Nitrogen rate study conducted at Imperial Valley Research Center 2016 – 2017.

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Objective: To collect more N rate response information for sugar beet grown in the Imperial Valley of California.

Methods: This study was conducted at the Imperial Valley Research Center located near Brawley, California during the 2016 – 2017 growing season. Sugar beet was planted October 13, 2016 and harvested July 4, 2017. The previous crop was one year of alfalfa and the sugar beet variety planted was Beta 52RR45. There were eight nitrogen rate treatments with six replications. For statistical analysis, replications 5 and 6 were discarded because of watering and disease issues. The experiment design was a randomized complete block. Before planting 200 pounds of 11-52-0 per acre was applied. This provided a uniform application of 22 lb N/acre to the plots. Soil samples are taken pre-plant, (Table 1). The total nitrate-N + N in phosphate fertilizer application was 60 lb N per acre. The nitrogen treatments of 0, 40, 80, 120, 160, 200, 240, and 280 lb N/acre were applied as UAN (32-0-0) at layby on November 11, 2016. Beet petioles were taken from the most recently mature leave mid-February, 2017. The root quality was determined in the Spreckel's Sugar quality lab.

Table 1. Soil test results for pH, nitrate-N, phosphorus, and potassium, Fall 2016.

Soil test	Amount
pH (6 inch depth unitless)	8.1
Nitrate-N (4 feet depth lb/A)	38
Phosphorus (6 inch depth ppm)	28
Potassium (6 inch depth ppm)	333+

Results:

Table 2 reports the harvest results from this study. There was no significant response to the use of nitrogen fertilizer for root yield and root rot in this study. The root yield averaged 66.5 tons per acre. The addition of N did not affect the occurrence of root rot.

The root quality parameters of sucrose concentration, extractable sucrose concentration, extractable sucrose per ton, extractable per acre, and purity were significantly decreased by the addition of nitrogen fertilizer. The root sucrose concentration and extractable sucrose concentration were reduced 2 % by the application of N. Extractable sucrose per ton was reduced 37 lb per ton and extractable sucrose was reduced 1867 lb sucrose per acre.

Petiole nitrate-N and beet nitrate-N were increased with increasing N application. These parameters indicate that N was the causal factor for the reduction in sucrose.

Table 2. Means and statistical analysis of the effect of N application to sugar beet.

N rate	Root yield	Sucrose	Extractable sucrose			Purity	Beet nitrate-N	Petiole-nitrate-N	Root rot
lb N/A	ton/A	%	%	lb/ton	lb/A	%	----- ppm ----		Number in harvest area
0	64.6	15.4	12.5	250	16145	88.7	67	743	1.0
40	66.4	15.3	14.5	249	16535	88.7	115	690	0
80	65.4	14.8	12.0	240	15649	88.3	88	1018	1.0
120	67.3	14.6	11.7	234	15750	88.0	121	1449	0.3
160	65.8	14.9	12.1	242	15922	88.3	69	1724	0.5
200	67.2	13.9	11.1	222	14879	87.6	145	1969	0
240	67.8	14.2	11.3	226	15319	87.5	129	2001	0.8
280	67.2	13.5	10.6	213	14278	87.1	178	1684	0.5
Statistical Analysis									
Nrate	0.77	0.0007	0.0008	0.001	0.02	0.06	0.002	0.0001	0.31
C.V. (%)	4.3	3.7	4.9	4.9	4.9	0.9	29.0	26.0	142
Grand mean	66.5	14.6	11.7	234	15560	88.0	114	1410	0.5

Summary:

There was no root yield response to the application of N fertilizer at this site. We raised 65 ton per acre sugar beet roots with only 60 lb nitrate-N in the surface 4 feet plus fertilizer plus the contribution from the previous crop of alfalfa. At this time, a value for the contribution from the previous crop of alfalfa is unknown because the study was not set up to answer that question. With the addition of N fertilizer, the quality parameters were reduced. There was no reason to apply N fertilizer at this site.