

## Canola cotyledon wounds contribute to blackleg disease

CATEGORY [disease](#) | May 17, 2022

Mechanical wounds on canola cotyledons, simulating flea beetle feeding, allowed infection of the blackleg pathogen while no infection occurred on un-injured cotyledons. Wounds that were 8 hours or older before inoculation had lower levels of infection. Temperature, leaf wetness and relative humidity also played a role in the development of disease on a susceptible and intermediately-resistant variety.

The fungal pathogen that causes blackleg disease, *Leptosphaeria maculans*, typically infects canola at the cotyledon and early leaf stages. Growth chamber research by Agriculture and Agri-Food Canada Saskatoon and the University of Manitoba investigated how wounding, wound age, temperature and leaf wetness impacted *L. maculans* infection on cotyledons of susceptible and resistant canola. The results help understand whether flea-beetle feeding and flea beetle control can impact blackleg disease.

A susceptible and a resistant blackleg canola variety were compared. Westar canola represented the susceptible variety. The resistant variety was 74-44BL, which carries the race resistant R genes Rlm1/LepR3, Rlm3, and possibly RlmS, as well as a level of race-non-specific resistance.

### **Wounding allowed infection**

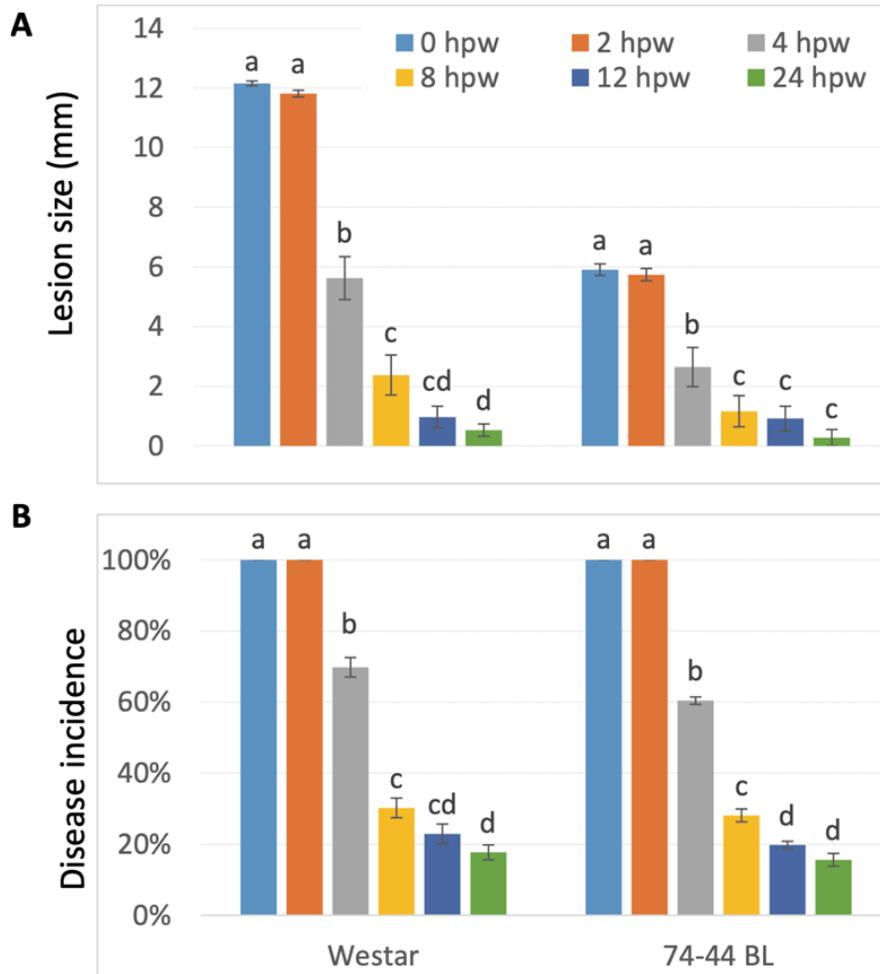
About 7 days after planting, a mechanical pencil was used to prick 4 or 16 wounds per cotyledon. The canola seedlings were then sprayed with a suspension of *L. maculans* isolate at  $1 \times 10^4$  and  $2 \times 10^5$  spores/mL. Some of the inoculated plants were subjected to a dew for a 6 hour period of leaf wetness at 21C, and then moved to another growth chamber at 21C day/18C night. The others went straight to the second growth chamber without exposure to dew.

