

Fungicide Treatment by Growth Stage for Control of Blackleg Disease on Canola, Langdon 2011

Scott Halley, Crop Protection Scientist, and Amanda Arens, Research Technician, North Dakota State University
Langdon Research Extension Center. Ph. 701.256.2582. E-mail: Scott.Halley@ndsu.edu.

Materials and Methods

A study was conducted at the North Dakota State University Langdon Research Extension Center in 2011 to evaluate fungicides for efficacy against blackleg disease in canola (*Brassica napus* L.). Blackleg disease is caused by the pathogen *Leptosphaeria maculans*. Infection occurs through penetration through the leaf or cotyledon surface at early development stages. The pathogen moves down the leaf petiole and into the stem. Stem tissue is destroyed near the soil surface. In severe cases a lesion will form on the exterior of the stem and cause eventual girdling and plant death. Generally earlier infection causes greater economic loss. Infections after 6-leaf growth stage are generally not economic. As with nearly all pathogens the environment is critical to the economic importance of the disease. Evaluations on fungicide efficacy were conducted by Bradley et al., 2003-05, but many new fungicide chemistries are now available or may be available soon. In addition, the resistance to blackleg present in canola cultivars may have changed, improved, and more evaluation is needed. The objective of this study is to determine the efficacy of three fungicide treatments when applied at three growth stages of canola for managing blackleg disease. The fungicides included Headline (BASF, pyraclostrobin) and Quadris (Syngenta, azoxystrobin). The study was designed as a randomized complete block with a factorial arrangement with four replications. A non-treated plot was included as a control but was not included in the statistical analysis because of the lack of fit for the growth stage factor. Treatments are listed in Table 1. The soil type was a Barnes/Svea complex. Twenty foot long plots were planted on 16 June in seven rows spaced 6-inches apart with an Almaco plot seeder equipped with double-disk openers and press wheels. Target plant stand was 610,000 plants per acre or 14 plants per square foot. The cultivar planted was hybrid DKL 30-42. Plots were also planted between the treated plots to minimize interference from spray drift to the treated plots. On three dates, 10, and 28 June and 6 July, a solution of pycnidiospores 10,000, 50,000 and 10,000 spores per ml respectively, was applied to each plot with a CO₂-pressurized back pack sprayer equipped with a three-nozzle boom, nozzles oriented vertically and spaced 20 inches apart to infect the plots and cause blackleg establishment. A 5 ft. alley was tilled after emergence reducing the harvest length to 15 ft. Weeds were controlled with two applications of RU WeatherMax (glyphosate) applied at 11.2 fl. oz. /A. The fungicides were applied with the aforementioned backpack sprayer operated at 40 psi and delivering 9.2 GPA. The foliar treatments were made using Spraying Systems XR8001 nozzles. The fungicide applications were made on 30 June at 8:15 a.m. (wind E speed 1 MPH, air temperature 76° F), 8 July at 8:00 a.m. (wind SE speed 3 MPH, air temperature 70° F) and 18 July at 10:15 a.m. (no wind, air temperature 82°F) at the respective growth stages reported in Table 1. Forty stems were dug by hand after swathing for disease assessment. Assessment was made after clean cut crosswise with band saw just above soil line. Blackleg severity was rated using a 0 to 5 scale, in which 0 = no visual penetration or infection of stem; 1 = 25% of the stem circumference with lesions; 2 = 50% of the stem circumference with lesions and slight girdling; 3 = 75% of the stem circumference with lesions and significant girdling; 4 = stem completely girdled, but intact at base; 5 = dead plant. The plots were harvested after the straw dried with an Almaco plot combine, 8 Sept and the yield and test weight determined. Data were analyzed with the general linear model procedure (PROC GLM) using SAS (SAS Institute, Cary, NC). Treatment means were compared using Fisher's protected least significant difference (LSD) test at the $P \leq 0.05$ level.

Results

Due to an issue with the initial planting, this trial was replanted and it emerged later than may have been preferred for the development of high levels of blackleg disease. Yields were quite excellent for this late planting. The sequential fungicide treatments increased yield compared to the Quadris treatment, Table 1. No differences for yield were determined for fungicide application by growth stage. An interaction was measured for yield. Application of sequential fungicide applications beginning at 4-leaf growth stage increased yield compared to all other fungicide treatments and application timings, Table 2. No other differences were determined for test weight or blackleg disease.

Table 1. Yield, test weight and blackleg disease incidence, severity and index by confidence interval, fungicide treatment and application growth stage to canola, Langdon 2011.

	Test		Blackleg Disease		
	Yield	Weight	Incidence	Severity	Index
Fungicide	0.0295	0.2872	0.1196	0.8414	0.1325
Growth Stage	0.0709	0.5471	0.9487	0.5471	0.9349
Fung.*GS	0.0154	0.7083	0.8964	0.5058	0.8147
% C.V.	8.9	2.0	90.9	82.5	98.4
<u>Treatment</u>	(lbs. /a.)	(lbs. /bu.	(%)	(0-1)	(0-5)
Non-treated	2299.7	51.8	4.4	0.13	0.06
Sequential	2449.6	51.1	8.5	0.19	0.09
Headline	2327.6	51.7	4.8	0.20	0.05
Quadris	2208.3	51.7	4.2	0.23	0.04
LSD _(0.05)	174.1				
<u>Growth Stage</u>					
Cotyledon	2213.7	51.3	6.2	0.16	0.07
2-Leaf	2411.3	51.7	5.8	0.22	0.06
4-Leaf	2360.4	51.6	5.5	0.24	0.06

[Severity calculated by multiplying the category value (0-5)*actual severity (0.2, 0.4, 0.6, 0.8, 1.0), and summing, then dividing by the infected plant count]. Index calculated by multiplying the plant count*actual category score, summing and then dividing by the total sample number.

Quadris was applied @ 6.2 fl. oz. /acre and Headline was applied @ 6 fl. oz. /acre. The sequential treatment included two applications of Headline, the first at the reported growth stage and the second 10 days later.

Table 2. Yield by treatment and application growth stage on canola, Langdon 2011.

<u>Treatment</u>	<u>Application Growth Stage</u>	<u>Yield (lbs./ acre)</u>
Sequential	Cotyledon	2164.5
	2-leaf	2404.8
	4-leaf	2779.4
Headline	Cotyledon	2377.4
	2-leaf	2353.2
	4-leaf	2252.1
Quadris	Cotyledon	2099.1
	2-leaf	2323.3
	4-leaf	2202.4
LSD _(0.05)		301.5

Quadris was applied @ 6.2 fl. oz. /acre and Headline was applied @ 6 fl. oz. /acre. The sequential treatment included two applications of Headline, the first at the reported growth stage and the second 10 days later.