

## A 5-Year History of Sugarbeet Production On Various Soil Types as Affected by Total Nitrogen Available to the Crop For the Period 2000-2004

Nitrogen management has been a focus of American Crystal Sugar Company growers and the Agriculture Department for over 25 years. No other aspect of sugarbeet production has been evaluated more in university research. Most recent university recommendation changes were made in 2001. Keep in mind that these recommendations are of necessity for 750,000 acres of beets in seven factory districts in Minnesota and North Dakota. Growers, agriculturists and crop consultants must then work together to make minor adjustments to get N rates correct for every field sugarbeets are raised on.

### Factors Influencing N Management:

1. Soil test values
2. Soil type
3. Planting Date
4. Harvest date
5. Soil organic matter and mineralization
6. Headlands versus rest of field
7. Variety selection, RSA vs. RST
8. Weather if you can predict it
9. Previous crop history for each field

**Soils in this group include:** Bearden Association, Bearden-Antler/Saline, Bearden-Colvin Association, Gardena-Overly Association, Glyndon Association, Ojata Association and Overly-Boetia-Bearden Association.

### Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)

**Table 1: SOILS ON GLACIAL LAKE PLAINS (silt loams)**

Total N( lbs) 0-4 ft.	# of Fields	Harv Acres	Yield (T/A)	Sugar (%)	SLM (%)	Rec Sugar lbs/Ton	Rec Sugar lbs/Acre	Rev Per Acre
0-90	235	15753	20.2	17.82	1.32	330	6666	\$850
91-110	855	60204	19.9	17.87	1.29	332	6607	853
111-130	5105	367322	19.8	17.86	1.23	333	6593	847
131-150	4070	305595	20.1	17.84	1.25	332	6673	846
151->	2557	181285	20.3	17.62	1.4	324	6577	827

### Points to Consider From Table 1:

- Only minor differences in RSA exist between nitrogen groups
- 91-110 is best revenue per acre
- There is certainly no need to have more than 130 lbs/acre available N
- Consider 10 to 40 lbs/acre less N to increase quality without loss of yield
- Potential fertilizer savings can be realized
- Balanced varieties should perform well on these soils
- Consider zone soil sampling and variable rate N management

**Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)**

**Table 2: SOILS ON GLACIAL LAKE PLAINS (heavy texture, clays)**

Total N (lbs) 0-4 ft.	# of Fields	Harv Acres	Yield (T/A)	Sugar (%)	SLM (%)	Rec Sugar lbs/Ton	Rec Sugar lbs/Acre	Rev Per Acre
0-90	62	4739	18	18.13	1.29	337	6066	\$777
91-110	270	19931	19	18.16	1.25	338	6422	837
111-130	2863	203090	18.8	18.04	1.23	336	6317	818
131-150	2369	173554	19.4	18.03	1.25	336	6518	831
151->	1192	83515	19.4	17.89	1.36	331	6421	814

**Soils in this group include:** Elmville-Donaldson Association, Fargo Association, Fargo-Bearden-Galchutt Association, Fargo-Hegne Association, Hegne-Northcote Association, Hegne-Viking Association, Northcote Association, and Ryan-Fargo Association.

**Points to Consider From Table 2:**

- 0-90 lb category has too few fields to make sound conclusions
- The best RSA is from 131-150 lbs total available N
- The best revenue/acre at 91-110
- Growing maximum tons/acre may not be achieved with lower N use rates
- Slightly more available N may not reduce quality appreciably
- Tonnage type varieties may have acceptable quality on these soil types
- Consider zone soil sampling and variable rate N management

**Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)**

**Table 3: SOILS ON DELTAS AND BEACHES**

Total N (lbs) 0-4ft.	# of Fields	Harv Acres	Yield (T/A)	Sugar (%)	SLM (%)	Rec Sugar lbs/Ton	Rec Sugar lbs/Acre	Rev Per Acre
0-90	17	882	21.6	17.74	1.23	330	7128	\$881
91-110	60	3648	21.1	17.88	1.27	332	7005	879
111-130	303	18985	19.4	17.85	1.23	332	6441	832
131-150	271	16621	20.1	17.73	1.24	330	6633	842
151->	220	11838	20.5	17.45	1.37	322	6601	803

**Soils in this group include:** Arvilla-Sandberg Association, Arvilla-Wyndmere-Embden Association, Embden-Inkster Association, Hecla-Arveson Association, Viking-Donaldson-Glyndon Association, Wheatville Association, Wyndmere-Embden Association, and Wyndmere-Tiffany-Arveson Association.

