

EFFECT OF NITROGEN RATES, VARIETIES, AND FUNGICIDES IN SUGAR BEET YIELD AND QUALITY

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North Dakota and Minnesota together produce 60% of the United States sugar beet (*Beta vulgaris* L.) crop of which over 97% is glyphosate tolerant. The objective of this research was to determine the effect of nitrogen rates, cultivars, and fungicides on glyphosate tolerant sugar beet yield and quality. Research was conducted at Foxhome, Minnesota in 2010 and 2011. The experimental design was a split-split plot arranged as a randomized complete block design with four replicates. There were four levels of the whole plot factor, nitrogen rates (78, 112, 146 and 180 kg/ha); two levels of the subplot factor, varieties, (HH 4022RR and Crystal 768RR); and five levels of the sub-subplot factor, fungicides (Inspire XT, Headline, Eminent, Proline and non-treated check). Individual plots comprised of six 9 m long rows spaced 0.6 m apart. Nitrogen was incorporated just prior to planting. Weeds were controlled with multiple applications of glyphosate. Single applications of fungicides for their effect on yield and quality were applied on August 20 and 22 in 2010 and 2011, respectively. In 2011, thiophanate methyl was applied in July to the entire experiment to prevent infection by *C. beticola*. Roots were harvested and weighed in late September. There were no significant interactions among the factors evaluated. In both years, N rates of 112 to 180 kg/ha resulted in significantly higher recoverable sucrose compared to 78 kg/ha; variety HH 4022RR produced higher recoverable sucrose than Crystal 768RR; and in 2010, in the presence of severe *Cercospora* leaf spot, fungicides resulted in significantly higher recoverable sucrose compared to the non-treated check, but in 2011, when *Cercospora* leaf spot was not a problem, there were no significant differences in recoverable sucrose between the non-treated check and any of the fungicide treatments. Results suggest that current recommendation for N of 146 kg/ha is still effective; the variety with more resistance to *Cercospora beticola* had greater yields; and fungicides are only necessary in the presence of disease.