CATTANACH, A. W., J. A. LAMB*, and D. HILDE. North Dakota State Univ., 203 Waldron Hall, Fargo, ND 58105, NW Experiment Station, Univ. of Minnesota, Crookston, MN 56716, and American Crystal Sugar Co., Inc., Moorhead, MN 56560. - Sugarbeet nitrogen management for maximum profit and environmental protection.

Sugarbeet production practices have changed drastically in the last two decades in Minnesota and North Dakota. Changes in grower payment systems in 1980 and 1982 mandated change to production of high sugar content, low impurity sugarbeets. Development, refinement, and extensive use of the soil nitrate-N test, varietal selection, and optimal plant populations in concert with the sugar company quality payment program resulted in greatly reduced N fertilizer use (29,510,000 kg N per year) while increasing sugar yield 1771 kg per ha. The number of sugarbeet fields soil-sampled for nitrate-N increased from 28% in 1979 to 70% in 1989, while the value of one Mg of sugarbeet increased $8.28.

Lauer, Joseph G.* University of Wyoming, UW-REC, 747 Road 9, Powell, WY 82435. Plant density and N rate effects on sugar beet (*Beta vulgaris* L.) harvest timing.

Adoption of an early harvest option in the grower-processor contract may require management adjustments for early harvested fields. The objectives of this study were: 1) To describe sugar beet yield and quality response to harvest timing, and 2) To determine optimum soil N and plant density for early versus late harvest. In 1989 and 1990, experiments were conducted at Powell, WY on a Garland clay loam (fine, mixed, mesic Typic Haplargid). Ammonium nitrate (34-0-0) was applied at rates of 0, 112, 168, 224, 280 and 336 kg N ha^{-1}. Sugar beet plant densities of 37100, 61800, 86500, and 111200 plants ha^{-1} were established. Harvests were at two or three week intervals, beginning 13 September and ending 25 October. Increasing applied N increased root yield from 34.0 to 54.7 Mg ha^{-1}, sucrose loss to molasses from 7.00 to 9.19 g kg^{-1}, and recoverable sucrose from 5.35 to 8.28 Mg ha^{-1}. Increasing applied N decreased sucrose content from 164 to 159 g kg^{-1}. Increasing plant density decreased sucrose loss to molasses from 8.51 to 7.53 g kg^{-1}. Increasing plant population increased sucrose content from 160 to 164 g kg^{-1} and recoverable sucrose from 7.37 to 7.67 Mg ha^{-1}. Plant density had no effect on root yield. Later harvest increased root yield from 44.7 to 51.8 Mg ha^{-1}, sucrose content from 145 to 175 g kg^{-1}, and recoverable sucrose from 6.08 to 8.64 Mg ha^{-1}. Later harvest decreased sucrose loss to molasses from 8.30 to 7.82 g kg^{-1}. No significant plant density X harvest interactions were observed. Significant applied N X harvest interactions were observed where recoverable sucrose increased more with later harvest at high applied N rates (6.50 to 9.91 Mg ha^{-1} at 336 kg N ha^{-1}) than at low applied N rates (6.40 to 8.08 Mg ha^{-1} at 112 kg N ha^{-1}). No changes in applied N rate and plant density management are necessary for early versus late harvest.