Cultivar Tolerance and Fungicide as Management Strategies for Control of Ascochyta Disease in Field Pea at Langdon 2005 and 2006.

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INTRODUCTION

Disease caused by *Ascochyta* spp. on field pea (*Pisum sativum*) is more problematic than other field pea diseases in northeast North Dakota. Three causal organisms make up this disease complex. *Phoma medicaginis var pinodella* (L.K.Jones) Boerema causes foot rot. *A. pisi* Lib. causes leaf and pod spot and is also found on plant parts below ground. *Mycosphaerella pinodes* (Berk.& Bloxam) causes blight which is the most common and damaging of the disease complex. Initial symptoms of blight are small dark flecks often irregular in shape. These lesions form a concentric ring like a cut tree trunk with a very dark brown color in the center and lighter brown on the outer rings. Stem lesions may be longer and wider than leaf lesions and turn blue black or purplish eventually girdling the stem. The developing pod is also affected. The complex has been evident since field pea pathology research was initiated in 2001 at the Langdon Research Extension Center at varying infection levels increasing when environmental conditions favor disease development. Losses are likely to increase as field pea acreages increase in the region and rotations that include field pea are shortened. Management alternatives should be evaluated to minimize these losses. A study conducted in 2004 found no differences among fungicide rates for control of *Ascochyta* spp. but significant differences among cultivars.

MATERIALS AND METHODS

A study was conducted in 2005 and repeated in 2006 at the Langdon Research Extension Center to evaluate cultivars for tolerance to *Ascochyta* disease. The study was designed as a randomized complete block arranged as a 2 x 10 factorial with four replicates. Cultivars ‘Eclipse’ and ‘SW Salute’ were planted in 2005 and ‘CDC Mozart’ was substituted for ‘SW Salute’ in 2006 due to availability of seed and the cultivar’s increased susceptibility to the *Ascochyta* disease complex. The trial was planted with a plot type double disk drill with rows spaced 6-inches in late May of each year to an area previously cropped small grains. Additional plots (borders) were planted between the treated plots to minimize spray drift movement to adjacent plots. Boscalid and pyraclostrobin (Endura 70% and Headline 23.6%; BASF Corp., Research Triangle Park, NC), and sulfur (Microthiol Disperss 80%; Cerexagri, Inc., King of Prussia, PA) were applied at early bloom, bloom and one week after bloom, or bloom, one week and two weeks after bloom growth stages. An untreated of each cultivar was included. Endura was applied at 8 oz/acre, Headline at 5.5 fl oz/acre (both BASF), and Microthiol Disperss at 1 lb/acre with a CO_2 backpack spray boom with XR8002 nozzles spaced 20 inches apart and oriented vertically at 18.4 GPA. Disease assessments were made visually on a scale of 0-9 with nine having infected leaves, stems, and pods throughout the canopy. The plots were harvested with a Hege plot combined and samples processed to determine yield, test

weight, and protein. North Dakota State University Extension recommended production practices for field pea in Northeast North Dakota were followed. Data was analyzed with the general linear model (GLM) in SAS. Fisher's protected least significant differences (LSD) were used to compare means at the 5% probability level Table 1.

RESULTS

The 2007 Manitoba Seed Variety Selection and Growers Guide rated 'CDC Mozart' with poor resistance to Mycosphaerella blight and 'Eclipse' and 'SW Salute' cultivars with fair resistance. Ascochyta disease levels were very high in 2005 and low in 2006 in the studies. The data report from our studies indicates differences in the susceptibility of 'Eclipse' and 'SW Salute'. Disease severity was over 60% greater in 2005 on cultivar 'SW Salute' than 'Eclipse' (Table 1). No differences in disease severity were determined among the two cultivars in 2006. All treatments of Headline and Endura applied two and three times reduced disease severity compared to the untreated when averaged over both seasons (Figure 1). The sulfur treatments were ineffective in reducing disease in our study. The seed guide indicates an average yield advantage of about 3% for 'Eclipse' over 'CDC Mozart' and 6% over 'SW Salute'. Our study showed similar differences between yield of Eclipse and SW Salute under high disease pressure (Table 2). Under low disease pressure cultivar CDC Mozart produced 9.3% greater yield when averaged across all treatments. Yields were increased over the untreated by Headline fungicide treatments in 2005 with two and three fungicide applications (Figure 2). No other treatments increased yields over the untreated in either environment. CDC Mozart had greater test weight than Eclipse. Eclipse had much greater protein than SW Salute and CDC Mozart. Protein was less under low disease environment. This was likely related to reduced crop yield potential caused by minimal precipitation in 2006. Future studies should evaluate the effect of different fungicide rates and cultivar interactions especially with pyraclostrobin.

Table 1. P values for Ascochyta disease, yield, test weight and protein by source of variation Langdon, 2005 and 2006.

Sources of Variation	Ascochyta Disease	Yield	Test Weight	Protein
Disease	0.5812	0.8444	0.4616	0.3218
Loc*Dis	0.0003	0.0028	0.0488	0.0035
Treatment	0.0260	0.3095	0.8461	0.2332
Loc*Trt	0.0884	0.0036	0.4064	0.6506
Dis*Trt	0.3797	0.6392	0.2459	0.7017
Loc*Dis*Trt	0.5935	0.2611	0.7741	0.3448
%C.V.	28.2	10.5	0.8	3.5

Table 2. Ascochyta disease, yield, test weight and protein by year and cultivar averaged across treatments Langdon, 2005 and 2006.

