

Sugar Enhancement Trial

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The sugar content and purity of a beet crop is a major factor in how efficiently the factory can operate and ultimately how profitable the sugar beet crop will be to the shareholders. The SMBSC growing area has struggled to increase the sugar content of the beet crop in recent years. The impact of finding a product that could substantially increase the sugar content of the beet crop would be a monumental achievement.

Research Objective

- Low sugar content has hindered the SMBSC beet payment in recent years. Several products currently available were tested in this trial to evaluate their ability to improve the sugar content of the crop.

Methodology

A trial was conducted near Clara City to screen products that may have the ability to improve sugar content. The trial was planted on June 6th using Crystal M089. Normal agronomic practices were used to keep the trial weed and disease free. This trial was designed as a randomized complete block with four replications and twelve treatments (Table 1). Applications were made using a custom-made tractor mounted sprayer traveling 2.1mph with a spray volume of 30gpa and 60psi, utilizing XR11002 spray nozzles. Each plot consisted of six rows that were 35ft in length. The sprayer used CO₂ as a propellant and was designed to apply the treatment to the center four rows, leaving rows one and six untreated. The center two rows of each six-row plot were harvested for yield and quality analysis on September 30th using a six-row defoliator and a two-row research harvester. The beets harvested from the center two rows were weighed on the harvester and samples of those beets were used for a quality analysis at the SMBSC tare lab. The data was analyzed for significance using SAS GLM version 9.4.

Results

Significant differences were observed between treatments in all yield parameters, except for extractable sugar per acre (Table 2). Treatments 2 and 3 had significantly lower quality parameters than the control treatment but had no impact on tons per acre. Treatments 4 – 7 and 12 were not any different than the control treatment for any parameters. Treatments 8 – 11 had significantly higher quality parameters than the control, however, these treatments generally had lower tons per acre than the control. Some visual differences were observed in the foliage of treatments 8 and 10 (Photo 1).

Table 1. Description of treatments in the Sugar Enhancement Trial.

Trt #	Product	Rate/Acre	Application Code
1	Control	n/a	n/a
2	Trinexapac-ethyl	64 oz	Sept. 1
3	Trinexapac-ethyl	64 oz	Aug 14 and Sept. 1
4	Terramar	1 gal	July 15 and Sept. 1
5	FP-20	1 gal	15-Jul
	Sure K	1 gal	15-Jul
6	FP-20	1 gal	15-Jul
	Sure K	1 gal	15-Jul
	FertiRain	1 gal	15-Jul
7	K-Express	3 pints	Sept. 1
8	Proprietary product	142.2 oz	Aug 14 and Sept 1
9	Proprietary product	284.4 oz	Sept. 1
10	Proprietary product	71.1 oz	Aug. 14
11	Proprietary product	71.1 oz	Sept. 1
12	Proprietary product	71.1 oz	Sept. 14

Table 2. Yield parameter results for the Sugar Enhancement Trial.

Treatment	Sugar	Tons per Acre	Percent Extractable Sugar	Extractable Sugar per Ton (lbs.)	Extractable Sugar per Acre (lbs.)	Percent Purity
1	14.0 d	29.9 abc	10.8 e	215.1 e	6423.7	85.6 d
2	12.3 e	30.2 abc	9.2 f	184.3 f	5580.9	84.7 e
3	12.6 e	32.5 a	9.4 f	188.1 f	6114.3	84.1 e
4	13.8 d	30.2 abc	10.7 e	213.0 e	6425.5	85.8 d
5	14.1 d	29.6 abc	10.8 e	216.5 e	6297.1	85.5 d
6	14.0 d	30.6 ab	10.9 e	217.5 e	6649.6	86.0 bcd
7	14.0 d	29.0 bcd	10.9 e	217.3 e	6298.2	85.8 cd
8	16.2 a	21.8 f	12.9 a	257.2 a	5588.7	86.8 a
9	15.4 b	25.2 e	12.1 b	242.0 b	5922.7	86.5 ab
10	15.0 bc	27.2 cde	11.7 bc	234.9 bc	6376.4	86.4 abc
11	14.7 c	26.2 de	11.4 cd	228.6 cd	5980.3	85.9 cd
12	14.2 d	30.0 abc	11.0 de	220.4 de	6469.0	86.1 bcd
Mean	14.2	28.5	11.0	219.6	6173.7	85.8
CV%	2.0	7.8	2.7	2.6	8.3	0.5
Pr>F	<.0001	<.0001	<.0001	<.0001	0.1154	<.0001
Isd(0.05)	0.4	3.2	0.4	8.4	ns	0.6

Conclusions

Many foliar nutrient products have been tested in the past to improve the sugar content of sugar beets here at SMBSC and in other sugar beet production areas. None of these foliar nutrient products have been able to meaningfully increase sugar content with any consistency. Treatments 4 – 7 would fall into that category. Other products known as plant growth regulators have also been tested on sugar beets. These products have generally resulted in a negative impact on yield or quality; similar to treatments 2 and 3. However, in one year of data it appears that a proprietary product (treatments 8 – 12) has shown a positive impact on the quality. Unfortunately, it appears that this product may also have a negative impact on tons. Further work will be done with this product to evaluate its effectiveness on improving sugar content while maintaining tons per acre.

Photo 1. Drone image of Sugar Enhancement Trial taken September 28th. Plot picture of treatment 8 taken on September 20th.

