

NITROGEN MANAGEMENT FOR PROFITABLE SUGARBEET PRODUCTION

Larry J. Smith, Head, and Albert L. Sims, Associate Professor
Northwest Research and Outreach Center, U of M, Crookston, MN

Nitrogen (N) management is a key factor in sugarbeet profitability in a quality-based payment system. Over the past 25 years, numerous trials on N management have been conducted in Minnesota, North Dakota and Manitoba. Early trials stressed maximizing tonnage with little real concern for quality, due to the payment system in place at that time. Changes to payment systems based on recoverable sugar per acre (RSA) and later to recoverable sugar per ton (RST) of processed sugarbeet has placed greater emphasis on quality rather than tonnage, which can have a far greater effect on profitability. Sugarbeet varieties planted today are also much different than those planted 20 years ago and may well require a different N management system. Results of these N trials over the past 25 years indicated a need to revise N recommendations in MN and ND. In 2001, both states lowered the N recommendations (see article in Research Report or Pocket Guide) and made other pertinent revisions. Nitrogen trials continue to be run at various locations to validate recommendations and serve as a basis for further changes. As part of this long term and continuing process, an N rate trial was conducted at the Northwest Research and Outreach Center, Crookston, MN in 2002.

Procedure: A fall nitrate test indicated 48 lb NO₃-N/A in the 0-24 inch soil profile and 11 lb/A in the 24-48 inch profile. Zero, 40, 80, 120, 160, and 200 lb N/A as well as the recommendation rate of urea were applied to treatments in a randomized block design on May 14, 2002. Eighty pounds of 0-46-0 were broadcast to bring the phosphate to recommended levels. Beta 6600 sugarbeet seed was planted in 22-inch rows on May 14, 2002 and thinned to a uniform population of 35640 seedlings per acre on June 19. The trial was harvested September 23 and quality determined at the American Crystal Quality Laboratory in East Grand Forks, MN.

Results and Discussion: Results of the trial are shown in [Table 1](#). A significant increase in yield occurred with the addition of the first 40 lb N/A. No further increase in yield was realized with additional N. Percent sucrose was maximized with the addition of 40 lb N/A. Levels above this decreased sucrose content, recoverable sugar per ton and gross return. The new N recommendation compares favorably with this treatment.

Results of this trial and others reported in this publication would support the decision made in 2001 to reduce the nitrogen recommendation for profitable sugarbeet production. Some soil testing companies report N recommendations based on both the new and the old N recommendations. Make sure you are using the new recommendations when you are applying N for 2003 sugarbeet production.

Table 1. Sugarbeet response to various N levels

N Applied (lb/A)	Nitrogen Total ² (lb/A - 0-4')	Yield (T/A)	Sucrose (%)	LM (%)	Recoverable sucrose		Gross Return ³	
					(lb/A)	(lb/T)	(\$/T)	(\$/A)
0	59	18.8	14.98	1.25	5147	274.5	28.87	542
40	99	20.7	15.45	1.28	5889	283.5	30.93	641
80	139	20.9	15.25	1.33	5815	278.5	29.78	622
120	179	20.7	14.95	1.38	5615	271.5	28.18	583
160	219	21.3	14.75	1.38	5688	267.5	27.26	580
200	259	20.9	14.63	1.48	5492	263.0	26.23	548
71 ¹	130	20.9	15.40	1.30	5907	282.0	30.59	640
LSD ₀₅		1.6	0.54	0.19	544	12.6		

¹ Current N Recommendation from U of M and NDSU (130-Total N in 0-4 ft depth)

² Soil Test N plus applied.

³ Basis - ACSC November 15, 2002 payment schedule.