Year	Cultivar	Ascochyta Disease (0-9)	Yield (bu/A)	Test Weight (lb/bu)	Protein (%)
2005	Eclipse	4.6	63.5	62.5	23.5
	SW Salute	7.5	60.0	62.5	23.1
2006	Eclipse	2.8	61.8	62.9	22.6
	CDC Mozart	2.5	67.6	63.4	21.4
$LSD_{(0.05)}$		0.4	2.1	0.2	0.3

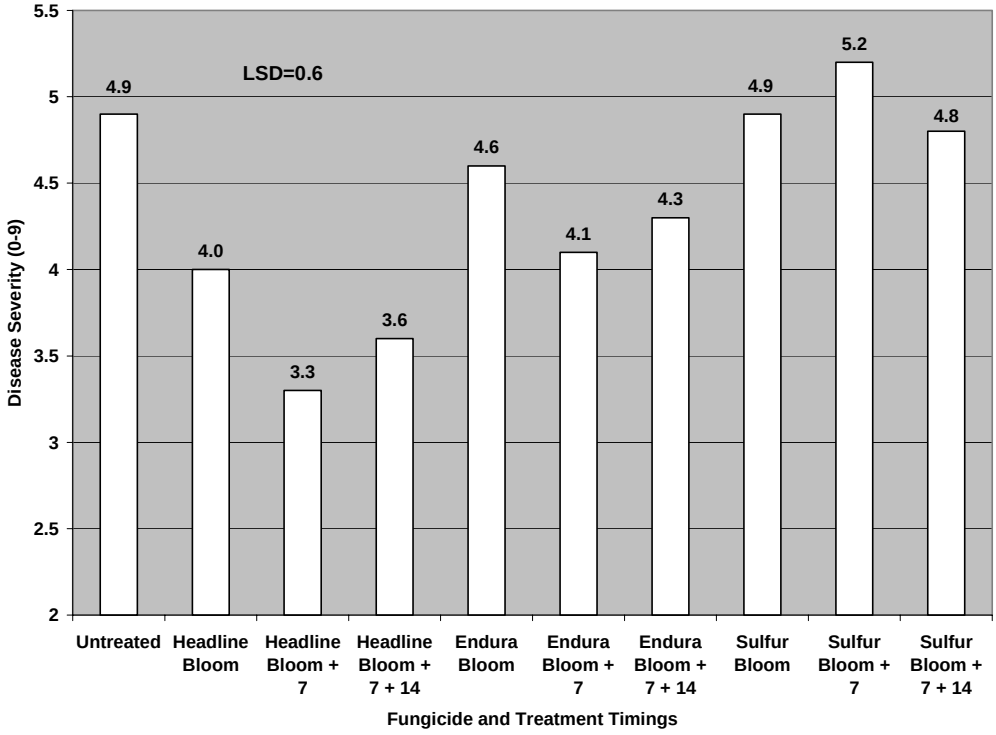

Figure 1. Disease severity by fungicide and treatment timings averaged across years and cultivars Langdon, 2005 and 2006.

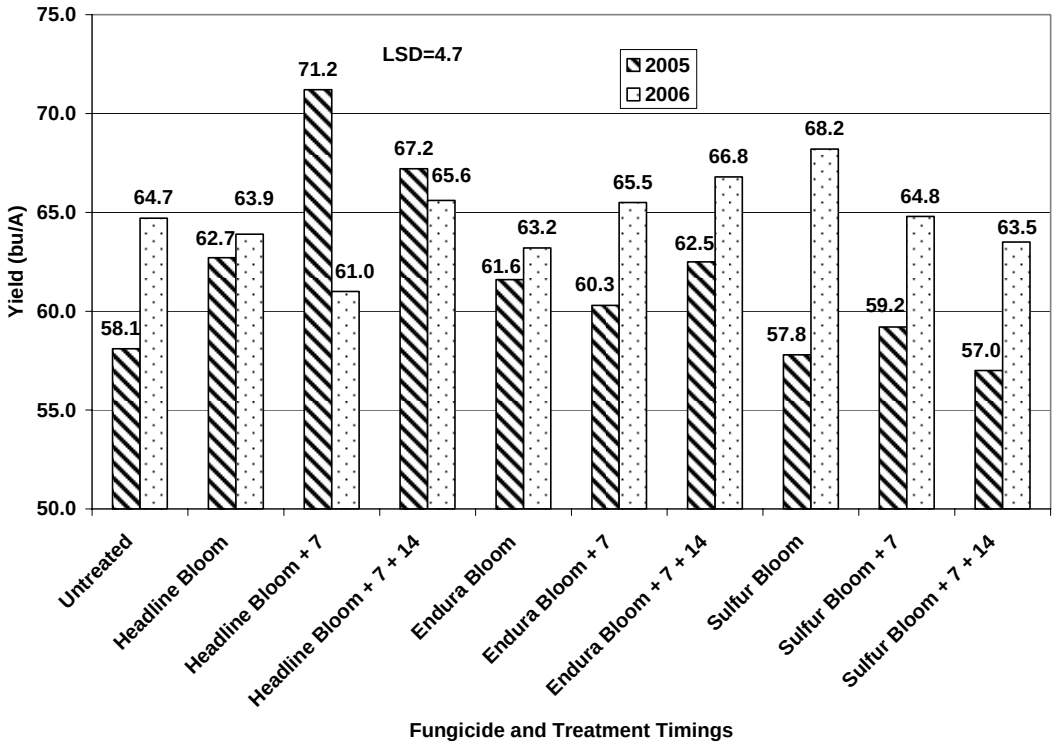

Figure 2. Yield by fungicide and treatment timing averaged across years and cultivars Langdon , 2005 and 2006.