Fungicide for Control of Blackleg Disease on Canola, Langdon 2011

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Materials and Methods

A study was conducted at the North Dakota State University Langdon Research Extension Center in 2011 to evaluate new 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 infections cause greater economic loses and 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 available or will be available soon. In addition, the resistance to blackleg present in canola cultivars may have changed, improved, and more evaluation is needed. The study was designed as a randomized complete block with four replications on a sight previously cropped to corn. The soil type was a Barnes/Svea complex. Prior to spring tillage, the site was fertilized with 120 lb. nitrogen and 15 lb. sulfate-S/ acre from a liquid fertilizer blend. The site was cultivated with a spring tooth field cultivator prior to planting. Twenty foot long plots were planted on 5 May in seven rows spaced six-inches apart with an Almaco plot seeder equipped with double-disk openers and press wheels. 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. Immediately after planting, 16 May, two bundles of three stems collected in fall 2010 from a site previously infected with blackleg, were placed in each plot. At two to three-leaf growth stage, 1 and 3 June, a solution of pycnidiospores 10,000 spores per ml, was applied to each plot with a CO_2-pressurized back pack sprayer equipped with a three-nozzle boom, nozzles oriented vertically and spaced 20 inches apart. 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 CO_2–pressurized backpack sprayer operated at 40 psi and delivering 9.2 GPA. The foliar treatments were made using Spraying Systems XR8001. The fungicide applications were made on 6 June at 8:30 a.m. (wind NNW speed 2 MPH, air temperature 64° F) and 14 June at 8:45 a.m., Mervion and Inspire fungicides (no wind, air temperature 70° F). 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 harvest after drying with an Almaco plot combine, 19 Aug 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

Two fungicide treatments increased yield compared to the non-treated, Table 1. The experimental fungicide S-2200 and Quash increased yield compared to the non-treated. Proline, Quadris and Endura statistically had the same yield as the aforementioned fungicides but were not statistically different from the non-treated. Aproach, Aftershock, Stratego Yld and Inspire had numerically less yield than the non-treated. The lower yield with the Inspire may have been affected by the later application timing compared to the other fungicides. Noticeably missing from the list of treatments with the greatest yield was Headline, a fungicide that previously was reported by Bradley et al. to have good efficacy for control of blackleg. No differences were measured for test weight or any of the blackleg disease parameters. The disease incidence in this study was low to moderate, < 20% in the non-treated. We conducted several studies evaluating blackleg in 2011. The level of the disease ranged from very low to an incidence of 60%. The low levels occurred in a trial planted 16 June. We would like to repeat this study again in 2012.

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

		Fungicide		Test	Blackleg Disease		
		Rate	Yield	Weight	Incidence	Severity	Index
Fungicide	Active Ingredient	(fl. oz.)	(lb./a)	(lb./bu)	(%)	(0-1)	(0-5)
Non-treated			2170.2	52.7	19.4	0.20	0.19
Headline	pyraclostrobin	6	2197.0	52.5	11.9	0.24	0.15
Proline	prothioconazole	5	2412.7	52.6	16.9	0.25	0.20
Aproach	picoxystrobin	12	2125.3	52.8	11.3	0.21	0.13
Quadris	azoxystrobin	6.2	2327.0	52.4	17.5	0.22	0.19
Quash	metconazole	4 oz.	2417.4	52.7	15.0	0.22	0.16
ProPulse	fluopyram, prothioconazole	8.6	2245.1	52.6	11.3	0.23	0.14
Endura	boscalid	11 oz.	2397.1	52.7	6.3	0.27	0.06
Vertisan	penthiopyrad	20	2253.2	52.9	13.1	0.23	0.15
Stratego YLD	trifloxystrobin, prothioconazole	4.65	2135.2	52.7	11.9	0.29	0.16
Priaxor	pyraclostrobin, fluxaporoxide	4	2209.9	52.6	8.8	0.25	0.11
S-2200		4	2538.0	52.9	16.3	0.22	0.17
Aftershock	fluoxastrobin	3	2069.3	52.6	11.9	0.24	0.15
Quadris Top	azoxystrobin/difenoconazole	14	2208.2	52.8	18.1	0.22	0.21
Inspire XT	difenoconazole/propiconazole	7	2253.6	52.6	11.9	0.40	0.15
Inspire	difenoconazole	7	2038.0	52.8	20.0	0.30	0.29
Mervion	pyraclostrobin, fluxaporoxide	4 and 4	2284.1	52.6	5.6	0.23	0.08
$LSD_{(0.05)}$			243.5	NS	NS	NS	NS
Pr > F			0.0091	0.2387	0.3374	0.8516	0.4789
% C.V.			7.6	0.4	59.7	28.6	66.7

Fluxaporoxide = Xemium. [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.