**Points to Consider From Table 3:**

- A total of less than 90 or 91-110 lbs of total available N maximized RSA and revenue/acre, but limited acres to make a decision from
- Strongly consider not exceeding 110 lbs per acre unless tons/acre have been low
- Providing in excess of 110 lbs/acre total available N will likely reduce quality
- Consider high quality varieties if tons per acre usually are excellent
- Consider zone soil sampling and variable rate N management

**Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)**

**Table 4: SOILS ON INTERBEACH AREAS**

Total N (lbs) 0-4 ft.	# of Fields	Harv Acres	Yield (T/A)	Sugar (%)	SLM (%)	Rec Sugar lbs/Ton	Rec Sugar lbs/Acre	Rev Per Acre
0-90	12	821	17.7	17.61	1.26	327	5788	\$706
91-110	91	4970	19.6	18.10	1.32	336	6586	863
111-130	363	20478	19.7	17.68	1.24	329	6481	825
131-150	271	15085	19.6	17.79	1.26	331	6488	825
151->	156	8191	20.1	17.69	1.33	327	6573	830

**Soils in this group include:** Arveson-Ulen Assoc., Bohnsack-Lankin Assoc., Embden-Glyndon-Egeland Assoc., Enstrom-Grygla Assoc., Flaming-Hamar Assoc., Hamerly-Gilby-Tonka Assoc., Karlstad-Markey-Corliss Assoc., Lohnes-Syrene-Hangaard Assoc., Renshaw-Brantford-Claire Assoc., Roliss-Kittson Assoc., Rosewood-Ulen-Flaming Assoc., Serden-Maddock Assoc., Sioux-Syrene Assoc., Svea-Buse-Hamerly Assoc., Viking-Roliss Assoc., Walsh Assoc.

**Points to Consider From Table 4:**

- Very little difference exists between available N categories above 90 lbs/acre limited fields in 91-110 group, but revenue per acre is very good
- Choose lower N fertilization rates on the coarser textured soils of this group
- It would be questionable to use more than 130 lbs/acre N on these soils unless tons/acre production history has been low
- Fields in these Interbeach areas may be highly variable
- Zone soil testing and variable rate N management should be considered

**Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)**

**Table 5: SOILS ON BREAKS AND BOTTOM LAND**

Total N (lbs) 0-4 ft.	# of Fields	Harv Acres	Yield (T/A)	Sugar (%)	SLM (%)	Rec Sugar lbs/Ton	Rec Sugar lbs/Acre	Rev Per Acre
0-90	11	700	21.9	17.79	1.43	327	7161	\$890
91-110	43	2551	18.4	17.89	1.32	331	6090	779
111-130	251	13705	20.2	17.78	1.34	329	6646	841
131-150	204	10753	20.2	18.18	1.33	337	6807	886
151->	162	8426	20.1	17.75	1.42	327	6573	847

**Soils in this group include:** Deerwood Assoc., La Prairie-Nutley-Fairdale, Ladelle-Cashel Assoc., Nutley-Aberdeen Assoc.

**Points to Consider From Table 5:**

- The two low N categories contain quite limited acres to draw solid conclusions
- Maximum RSA was achieved at 131-150 lbs/acre available N
- Excellent revenue per acre at 131-150 lbs/A
- More than 150 lbs/acre N definitely reduced RSA
- Consider zone sampling and variable rate N management

**Total Nitrogen 0-4ft by Soil Type - 5 Year Summary (2000 - 2004)**

**Table 6: SOILS ON GLACIAL TILL PLAINS**

<b>Total N (lbs) 0-4 ft.</b>	<b># of Fields</b>	<b>Harv Acres</b>	<b>Yield (T/A)</b>	<b>Sugar (%)</b>	<b>SLM (%)</b>	<b>Rec Sugar lbs/Ton</b>	<b>Rec Sugar lbs/Acre</b>	<b>Rev Per Acre</b>
0-90	6	605	19.5	17.42	1.09	327	6377	\$769
91-110	68	5818	20.6	17.74	1.16	332	6839	867
111-130	307	22891	20.1	17.78	1.16	332	6673	851
131-150	226	18278	19.7	17.65	1.18	329	6481	822
151->	81	6649	21.5	17.58	1.23	327	7031	878

**Soils in this group include:** Barnes Assoc., Birchlake-Audubon-Foxlake Assoc., Emrick-Heimdal Assoc., Farmdale-Langhei-Flom Assoc., Hamerly-Tonka-Wyard-Assoc., Hamerly-Vallers Assoc., Hedman-Fram-Heimdal Assoc., Mcintosh-Winger-Assoc., Nebish-Beltrami-Shookes Assoc., Percy-Fram Assoc., Roliss-Nereson Assoc., Svea-Brnes Assoc., Waukon Assoc.

**Points to Consider From Table 6:**

- The lowest rate category has too few fields to draw any conclusions
- Excellent revenue per acre at 91-110 and greater than 151 lbs/A
- Using over 150 lbs/A has risk for poor quality and much increased fertilizer costs
- Strongly consider past successful cropping history to manage N fertilization
- Use of zone sampling and variable rate N management should be considered

For further information on nitrogen management for sugarbeet see these sources:

- American Crystal Sugar Company Blue Book reports
- Annual Pocket Production Guides
- Annual Sugarbeet Research and Extension Reports also available at [www.sbreb.org](http://www.sbreb.org)
- Past American Crystal Sugar Company Ag Notes, archived at [www.crystalsugar.com](http://www.crystalsugar.com)
- Fertilizing Sugarbeet In Minnesota and North Dakota, U of MN Extension Circular.
- Your agriculturist
- University research and extension specialists
- Your crop consultant or fertilizer dealer