SMITH, LARRY J.[1], and DOUGLAS W. RAINS[2]*, [1]Northwest Experiment Station, University of Minnesota, Crookston, MN 56716 and [2]American Crystal Sugar Company, Crookston, MN 56716. Effect of three years of grid soil sampling and variable rate nitrogen application on sugarbeet yield and quality in the northern Red River Valley.

The conventional soil test of 20-30 random soil cores (0-4 ft) per field and a single blanket application of nitrogen (N) may result in underfertilization of areas in a field needed to optimize yield, and overfertilization of other areas resulting in reduced quality. Grid soil sampling coupled with variable rate N application should provide for a more balanced N fertility program. The objective in these trials was to 1) determine variability in nitrate-nitrogen NO_3-N levels (0-4 ft) across three fields used in commercial sugarbeet production and 2) determine if variable rate N application, based on grid soil sampling versus random soil sampling and single rate N application would increase yield, quality and profitability. Variability in NO_3-N levels (0-4 ft) across the commercial field used in the 1994, 1995 and 1996 trials ranged from 34-238, 45-144, and 25-643 lb/A respectively. If the conventional random soil test and single rate N application recommendation was followed, the fields would have been underfertilized by 79, 65 and 55 % respectively. Variable rate N application based on grid soil samples increased recoverable sucrose 573, 434 and 756 lb/A respectively.