EFFECT OF FUNGICIDES AND STARTER FERTILIZER ON PHYTOTOXICITY AND CONTROLLING RHIZOCTONIA ROOT ROT IN SUGARBEET

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Rhizoctonia root and crown rot, caused by *Rhizoctonia solani* Kühn, is currently the most devastating soil borne disease of sugarbeet (*Beta vulgaris* L.) in North Dakota and Minnesota. *R. solani* AG-2-2 IV and IIIB are considered the major root rot pathogen and AG-2-2, AG-4 and AG-5 cause damping off of sugarbeet seedlings endemic in soils where sugarbeet is grown. *R. solani* has a wide host range including broad leaf crops and weeds (Anderson 1982). Severe disease occurs if sugarbeet follows beans or potato (Baba and Abe 1966) and both of these crops are used in rotation in the bi-states. Crop rotations of three or more years with small grains planted before sugarbeet has significantly decreased over the past decade. Research showed that timely application of Quadris and Proline provided effective disease control when applied before infection takes place (Khan and Carlson, 2010). Headline and Quadris fungicides applied in-furrow has also shown to provide effective early season disease control. Many growers typically use a liquid starter fertilizer applied in-furrow at planting. There are reports that the use of fungicides mixed with starter fertilizer result in phytotoxicity.

The objective of this research was to determine the safety and effectiveness of mixing starter fertilizer (10-34-0) with different fungicides for controlling Rhizoctonia root rot in sugarbeet.

MATERIALS AND METHODS

Field trial was conducted in Hickson, ND in 2013. The site was inoculated on 28 May with *R. solani* AG 2-2 IIIB grown on barley. Inoculum was broadcast using a three-point mounted rotary/spinner type spreader calibrated to deliver 18 lbs/A of inoculum. The inoculum was incorporated with a Konskilde field cultivator to about the two-inch depth just before planting. The experimental design was a randomized complete block with four replicates. Field plots comprised of six 25-foot long rows spaced 22 inches apart. Plots were planted to stand on 14 June with SES 36917RR. Seeds were treated with Tachigaren at 45 g/kg seed to provide early season protection against *Aphanomyces cochlioides*, and Nipsit to provide protection against insect pests. Counter 20G was also applied at 8.9 lb/A at planting to control insect pests. Weeds were controlled with glyphosate on 25 June, 10 July, 19 July, 9 August and 22 August.

The fungicides and rates used are listed in Table 1. Treatments were applied as an in-furrow application. The in-furrow applications were made on 14 June (at planting) using 9.5 gal of spray solution/A. The Post applications were made 14 June and all plots received a Post application on 11 July of Quadris at 9.2 fl oz/A.

Stand counts were taken during the season and at harvest. The middle two-rows of plots were harvested on 29 October and weights were recorded. Samples (12-15 roots) from each plot, not including roots on the ends of plots, were analyzed for quality at American Crystal Sugar Company tare laboratory at 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

Planting was delayed by prolonged wet field conditions and planting was done when average daily soil temperature had already surpassed 65 F. Emergence was good but crop growth was slow because of late fertilization also delayed by wet conditions. Stand count was taken regularly and at harvest. Although the site had a history of *R. solani* and was also artificially inoculated about two weeks prior to planting, disease incidence was very low and did not impact plant population during the season or at harvest. Likewise, there were no significant differences in any of the yield parameters evaluated. No phytotoxicity symptoms were observed in the experiment.

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Table 1. Effect of fungicides and 10-34-0 starter fertilizer on plant stand, sugarbeet yield and quality at Hickson, ND 2013

Product and Rate in fl oz/A	18 July Stand Count	29 October Stand Count	29 October Yield	29 October Sucrose concentration	29 October Recoverable sucrose
	beets/100'	beets/100'	Ton/A	%	lb/A
Headline 12 fl oz + 10-34-0 3 gal	108	102	21.8	15.6	6,171
Quadris 9.2 fl oz + 10-34-0 3 gal	112	105	20.4	15.8	5,966
Vertisan 28.5 fl oz + 10-34-0 3 gal	121	125	19.4	16.2	5,834
Headline 12 fl oz	111	116	20.4	15.6	5,799
Quadris 14.3 fl oz + 10-34-0 3 gal	118	111	18.9	15.8	5,534
Vertisan 28.5 fl oz	114	109	18.8	15.7	5,432
10-34-0 3 gal	112	104	19.0	15.6	5,387
Quadris 14.3 fl oz	134	124	18.2	15.8	5,293
Quadris 14.3 fl oz*	105	106	17.4	16.3	5,263
LSD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**

*Treatment applied POST on day of planting instead of in-furrow. All Treatments also received a Quadris application on 11 July of 9.2 fl oz/a.