Fungicide tank mixtures for control of *Sclerotinia* stem rot on canola

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INTRODUCTION

Sclerotinia stem rot of canola (SSR), caused by the fungus *Sclerotinia sclerotiorum,* is managed mainly through the use of fungicides. Most guidelines suggest application of single compounds once or twice during flowering (McMullen and Markell, 2011). The efficacy of SSR control using tank mixtures of two compounds with different mechanisms of action has not been thoroughly assessed. This poster presents results of trials conducted in 2011 and a summary of the efficacy of combinations evaluated in the past four years.

MATERIALS and METHODS

Field trials were conducted at the NDSU Langdon Research Extension Center using a randomized complete block design with four replications. Plots (5x20 ft) were infested the previous fall with approximately 300 g of sunflower-produced field sclerotia and planted to canola 'DKL 30-42', in rows spaced 6-inches apart. Border plots were planted between treated areas to minimize fungicide drift. Plots were misted every night during flowering to stimulate SSR development. Treatments were applied at a rate of 18 GPA using a CO_2 backpack sprayer equipped with XR8001 nozzles oriented vertically.

Fungicides: Fungicides and fungicide combinations varied with years, however, those evaluated in all four years are listed in Table 1. When two fungicides were combined, each was used at 50% of the rate recommended when applied alone. Fungicides were applied at 30-40% bloom.

Data collection: Disease incidence (proportion of symptomatic plants in 25-50 plants per plot), severity (0-5 scale) and yield (lb/A) were calculated for each plot. Data were expressed as proportions of non-treated control plots and the arcsine of the square root of each of them was calculated. Analysis of variance was conducted on the transformed data. Treatment means were compared using least significant difference (P=0.05). Figures were produced using back-transformed data.

Table 1. Fungicides evaluated for control of Sclerotinia stem rot of canola in Langdon, ND between 2008 and 2011.

Fungicide mix	Code	Doses/A	FRAC[1]
Endura	E	6 oz	7
Proline 480 SC	P	5 fl oz	3
Topsin 4.5 Fl	T	20 fl oz	1
Topsin + Bravo	T + B	10 fl oz + 11 fl oz	1+M5
Topsin + Endura	T + E	10 fl oz + 3 oz	1+ 7
Topsin + Proline	T + P	10 fl oz + 3 fl oz	1+ 3
Proline + Bravo	P + B	3 fl oz + 12 fl oz	3+M5
Proline + Microthiol	P + M	3 fl oz + 5 lb	3+M2
Non-treated control	CHK	---	---

[1] Fungicide resistance action committee code for fungicide mode of action

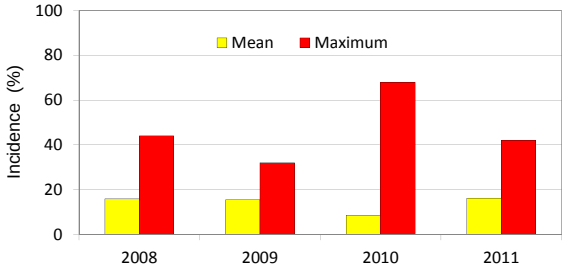

Figure 1. Mean and maximum Sclerotinia stem rot incidence (%) on field trials at Langdon, ND between 2008 and 2011.

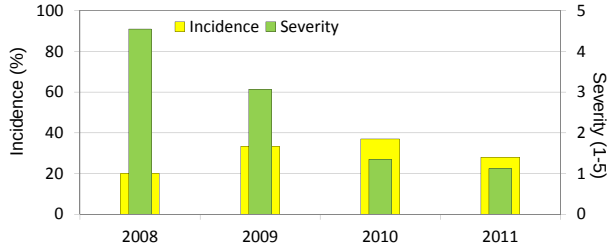

Figure 2. Mean Sclerotinia stem rot incidence (%) and severity on non-treated (control) plots in field trials at Langdon, ND between 2008 and 2011.