Spraying the non-wounded cotyledons did not result in blackleg infection for either the susceptible or resistant variety under these conditions. For the wounded treatments, all cotyledons in the susceptible variety were infected as measured by spreading fungal hyphae at 9 days post infection (dpi). Both varieties showed visual leaf lesions at 14 days dpi, but the resistant variety had lower levels of infection severity.

### **Older wounds were less susceptible to infection**

The same canola varieties were inoculated at 0, 2, 4, 8, 12 and 24 hours post wounding (hpw). Wounds inoculated immediately or at 2 hpw had large lesions on Westar, but small lesions typical of intermediate resistance on 74-44 BL. Wounds inoculated 8 hpw or later were substantially less susceptible than inoculation at earlier periods for both varieties. There was a reduction of more than 90% in symptoms on both varieties when inoculation happened at 12 or 24 hpw.

Lesion size and disease incidence caused by the inoculation of wounds with *L. maculans* 0 to 24 hours post wounding (hpw)



Source: Huang et al. 2022

Three separate sets of seedlings (0-24 hpw) were also transferred to growth chambers set at 25C continuous (high), 21C/18C (control) and low (10C) temperatures with 16-hour photoperiod and relative humidity (RH) at 50 to 60%. Another set of these seedlings were placed in a growth chamber at 21C/18C but high RH of 80 to 90% for 12 hours post inoculation.

At 14 days post inoculation, the high 25C temperature had similar disease infection as the control temperature of 21C/18C. Again, infection was significantly lower when inoculated 8 or more hours post wounding. At the 10C temperature, there was a similar trend of higher infection levels in

Westar compared to later hpw infections, but the infection levels was lower than under higher temperatures.

Disease incidence and severity were similar between the seedlings exposed to 12 hours of high relative humidity, and those at 50 to 60% relative humidity.

In another trial, cotyledons were wounded and placed in a growth chamber at 21/18C, 16-hour photoperiod and 50 to 60% relative humidity. They were then placed into 25C or 10C temperatures for 4 or 8 hours with a period of leaf wetness at 21C. Inoculation occurred at 4 or 8 hours after wounding, and were then placed back in the control chamber.

Again, wound age was the most important factor, with lower infection or severity at 8 hpw than at 4 hpw, with similar infection patterns between Westar and the resistant variety (although with noticeably smaller lesions). On Westar, exposure to the low post-wounding temperature or leaf wetness slightly increased susceptibility to infection.

### **Re-wounding reset susceptibility**

Cotyledons of these canola varieties were pricked and then held at control conditions of 21C/18C, 16-hour photoperiod and 50 to 60% RH for 0, 2, 4, 8, 12 and 24 hours. They were then re-wounded at the original puncture locations, inoculated with *L. maculans*, and held for 14 days in the control conditions.

This re-wounding and immediate inoculation generally erased the initial wound age effect, resulting in typical infection levels on the susceptible and intermediately resistant varieties. Lesions sizes were much smaller on the resistant variety, but the disease incidence reached 100% for both varieties.

Overall, the results clearly showed that mechanical wounding of canola cotyledons can facilitate infection by *L. maculans*. Wound age was the key factor in infection, while environmental conditions contributed to infection in some cases. This supports a hypothesis that flea beetle feeding wounds favor infection by *L. maculans* on canola seedlings and this hypothesis is being examined in further research.

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Shuanglong Huang, Chun Zhai, Zhongwei Zou, Fei Liu, Paula Parks, Linda Mcgregor, W. G. Dilantha Fernando & Gary Peng (2022): Effect of wounding and wound age on infection of canola cotyledons by *Leptosphaeria maculans*, interacting with leaf wetness, Canadian Journal of Plant Pathology.

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