Reducing Seedling Blight to Improve Stand Establishment in Hybrid Canola

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Producers have noted much more severe infestations of seedling blight and root rot in canola fields. Researchers conducted both field and greenhouse studies from 2007 to 2010 to identify the organisms associated with the increased incidence of root rot in hybrid canola crops, and to determine how to optimize cultural methods to reduce the impact of seedling blight and root rot on canola seedling populations and on plant yield.The project will benefit canola producers, many of whom have suffered severe plant population losses due to root rot and seedling blight in hybrid canola.

Producers have noted much more severe infestations of seedling blight and root rot in canola fields. In the Peace River and central regions, most fields are affected, with up to 80-100% infected plants. Changes in canola production may have caused some fundamental shifts in susceptibility to seedling blight and root rot. Rising seed costs of new cultivars have also made it more important to efficiently achieve target plant populations.

Figure 1. Roots collected in a field survey showing root rot symptoms. Source: S. Hwang. ARD.

This project, conducted from 2007 to 2010 in both greenhouse and field studies in Alberta, was established to identify the organisms associated with the increased incidence of root rot in hybrid canola crops. Researchers also wanted to determine how to improve seedling establishment, seedling vigour and seed yield of canola by optimizing chemical and cultural methods to reduce the impact of seedling blight and root rot on canola seedling populations and on plant yield.

Researchers conducted surveys to isolate, culture, identify and assess the virulence of pathogens causing seedling blight of canola under field conditions in Alberta. Disease incidence was determined based on the number of plants infected out of the total plants observed for root rot (*Rhizoctonia* spp.,

Fusarium spp.) and Fusarium wilt (*F. oxysporum* f. sp. *conglutinans*). In 2008, a total of 13 fields of canola were surveyed, mostly in the southern and central part of Alberta. Fusarium root rot was identified as the predominant pathogen in association with the increased incidence of root rot in hybrid canola crops. In 2010, 110 fields were surveyed in the area surrounding Edmonton.

Figure 2. Roots infected by Rhizocondria sp. in a greenhouse study showing symptoms of root rot. Source: S. Hwang. ARD.

Researchers also wanted to study the impact of inoculum density on seedling establishment and seedling vigour of canola. This study found that inoculation with *Rhizoctonia solani* severely reduced seedling emergence and yield in canola in both greenhouse and field studies. (Table 1) The degree of losses observed after inoculation with this pathogen was greater than for either Fusarium or Pythium. This pathogen may be responsible for many of the losses experienced by canola producers.

Table 1. Effects of inoculum density with *R. solani* on seedling emergence and yield of canola in 2010.

Inoculum density (mL/plot)	Seedling emergence (plants/m^2)	Seed yield (t/ha)
Non-inoculated	**53.5 a**	**6.16 a**
20 mL	**0.3 b**	**0.40 b**
40 mL	**0.7 b**	**0.56 b**
60 mL	**0.3 b**	**0.64 b**
80 mL	**0.1 b**	**0.34 b**

Figure 3. Roots infected by *Fusarium* sp. in a greenhouse study showing symptoms of root rot. Source: S. Hwang. ARD.

Several field and greenhouse studies were also conducted near Edmonton in 2007, 2008 and 2009 using cv. 3465 RR. Researchers wanted to determine the effect of seeding date and soil temperatures (early, mid and late May), seed size (<0.7 mm, 0.7 – 2.0 mm, >2.0 mm) and seeding depth (1.2, 2.4 or 3.6 cm) on the susceptibility of canola seedlings to seedling blight and root rot. They also wanted to determine the effect of harvest date (September 3, 6, 11, 14, 17, or 22) on seedling vigour and viability.

The study found that seedling establishment was reduced in plants seeded at the early date of the first week of May in 2007, but not in 2008. Results also showed that seed ranging from 0.7 – 2 mm in size showed greater yield compared to seed smaller than 0.7 mm. Seedling establishment decreased with each successive increase in seeding depth although yield was not

significantly affected. Delaying harvest resulted in increased viability of canola seed and increased vigour of the resulting seedlings.

The results of this project will benefit canola producers, many of whom have suffered severe plant population losses due to root rot and seedling blight in hybrid canola. Researchers have received funding from ACIDF to continue their research to assess the effects of fungicidal seed treatments on pathogen populations, canola establishment and root rot severity and on plant yield.