RESULTS

SSR incidence was not uniform across years and thus a combined analysis could not be conducted. The mean SSR incidence in all four years was < 20%, although in three of them maximum incidence was > 40% (Figure 1). In 2008 and 2009, SSR severity in non-treated (control) plots was > 3 whereas in 2010 and 2011 it was < 2 (Figure 2). In all years, non-treated plots had SSR mean incidence ranging between 20 and 37%. Tank mixtures of Topsin + Endura and Topsin + Proline reduced SSR incidence and increased yields significantly (P=0.05) compared to non-treated plots in three and two of the four years of study, respectively (Figure 3). When these fungicides were used in single-product applications they reduced SSR incidence in three of the four years but increased yields in only one of them.

DISCUSSION

Use of fungicide tank mixtures is a viable alternative to manage SSR. Tank mixtures increased yields more consistently and because of the reduced rates used, they cost less than some single-product applications made at full rate. Since fungicide resistance is always a concern (FRAC, 2010), increasing the concentration of these compounds in the mix to 75% of the full doses and inclusion of fungicides with multiple modes of action in the mix are alternatives that should be explored.

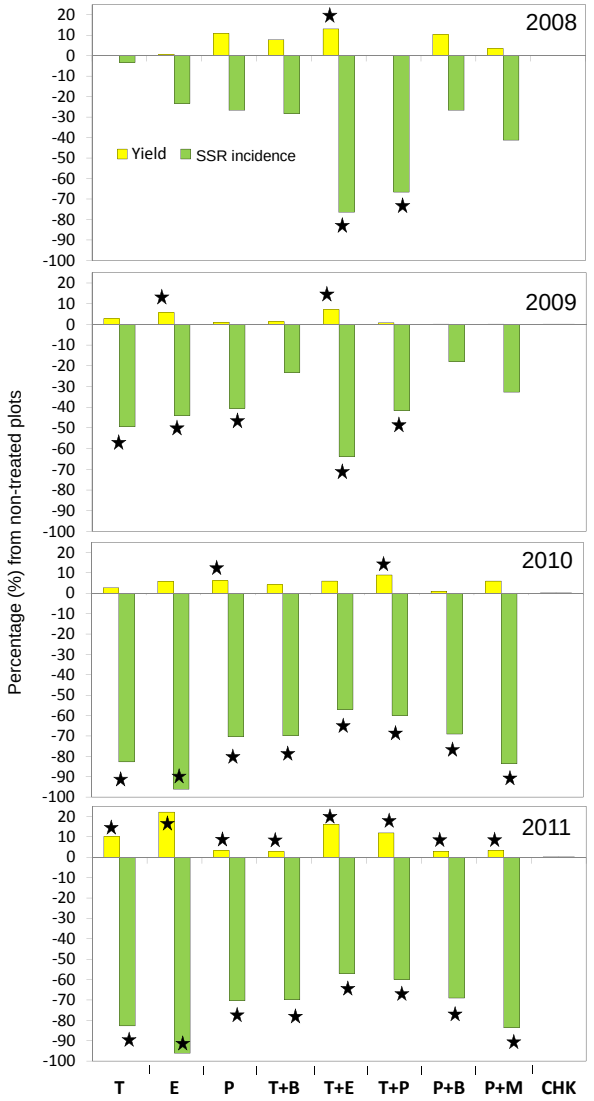

Figure 3. Effect of fungicide applications on disease incidence and yield expressed as percentage from non-protected plots in trials conducted at Langdon, ND between 2008 and 2011.
T= Topsin; E= Endura; P=Proline; T+B=Topsin+Bravo; T+E=Topsin+Endura; T+P=Topsin+Proline; P+B=Proline+Bravo; P+M=Proline+Microthiol; CHK=non-protected control. A (★) sign indicates significant differences at P=0.05.

LITERATURE CITED

FRAC, 2010. FRAC recommendations for fungicide tank mixtures designed to delay resistance evolution.
McMullen, M. and S. G. Markell. 2011. 2011 North Dakota Field crop fungicide guide. NDSU Extension Bulletin PP-622.

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