Trifloxystrobin Based Seed Treatment Fungicides Control Seed Rot and Pre-emergence Damping-Off of Canola, Pulses, and Corn

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Abstract

Active ingredient Trifloxystrobin belongs to the strobilurin class of fungicides which possess improved safety and environmental characteristics. The objective of this research was to evaluate the efficacy of seed treatment fungicides based on Trifloxystrobin to control seed rot and pre-emergence damping off of canola, pulses, and corn crops. In 2004-2006, canola, pulses, and corn trials were conducted in Saskatchewan (Aberdeen, Allan, Indian Head, and Wakaw), Alberta (Vegreville), and Manitoba (High Bluff). The experimental design used was a randomized complete block design with four replications. Seed treatments fungicide tested were **Trilex FL** (trifloxystrobin [10g]/100 kg of seed); **Trilex AL** (trifloxystrobin [5g] + Allegiance FL (metalaxyl) [4g]/100 kg of seed); and **Trilex FL** (trifloxystrobin [5g]/100 kg of seed) tank mixed with **Allegiance FL** (metalaxyl) [2g]/100 kg of seed) Plants were counted at 14 to 28 days after planting. Data were analyzed using an ANOVA. Trifloxystrobin based seed treatment fungicides possessed excellent efficacy for controlling seed rot and pre-emergence damping-off of canola, pea, lentil, chickpea, and corn crops grown in soils infected with *Rhizoctonia solani* or *Fusarium avenaceum*.

Introduction

Pathogens responsible for seed and seedling diseases in canola, pulses, and corn crops are many and widespread (Bailey et al., 2003; Hwang and Chang, 1989; Katania and Verma, 1990). Plant and yield losses are common in canola, pulses, and corn crops due to *Rhizoctonia solani* and *Fusarium spp*. infection. Trifloxystrobin was identified as a potential replacement for Thiram in commercial seed treatment fungicides. Trifloxystrobin belongs to the strobilurin class of fungicides which possess improved safety and environmental characteristics. Trifloxystrobin interferes with the respiration of plant pathogenic fungi and is a potent inhibitor of fungal spore germination and mycelia growth (Pest Management Registration Agency, 2004). The objective of this research was to evaluate the efficacy of seed treatment fungicides based on Trifloxystrobin to control seed rot and pre-emergence damping off of canola, pulses, and corn crops.

Materials and Methods

Seed treatments tested were **Trilex FL** (trifloxystrobin [10g]/100 kg of seed); **Trilex AL** (trifloxystrobin [5g] + Allegiance FL (metalaxyl) [4g]/100 kg of seed); and **Trilex FL** (trifloxystrobin [5g]/100 kg of seed) tank mixed with **Allegiance FL** (metalaxyl) [2g]/100 kg of seed). In canola trials, the inoculated control (IC), non-inoculated control (NIC), and Trilex FL treatments were treated with 400g clothianidin/100 kg seed to protect emerging seedlings from flea beetle damage. In Canola, pulses, and corn crops all treatments were treated with Allegiance FL (metalaxyl) to control seed rot and pre-emergence damping-off caused by *Pythium spp*.

All trials included an IC and NIC. Plant stand reductions caused by an introduced pathogen are confirmed if stand establishment in the IC is lower than the NIC. When soil inoculation with a pathogen is effective in causing adequate disease pressure, numerical or statistical differences are generally detected between the IC and NIC.

In 2004-2006, canola, pulses, and corn crop trials were conducted in Saskatchewan (Aberdeen, Allan, Indian Head, and Wakaw), Alberta (Vegreville), and Manitoba (High Bluff). The experimental design used was a randomized complete block design with four replications. Plants were counted at 14 to 28 days after planting. Data were analyzed using an ANOVA and a means separation tests was conducted if main treatment effects were significant at a 5% probability level.

Results

Canola Plant Stand and Grain Yield

Rhizoctonia solani soil inoculation resulted in excellent disease pressure. In all four canola trials, the NIC at 14 days after planting had a significantly higher stand count than the IC (Table 1). In all four canola trials, the NIC had significantly higher grain yield than the IC (Table 2). On average the crop stand and grain yield of Trilex FL (trifloxystrobin) seed treatment fungicide was statistically higher than the IC. Thus, replacement of thiram by trifloxystrobin has no impact on the efficacy of seed treatments fungicides to control seed rot and pre-emergence damping-off of canola.

