SUGAR BEET RESPONSE TO FOLIAR APPLICATIONS OF MAGNESIUM THIOSULFATE AND NITROGEN FERTILIZERS

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Objective

Compare the effects of different levels of foliar applications of N-Sure® and MagThio® fertilizers on the yield and quality of sugar beet.

N-Sure is a liquid nitrogen (N) formulation that provides 28-0-0 in a slow-release form. As a foliar application, N-Sure is intended to act as a humectant that keeps leaf surfaces moist, allowing sufficient time for direct uptake of N into the leaf tissue.

MagThio is a liquid formulation of magnesium (Mg) and sulfur (S) in the form of magnesium thiosulfate that provides 0-0-0-10S-4Mg.

Materials and Methods

A field study was initiated during fall 2019 in a field near Ontario, Oregon, previously planted to wheat. The predominant soil was a Greenleaf silt loam with a pH of 7.2 and 1.79% organic matter. Wheat stubble was flailed and the field was irrigated and disked in August 2019.

Following the ground work, fertilizer was broadcast according to a soil analysis to provide 100 lb/acre of nitrogen (N), 100 lb/acre of phosphorous, 200 lb/acre of elemental sulfur, 9 lb/acre of manganese, and 2 lb/acre of boron; the field was then plowed. After plowing, the field was groundhogged, then fumigated with Vapam® at 15 gal/acre and bedded at 22 inches.

On April 7, 2021, beds were harrowed. The field was planted on April 17 with 'BTS 251 RR' seed. The first irrigation was on April 20. Emergence was observed on April 26.

All plots were sprayed with glyphosate at 32 fl oz/acre plus Outlook® at 21 fl oz/acre on May 7. Poast® at 1.5 pt/acre was applied on May 13 for grass control. On May 27, the field was sidedressed with 225 lb/acre of N. On July 13, Proline® at 5.7 fl oz/acre was applied for control of powdery mildew.

The experiment was arranged as a randomized complete-block design with four replications of each treatment. Individual plots were 7.33 ft wide (4 rows) by 25 ft long. The experiment used two rates of a combination of N-Sure and MagThio and a grower standard that had no additional fertilizer applied. One treatment used N-Sure at 1 qt/acre and MagThio at 1 qt/acre. The second used N-Sure at 1 qt/acre and MagThio at 1 pt/acre. Applications were made on July 16, July 24,

July 31, and August 10 with a CO_2-powered backpack sprayer with a four-nozzle boom with 11004 nozzles at 30 psi and 35 gal/acre.

The beets were topped on September 21 and harvested on September 24. Beets from the middle two rows of each plot were harvested. After harvest, the beets were taken to the Amalgamated Sugar Refinery, Nampa, Idaho, for analysis.

Results and Conclusions

There were no statistically significant differences among the treatments in root yield, sugar content, or sugar yield. Yields were numerically greater with the higher levels of MagThio. The yield for the low rate was approximately 3% higher than yield for the grower standard, and the yield for the high rate was approximately 7% higher than the yield for the grower standard. The sugar yield for the low rate of MagThio was 4.4% greater than the yield for the grower standard, and the sugar yield for the high rate was 7.1% greater than for the grower standard.

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Table 1. Yield and quality results for sugar beets treated with different concentrations of MagThio® and N-Sure®, compared with sugar beets receiving a grower-standard fertilizer treatment, Malheur Experiment Station, Ontario, Oregon, 2020. Results are means ± standard errors of the mean.

Treatment	Yield	Sugar content	Sugar yield
	ton/acre	%	ton/acre
High MagThio + N-Sure	53.60 ± 1.45	15.15 ± 0.24	8.13 ± 0.29
Low MagThio + N-Sure	51.47 ± 2.20	15.37 ± 0.23	7.92 ± 0.44
Grower standard	50.10 ± 2.87	15.14 ± 0.09	7.59 ± 0.47