Progress Report for "Fungicide Evaluations for Control of Blackleg in Canola" funded by the North Central Canola Research Program – 2005

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Background

Blackleg, caused by *Leptosphaeria maculans*, is a reemerging disease in North Dakota. Short crop rotations and the development of more aggressive *L. maculans* strains may be partially responsible for the reemergence of the disease. Because of the growing threat of blackleg to canola in the major production region in the U.S., fungicide research was conducted in 2005. The objective of the research was to evaluate fungicides for management of blackleg.

Materials and Methods

Two experiments were conducted at each location (Langdon, ND; Minot, ND; and Crookston, MN). Experiment 1 evaluated different fungicides and rates on a moderately-susceptible (MS) cultivar (see Tables for treatments). Experiment 2 evaluated Quadris fungicide at different rates (the only fungicide currently registered for blackleg control on canola in the U.S.) on a MS cultivar, a moderately-resistant (MR) cultivar, and a resistant (R) cultivar (see Tables for treatments). Fungicides were applied at the 2 to 4 leaf stage. The Langdon and Minot sites were located in areas with natural disease pressure. To ensure disease pressure, all sites were inoculated with a *L. maculans* pycnidospore suspension within 24 hours after fungicides were applied. Blackleg severity was rated using a 0 to 5 scale in late August / early September. Plots were combined and yields were calculated. Plots were arranged in a randomized complete block design with 4 replications. Data were analyzed using the general linear model procedure (PROC GLM) in SAS (SAS Institute Inc., Cary, NC). Fisher's protected least significant difference (LSD) test was used to compare means where $\alpha = 0.05$. If significant cultivar × fungicide interactions were present, then the PDIFF test was used to compare least-square means of the interaction at $P = 0.05$.

Results

Due to adverse weather, all plots were lost at the Minot location and the Quadris × Cultivar plots were lost at the Langdon location.

Langdon. Disease pressure was moderately-high at Langdon, with a severity of 3.6 on the untreated control. Significant ($P \leq 0.05$) differences among treatments for blackleg severity and yield occurred. Headline at both 6 and 9 fl oz/A, Impact, Amistar at 3 oz/A, Pristine at both 12 and 18 oz/A, and Quadris at 6.2 fl oz/A significantly reduced blackleg severity compared to the untreated control (Table 1). Amistar at 2.25 oz/A, Pristine at 12 oz/A, Headline at both 6 and 9 fl oz/A, JAU 6476 at both 4.3 and 5.7 fl oz/A, A7402T, and Quadris at 6.2 fl oz/A had significantly greater yield than the untreated control.

Crookston. Disease pressure was low at Crookston. No significant ($P \leq 0.05$) differences were detected for Experiment 1 (fungicide trial) (Table 2). For Experiment 2 (cultivar × Quadris trial), no significant cultivar × fungicide interaction was detected for blackleg severity; therefore main effects only are reported for blackleg severity. Significant differences in blackleg severity were detected among cultivars, with DeKalb 223 having greater severity than the other two cultivars (Table 3). No significant differences were detected among fungicides for blackleg severity (Table 4). A significant cultivar × fungicide interaction was detected for yield. Quadris applied at 15.4 fl oz significantly increased yields of cultivars HyClass 2061 and Pioneer 45H21, but not DeKalb 223 (Table 5).

Table 1. Effect of fungicides on a cultivar moderately-susceptible to blackleg at Langdon, ND in 2005.

Fungicide	Severity (0-5)	Yield (lb/A)
Quilt 8.67 fl oz/a	3.2	1134
Untreated	3.6	1221
Impact 7 fl oz/a	2.5	1284
Quadris Opti 1.6 pt/a	3.3	1307
Endura 6 oz/a	3.3	1327
Endura 5 oz/a	3.5	1337
Tilt 4 oz/a	3.7	1393
Quilt 14 fl oz/a	3.0	1423
Quadris 9 fl oz/a	3.1	1440
Amistar 3 oz/a	2.6	1463
Pristine-18 oz/a	2.7	1466
Amistar 2.25 oz/a	3.5	1483
Pristine-12 oz/a	2.9	1496
Headline- 9 fl oz/a	2.3	1497
A7402T 4 fl oz/a	3.0	1503
JAU 6476 5.7 fl oz/a	3.3	1503
JAU 6476 4.3 fl oz/a	3.1	1506
Headline- 6 fl oz/a	2.7	1556
Quadris 6.2 fl oz/a	2.7	1610
P > F	**0.0032**	**0.0351**
CV (%)	**15.6**	**12.4**
LSD 0.05	**0.7**	**249**

Table 2. Effect of fungicides on a cultivar moderately-susceptible to blackleg at Crookston, MN in 2005.

Fungicide	Rate/acre	Severity (0-5)	Yield (lb/A)
A7402T	4 fl oz	0.8	1698
Impact	7 fl oz	1.2	1677
Untreated		1.3	1632
Headline	6 fl oz	0.8	1619
JAU6476	4.3 fl oz	0.8	1610
Endura	6 oz	1.0	1586
Headline	9 fl oz	1.1	1573
JAU6476	5.7 fl oz	0.9	1565
Amistar	2.25 oz	0.8	1550
Quadris	6.2 fl oz	0.8	1546
Tilt	4 fl oz	1.4	1541
Quilt	8.67 fl oz	1.1	1515
Quadris	9 fl oz	0.7	1482
Quadris Opti	1.6 pt	1.0	1468
Amistar	3 oz	0.9	1432
Endura	5 oz	1.1	1427
Pristine	18 oz	1.0	1416
Quilt	14 fl oz	0.8	1403
Pristine	12 oz	1.1	1378
	P > F	0.1310	0.3355
	LSD 0.05	NS	NS
	CV (%)	32	11

Table 3. Blackleg severity of cultivars differing in susceptibility at Crookston, MN in 2005.

Cultivar	Severity (0-5)
Pioneer 45H21	0.8
HyClass 2061	0.6
DeKalb 223	1.3
P > F	0.0006
LSD 0.05	0.3
CV (%)	49

Table 4. Effect of fungicides on blackleg severity at Crookston, MN in 2005.

Fungicide	Rate/A	Severity (0-5)
Untreated		1.0
Quadris	6.2 fl oz	0.8
Quadris	9 fl oz	0.9
Quadris	15.4 fl oz	0.7
	P > F	0.3153
	LSD 0.05	NS
	CV (%)	49

Table 5. Effect of Quadris fungicide on yield of canola cultivars differing in susceptibility to blackleg at Crookston, MN in 2005.

Cultivar	Fungicide	Rate/acre	Yield (lb/A)[a]
DeKalb 223	untreated		1244 cde
DeKalb 223	Quadris	6.2	1145 de
DeKalb 223	Quadris	9.0	904 f
DeKalb 223	Quadris	15.4	1083 ef
HyClass 2061	untreated		1172 de
HyClass 2061	Quadris	6.2	1289 cde
HyClass 2061	Quadris	9.0	1179 de
HyClass 2061	Quadris	15.4	1564 ab
Pioneer 45H21	untreated		1459 bc
Pioneer 45H21	Quadris	6.2	1340 cd
Pioneer 45H21	Quadris	9.0	1411 bc
Pioneer 45H21	Quadris	15.4	1701 a
		P > F	0.0194
		CV (%)	12

[a] Yield values followed by the same letter are not significantly ($P \leq 0.05$) different according to the PDIFF test using SAS.