FUNGICIDE AND GLYPHOSATE MIXTURES

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Cercospora leaf spot (CLS), caused by the fungus Cercospora beticola Sacc., is the most economically damaging foliar disease of sugarbeet in Minnesota and North Dakota. The disease reduces root yield and sucrose concentration and increases impurity concentrations resulting in reduced extractable sucrose and higher processing losses (Smith and Ruppel, 1973; Khan and Smith, 2005). 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 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 (Miller et al., 1994) under moderate and high disease severity. Fungicides are typically first applied for control of *C. beticola* in late June or in July at which time there may be a need for a final glyphosate application to control any late emerging weeds. Growers will like to know if it is safe to use glyphosate with fungicides for weed and disease control simultaneously.

The objective of this research was to determine if fungicides mixed with glyphosate will be safe to the sugarbeet crop and if it adversely impacts sugarbeet yield and quality.

MATERIALS AND METHODS

A field trial was conducted at Hickson, ND in 2016. The experimental design was a randomized complete block with four replicates. The field was prepared by the cooperator on 1 May. Field plots comprised of six 30-foot long rows spaced 22 inches apart. Plots were planted to stand on 6 May with Hilleshog 4094RR. Seeds were treated with Tachigaren at 45 g/kg seed to provide early season protection against *Aphanomyces cochlioides*, Poncho Beta and Vibrance for protection against Rhizoctonia. Counter 20G was also applied at 9 lb/A at planting to control insect pests. Weeds were controlled on 9 June, and 7 July using glyphosate. Fungicides were applied to control Cercospora leaf spot on 25 July, 12 and 24 August.

The fungicides used are listed in Table 1. Treatments were applied as a broadcast application. The applications were made on 27 June at the 12 leaf stage using 17 gal of spray solution/A.

Stand counts were taken during the season and at harvest. The middle two-rows of plots were harvested on 27 September 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

Plots were evaluated for signs of phytotoxicity (leaf burn, leaf curl, spotting, stunting etc) after applications of the glyphosate and fungicide mixtures and compared with the glyphosate+Powermax+Class Act NG treatment. None of the treatments resulted in any adverse effects on plant foliage. There were no significant differences in plant stand at harvest, yield, sucrose concentration on recoverable sucrose among treatments. The results indicated that it was safe to mix glyphosate with fungicides since it did not adversely impact the plants (no phytotoxicity), stand, yield or any of the quality parameters evaluated.

References

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Table 1. Effect of fungicide-glyphosate mixtures at Hickson, ND in 2016

Product and Rate in fl oz/A	21 June Stand Count	27 September Stand Count	27 September Yield	27 September Sucrose concentration	27 September Recoverable sucrose
	beets/100'	beets/100'	Ton/A	%	lb/A
Roundup Powermax + Class Act NG	165	171	31.4	16.1	9,070
Roundup Powermax + Class Act NG + Agri Tin + Topsin	183	174	31.3	16.9	9,605
Roundup Powermax + Class Act NG + Inspire XT	168	174	33.0	16.5	9,761
Roundup Powermax + Class Act NG + Proline	183	182	32.5	16.9	10,010
Roundup Powermax + Class Act NG + Priaxor	184	181	33.5	17.4	10,668
Roundup Powermax + Class Act NG + Minerva Duo	176	188	32.8	16.3	9,570
Roundup Powermax + Class Act NG + Gem	184	186	33.1	16.7	9,952
Roundup Powermax + Class Act NG + Stinger + Agri Tin + Topsin	192	208	33.2	16.5	9,910
LSD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**