible check in disease tests.
What this means	**(R) varieties are not immune,** but highly restrict the development of clubroot symptoms in fields with low to moderate disease pressure from resting spores in the soil.	This (I) rating will mostly be used for adding rating labels to the base (R) label in multiple-resistance-gene varieties to specify moderate resistance against certain new strains.	If there is no CR label on a variety, assume it is susceptible to clubroot. An (S) label could be added to a base (R) label to specify susceptibility to certain strains that aren't common.
What to expect	Under heavy pressure in severely infested fields, an (R) variety can show significant root galling, but may develop fewer and smaller galls than a susceptible variety. Under these heavy pressure situations and frequent use of CR varieties, clubroot populations rapidly evolve to strains that overcome the resistance.	Although intermediate resistance may restrict the development of clubroot symptoms for the corresponding strains, the spore concentration in the soil will be increased.	An extreme buildup of spores can occur very quickly when susceptible varieties are grown in short rotation on slightly infested fields.
Management tips	To delay this shift in clubroot strains and loss of CR variety efficacy, CR varieties should not be grown in short rotations in infested fields.	Varieties with additional (I) labels can provide marginally better disease protection on fields with presence of new corresponding strains, but should not be grown in fields where resistance to predominant strains has been widely defeated.	Susceptible varieties should not be grown in clubroot-infested fields, or those at risk of becoming infested soon.

WHICH PATHOTYPES DO CR VARIETIES REFER TO?

A base (R) resistance label requires that the variety is resistant to the **predominant** clubroot strains or pathotypes in Western Canada. Additional ratings can be appended to the base (R) label to describe resistance to specific uncommon or new pathotypes.

No CR varieties, including new ones with multiple resistance genes, are resistant to all of the clubroot pathotypes detected in Western Canada to date. As clubroot populations in infested fields become more diverse over time, and more CR genes are bred into canola varieties, the usefulness of rotating CR varieties with different resistances will increase. Currently, there are no tests commercially available for growers to distinguish or detect new virulent strains in their infested fields.

Careful scouting to detect early infestations to alert growers and deploy resistant varieties is of utmost importance. Waiting to use (R) varieties until significant infestations have developed will create high soil spore loads and increase the probability for pathogen shifts which can rapidly defeat variety resistance.

Photo:
Mike Harding

For more information on clubroot,
such as prevention strategies and scouting,
please go to **clubroot.ca**

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To contact your local Canola Council of Canada agronomy specialist, visit **canolacouncil.org** or call **1-866-834-4378.**

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