Evaluation of Headline Fungicide applied to Carter and York Flax Cultivars at Four Growth Stages for Management of Pasmo Disease

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Objective

The objective of the study was to evaluate the application of Headline fungicide at growth stages 7, 8, 9, and 10 for efficacy for control of pasmo disease (*Septoria linicola*) in flax (*Linum usitatissimum* L.)

Materials and Methods

The study was conducted at the Langdon Research Extension Center in 2006. The study was designed as a randomized complete block arranged as a factorial with four replicates. Factors included 1) Carter and York flax cultivars, a yellow and brown seed type respectively, and 2) Applications of Headline fungicide (pyraclostrobin) applied at growth stages 7, 8, 9, and 10 (based on Turner) and an untreated. The site was previously cropped small grains and was soil type Svea/Barnes complex. Flax seed was plant on 8 May with an Almaco disk-type plot seeder, disks spaced 6-inches apart. Plot size was 7 rows wide and 16 ft long with border plots planted between treatment plots to minimize fungicide drift to adjacent treatment plots. After emergence, a small handful (approximately 65 grams of 15-inch long material) of flax stems infected with Pasmo disease in 2005 was placed in the center on both sides of the treatment plot as a source of inoculum. Fungicide was applied with a CO_2 backpack type sprayer equipped with Spraying Systems XR8002 nozzles spaced 20 inches apart operating at 40 psi and delivering 18.4 GPA. The initial treatment was made early morning 1 July followed by early afternoon on 8 July, early morning 14 July, and early morning 21 July at growth stages 7, 8, 9, and 10 respectively. Disease assessment was made by measuring the distance in inches above the soil surface that the leaves had died (necrotic leaves) and had visible leaf infection (leaf severity). Flax production recommendations for northeast North Dakota from the North Dakota State University Extension Service were followed. The plots were harvested with a Hege small plot combine and the yield and test weight determined. Oil concentration was determined from sub samples of the treated plots. Data was analyzed with the general linear model (GLM) in SAS. Least significant differences (LSD) were used to compare means at the 5% probability level (Table 2).

Results

No phytotoxic effects from any of the treatments were observed. Cultivar ‘Carter’ had significantly less necrotic leaves at GS 8 and 10 than the other stages and the untreated (Table 1). ‘York’ also had the lowest amount of necrotic leaves at GS 8. Growth stage 7 and 9 had significantly less necrotic leaves than the untreated and GS 10. ‘Carter’ cultivar had significantly greater amount of pasmo infected leaves compared to York cultivar. ‘Carter’ had the greatest overall yield when Headline was applied at GS 7. Applications

at other GS were the same or less than the untreated. Headline applied to 'York' had the greatest yield at GS 8 but not significantly different than GS 9 (Table 1). Test weight was greater on 'York' cultivar but oil concentration was greater on 'Carter'. The disease pressure was the lowest in the five years I have evaluated pasmo disease on flax as a result of the dry/limited precipitation environment. Even so, there appears to be substantial benefit to an application of Headline to flax when pasmo disease is present. I would encourage BASF to consider requesting labeling for flax.

Table 1. Pasmo disease, yield, test weight and oil concentration average across cultivars and growth stages and by cultivar and growth stage, Langdon 2006.

Cultivar or Growth Stage (GS)	Pasmo Necrotic Leaves (inches above ground)	Pasmo Infected Leaves (inches above ground)	Yield (bu/acre)	Test Weight (lb/bu)	Oil (%)
Carter	3.9	18.3	32.9	54.0	48.7
York	3.4	15.6	34.9	54.7	47.2
$LSD_{(0.05)}$	NS	1.7	[Y]	0.4	0.7
Untreated	4.6	17.3	33.5	54.5	48.3
GS 7	3.8	17.4	35.8	54.4	48.0
GS 8	2.1	16.3	33.0	54.1	47.4
GS 9	3.9	15.6	33.8	54.4	47.9
GS 10	3.9	18.0	33.4	54.5	48.0
$LSD_{(0.05)}$	NS	NS	[Y]	NS	NS
Cultivar by Growth Stage					
Carter					
Untreated	5.3	20.0	33.7	53.9	49.0
GS 7	4.5	18.8	37.1	54.4	49.1
GS 8	2.8	17.5	29.9	53.6	47.6
GS 9	4.8	16.3	32.1	54.0	49.0
GS 10	2.3	18.8	31.7	54.2	48.7
York					
Untreated	4.0	14.5	33.4	55.0	47.6
GS 7	3.1	16.0	34.4	54.3	46.9
GS 8	1.5	15.0	36.2	54.5	47.2
GS 9	3.0	15.0	35.6	54.7	46.9
GS 10	5.5	17.3	35.2	54.9	47.3
$LSD_{(0.05)}$	0.8	NS	0.9[Z]	NS	NS

[Y] See LSD for interaction. [Z] Calculated at 10% level of significance. Turners growth stage (7=early flower early branching, 8=full flower capsules start forming continuation of branching, 9=late flower most branches and capsules formed, and 10=green capsule seed white and lower leaves yellow.

Table 2. Source of variation and probability levels for significant differences by pasmo disease, yield, test weight and oil concentration Langdon, 2006.

Source of Variation	Pasmo		Yield	Test Weight	Oil
	Necrotic Leaves	Infected Leaves			
Cultivar	0.4045	0.0029	0.0569	0.0009	0.0003
Growth Stage	0.1002	0.3939	0.5014	0.5727	0.6300
Cult*GS	0.0467	0.5109	0.0778	0.3059	0.5390
% C.V.	48	15	10	1	2

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