EFFICACY OF EMINENT IN TANK MIXES FOR CONTROLLING CERCOSPORA LEAF SPOT ON SUGARBEET

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Cercospora leaf spot, caused by the fungus *Cercospora beticola* Sacc., is the most economically damaging foliar disease of sugarbeet in Minnesota and North Dakota. The disease reduces tonnage and sucrose concentration, and increases sugar loss to molasses which results in reduced extractable sucrose and higher processing costs. Roots of diseased plants do not store well in storage piles that are processed in a 7 to 9 month period in North Dakota and Minnesota (Smith and Ruppel, 1973). Cercospora leaf spot is managed by integrating the use of tolerant varieties, reducing inoculum by crop rotation and tillage, and timely fungicide applications (Khan et al; 2007). It is difficult to combine high levels of Cercospora leaf spot resistance with high recoverable sucrose in sugarbeet (Smith and Campbell, 1996). Consequently, commercial varieties generally have only moderate levels of resistance and require fungicide applications to obtain acceptable levels of protection against Cercospora leaf spot under moderate and high disease severity.

The objective of this research was to evaluate the efficacy of Eminent in Tank mixes to control Cercospora leaf spot on sugarbeet.

MATERIALS AND METHODS

A field trial was conducted at Foxhome, MN in 2012. The experimental design was a randomized complete block with four replicates. Field plots comprised of six 30-feet long rows spaced 22 inches apart. Plots were planted on 10 May with Beta 89RR10. Seeds were treated with Tachigaren (45 g/kg seed) and Poncho beta. Seed spacing within the row was 4.7 inches. Weeds were controlled with two applications (24 May and 21 June) of glyphosate. Plots were inoculated on 3 July with grounded *C. beticola* inoculum not previously exposed to fungicides (Betaseed, Shakopee, MN).

Fungicide spray treatments were applied with a CO_2 pressurized 4-nozzle boom sprayer with 11002 TT TwinJet nozzles calibrated to deliver 17 gpa of solution at 60 p.s.i pressure to the middle four rows of plots. Quadris was applied to all plots on 22 May; all other fungicide treatments were initiated on 17 July. Most treatments were three fungicide applications on 17 July, 2 and 17 August. Treatments were applied at rates indicated in Table 1.

Cercospora leaf spot severity was rated on the leaf spot assessment scale of 1 to 10 (Jones and Windels, 1991). A rating of 1 indicated the presence of 1- 5 spots/leaf or 0.1% disease severity and a rating of 10 indicated 50% or higher disease severity. Cercospora leaf spot severity was assessed during the season. The rating done on 29 August is reported.

Plots were defoliated mechanically and harvested using a mechanical harvester on 27 September. The middle two rows of each plot were harvested and weighed for root yield. Twelve to 15 representative roots from each plot, not including roots on the ends of the plot, were analyzed for quality at the American Crystal Sugar Company Quality Tare Laboratory, East Grand Forks, MN. The data analysis was performed with the ANOVA procedure of the Agriculture Research Manager, version 8 software package (Gylling Data Management Inc., Brookings, South Dakota, 2010). The least significant difference (LSD) test was used to compare treatments when the F-test for treatments was significant.

RESULTS AND DISCUSSIONS

Environmental conditions were favorable for development of *C. beticola* and first symptoms were visible on 13 July. Fungicide treatments were initiated on July 17. Cercospora leaf spot progressed very rapidly in the non-treated check and reached economic injury level by early-August. By mid-August, the non-treated check had severe disease and a Cercospora leaf spot rating of 10 which was significantly greater than the fungicide treatments (Table 1). Eminent (tetraconazole), a triazole fungicide, has been used for Cercospora leaf spot control since 1999. By the

mid-2000s, Eminent was not providing the same high level of leaf spot control as it did in earlier years. Isolates (12.4%) collected from growers fields by agriculturists in 2005 showed increased resistance to tetraconazole (at >1 ppm). In this trial where Eminent was used in a mixture in the first application and followed by two fungicide applications at 14 day intervals, *C. beticola* was effectively controlled resulting in significantly higher tonnage, sucrose concentration, and recoverable sucrose than the non-treated check. The use of Eminent in a fungicide mixture may be one strategy to preserve its utility in a fungicide rotation program for effectively controlling *C. beticola* and managing fungicide resistance.

Table 1. Effect of Eminent in a mixture in a rotation program on Cercospora leaf spot control, and sugarbeet yield and quality at Foxhome, MN in 2012

Treatment*	CLS**	Stand Count Sept 27	Root Yield (t/A)	Sucrose (%)	SLM (%)	Recoverable Sucrose (lb/t)	Recoverable Sucrose (lb/A)	Net Rev ($/A)***
Eminent 13 fl oz + Topsin 7.6 fl oz/ Super Tin 8 fl oz + Topsin 7.6 fl oz/ Headline 9 fl oz	6.0	222	24.7	19.8	1.94	356	8,788	1,681
Eminent 13 fl oz + Super Tin 8 fl oz/ Headline 9 fl oz/ Super Tin 8 fl oz	5.0	216	24.0	20.4	2.03	366	8,727	1,667
Eminent 13 fl oz + Topsin 7.6 fl oz/ Super Tin 8 fl oz/ Headline 9 fl oz	6.0	225	23.7	20.3	1.89	369	8,717	1,670
Eminent 13 fl oz + Super Tin 8 fl oz/ Topsin 7.6 fl oz + Super Tin 8 fl oz/ Headline 9 fl oz	5.0	218	23.0	20.5	1.82	373	8,570	1,633
Eminent 13 fl oz + Topsin 7.6 fl oz/ Headline 9 fl oz/ Super Tin 8 fl oz	6.0	212	22.7	20.2	1.80	368	8,354	1,598
Eminent 13 fl oz + Super Tin 8 fl oz/ Super Tin 8 fl oz/ Headline 9 fl oz	5.0	223	23.7	19.7	2.00	353	8,352	1,592
Eminent 13 fl oz + Super Tin 8 fl oz/ Headline 9 fl oz/ Super Tin 8 fl oz + Topsin 7.6 fl oz	5.0	219	22.9	20.5	2.01	369	8,435	1,606
Nontreated Check	10.0	208	19.0	17.2	2.00	304	5,786	1,157
LSD (P=0.05)	0.8	NS	2.6	0.9	NS	18.8	959.5	192

*Treatments applied at 14 day intervals

**Cercospora leaf spot measured on 1-10 scale (1 = 1- 5 spots/leaf or 0.1% severity and 10 = 50% severity) on August 29.

***Net Revenue calculated by multiplying Recoverable Sucrose (lb/A) by $0.20 and subtracting estimated pesticide costs and application costs.

NS = Not Statistically different