Table 1. Crop Stand of Canola Treated with Trilex FL and Grown in Saskatchewan and Manitoba in 2006

Location	DAP[1]	Plants/m^2					
		IC[2]		NIC[3]		Trilex FL	
Aberdeen, SK	14	21	b[4]	75	a	34	b
Allan, SK	14	24	b	102	a	42	b
Indian Head, SK	14	25	c	70	a	44	b
High Bluff, MB	14	34	b	127	a	56	b
Average		**26**	**c**	**94**	**a**	**44**	**b**

[1] DAP, days after planting
[2] IC, Inoculated control
[3] NIC, Non-inoculated control
[4] Means within a row with the same letter are not significantly different at 5% probability level

Table 2. Grain Yield of Canola Treated with Trilex FL and Grown in Saskatchewan and Manitoba in 2006

Location	Grain yield (kg/ha)					
	IC[1]		NIC[2]		Trilex FL	
Aberdeen, SK	2413	b[3]	3822	a	2906	ab
Allan, SK	1961	c	3404	a	2753	b
High Bluff, MB	4715	b	5576	a	4868	b
Average	**3030**	**c**	**4268**	**a**	**3509**	**b**

[1] IC, Inoculated control
[2] NIC, Non-inoculated control
[3] Means within a row with the same letter are not significantly different at 5% probability level

Pulse Plant Stands and Grain Yields

Rhizoctonia solani and *Fusarium avenaceum* soil inoculation resulted in excellent disease pressure. In all crop trials, the NIC at 14 days after planting had a significantly higher stand count than the IC (Table 3). Crop stand and grain yield values treated with Trilex AL were significantly higher than the IC (Tables 3 and 4). Thus, Trilex AL effectively controls seed rot and pre-emergence damping-off of pea, lentil, and chickpea.

Table 3. Crop Stand of Pea, Lentil, and Chickpea Grown in Soil Infected with *Rhizoctonia solani* and *Fusarium avenaceum* Treated with Trilex AL and Grown in Alberta and Saskatchewan in 2005

Location	Crop	Pathogen	DAP[1]	Emergence (%)					
				IC[2]		NIC[3]		Trilex AL	
Wakaw, SK	Pea	*R. solani*	14	29	b[4]	70	a	75	a
Vegreville, AB	Lentil	*F. avenaceum*	14	17	b	40	a	44	a
Aberdeen, SK	Chickpea	*F. avenaceum*	14	40	c	99	a	76	b
Average				**29**	**b**	**70**	**a**	**65**	**a**

[1] DAP, days after planting
[2] IC, untreated inoculated control
[3] NIC, untreated non-inoculated control
[4] Means within a row with the same letter are not significantly different at 5% probability level

Table 4. Grain Yield of Pea, Lentil, and Chickpea Grown in Soil Infected with *Rhizoctonia solani* Treated with Trilex AL and Grown in Alberta and Saskatchewan in 2005

Location	Crop	Grain yield (kg/ha)					
		IC[1]		NIC[2]		Trilex AL	
Wakaw, SK	Pea	790	b[3]	1980	a	1850	a
Vegreville, AB	Lentil	595	a	890	a	967	a
Aberdeen, SK	Chickpea	380	b	3580	a	2630	a
Average		**588**	**b**	**2150**	**a**	**1816**	**a**

[1] IC, inoculated control
[2] NIC, non-inoculated control
[3] Means within a row with the same letter are not significantly different at 5% probability level

Corn Plant Stand

Fusarium avenaceum soil inoculation resulted in excellent disease pressure. In all trials, the NIC at 21 and 28 days after planting had significantly higher stand count than the IC (Table 5). For crop stand, corn treated with Trilex FL tank mixed with Allegiance FL (metalaxyl) was significantly higher than the IC. Thus, trifloxystrobin effectively controls seed rot and pre-emergence damping-off of corn.

Table 5. Crop Stand of Corn Grown in Soil Infected with *Fusarium avenaceum* and Treated with Trilex FL Mixed with Allegiance FL (Metalaxyl) and Grown in Saskatchewan in 2004

Location	Cultivar	DAP[1]	Plants/5m row					
			IC[2]		NIC[3]		Trilex FL + Allegiance FL	
Aberdeen, SK	39W54	21	19	b[4]	32	a	37	a
		28	20	b	30	a	30	a
Allan, SK	Early Xtra Sweet	21	8	b	30	a	27	a
		28	10	b	33	a	28	a
Average			**14**	**b**	**31**	**a**	**31**	**a**

[1] DAP, days after planting
[2] IC, inoculated control
[3] NIC, non-inoculated control
[4] Means within a row with the same letter are not significantly different at 5% probability level

Summary

Trifloxystrobin based seed treatment fungicides possess excellent efficacy for controlling seed rot and pre-emergence damping off of canola, pea, lentil, chickpea, and corn crops grown in *Rhizoctonia solani* or *Fusarium avenaceum* infected soils.

References

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