



Blackleg yield loss in resistant canola

CATEGORY [disease](#) | November 5, 2020

Yield losses increased from 18% to 99% in the hybrid canola '73-15RR' and 26% to 86% in hybrid '1950RR' when disease severity rose from 2 to 5 compared with plants with severities of 0-1. Understanding the yield loss relationship with blackleg severity will help agronomists and growers more accurately evaluate the performance of their blackleg resistant hybrids, and assess the economic benefit of control measures, such as fungicide application or switching to hybrids with a different genetic resistance background.

Blackleg, caused by *Leptosphaeria maculans*, is an important disease of canola worldwide. In Canada, blackleg is managed mainly by the cultivation of resistant or moderately resistant canola hybrids.

Recent research by Hwang et al. (2016) <https://canadianagronomist.ca/blackleg-severity-and-yield-loss-in-canola/> on open-pollinated and blackleg susceptible Westar canola found a strong negative relationships between blackleg severity and seed yield and pod number. In this research, every 1-unit increase in disease severity rating on a scale of 1 to 5 resulted in a yield loss of 17.2% and pod loss of 13.0%.

However, the relationship between disease severity and yield had not been examined in hybrid canola with blackleg resistance. The objective of this study was to establish the relationship between blackleg severity and the yield of moderately resistant canola hybrids in western Canada.

Field experiments were conducted over 2 years at two sites located at the Crop Diversification Centre North, Alberta Agriculture and Forestry, Edmonton, Alberta. Two canola hybrids, '1950RR' and '73-15RR', rated as moderately resistant to blackleg, were used in the experiments.

Inoculum of *L. maculans* was cultured and used to inoculate the field plots. At one site, the inoculum was applied at seeding by placing it in the push seeder along with the seeds. At the other site, the plots were hand-seeded at a rate of 25 seeds per row together with the inoculum.

At harvest, Sept 18, 2017 and Sept 24, 2018, the plants were clipped at the soil line, and the stem cross-sections were examined visually for blackened tissue.

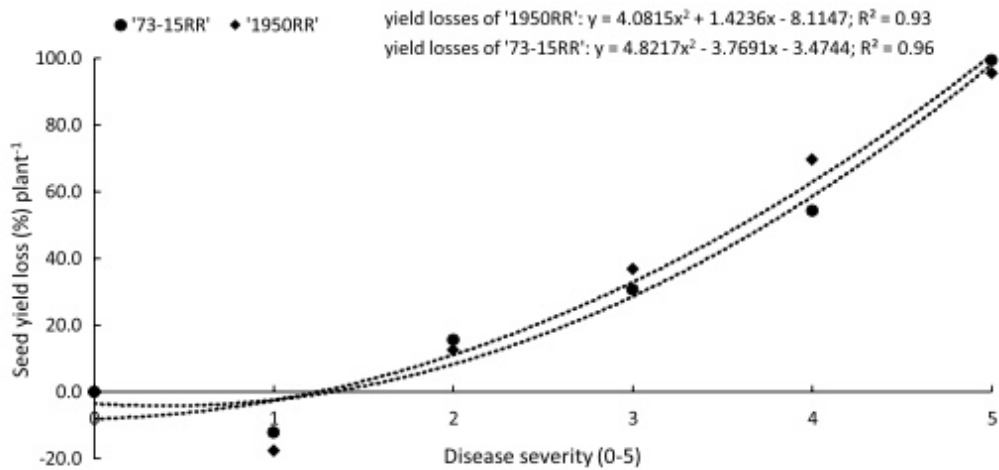
Blackleg severity was rated on a 0–5 scale:
0 = no disease in a cross-section of the stem base;
1 = decay on <25% of the cross-section;
2 = decay on 25%–50% of the cross-section;
3 = decay on 51%–75% of the cross-section;
4 = decay on >75% of the cross-section; and
5 = death of the plant

For each plant harvested, the height, number of pods, and seed yield were recorded individually.

The average blackleg severity rating was approximately 2 on each canola hybrid, consistent with their classification as moderately resistant to this disease. Regression analysis was used to establish the relationship between blackleg severity and both pod number and seed yield.

The blackleg severity–yield loss relationships found that when disease severity increased to 2 or greater, yields began to decrease dramatically. In '73-15RR', the percentage yield loss increased by 15.5% to 99.4% in plants with disease severities of 2 to 5, relative to plants with disease severities of 0–1. For '1950RR', the percentage yield loss increased by 12.6% to 95.7% in plants with disease severities of 2 to 5 compared with plants with disease severities of 0 to 1.

Relationship between blackleg severity and yield loss in the canola hybrids '73-15RR' and '1950RR' under field conditions at Edmonton, AB



Source: Hwang, et al. 2020

The results of this research show that infection of canola by *L. maculans* can result in significant yield losses, even in moderately resistant varieties, particularly at higher disease severities. Adoption of integrated strategies, potentially with the rotation of resistance gene groups, may be necessary for the successful long-term management of blackleg of canola.

Additionally, most studies have used a 0–5 scale to quantify the severity of blackleg in stem cross-sections, and used regression analysis to predict yield loss. Further studies based on quantitative measurements of the percentage of diseased tissue in stems, achieved with imaging technology, could provide a continuous predictor, and allow further refinement of risk and yield-loss models.

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Wang, Y., S.E. Strelkov, and S.F. Hwang 2020. Yield losses in canola in response to blackleg disease. *Can. J. Plant Sci.* <https://doi.org/10.1139/cjps-2019-0259>