

MORAGHAN, JOHN T.*, and KEVIN HORSAGER, Department of Soil Science, North Dakota State University, Fargo, ND 58105. - Fate of fall-applied nitrogen fertilizer in the Red River Valley.

Most N fertilizer for sugarbeet production in the Red River Valley is applied in the previous autumn. Fall application of N fertilizer is not recommended in many areas of the northern United States because of (a) possible losses due to denitrification, and/or (b) leaching losses with an increased likelihood of groundwater NO_3^- -N contamination. The fate of late fall-applied, N15-labelled urea-N ($75 \text{ lb N acre}^{-1}$ in 1989 and $100 \text{ lb N acre}^{-1}$ in 1990 and 1991), added to the upper 3 inches of soil, was studied the following year in silty clay (1990) and loam (1991 and 1992) soils. Growing season rainfall was 10.97, 18.46 and 13.33 inches in 1990, 1991 and 1992, respectively. The moisture content of the soils at planting was close to the field capacity. The fertilizer N present in tops, storage roots and soil was measured after the sugarbeet harvest. Recoveries of fertilizer N were 98, 96 and 91%, respectively, in 1990, 1991 and 1992. Less than 7% of the fertilizer N was located below the 2-foot depth. In contrast, 28, 22 and 26% of the fertilizer N was located in the upper 6 inches of soil in 1990, 1991 and 1992, respectively. Associated in situ cylinder experiments showed that fertilizer N was leached below 2 feet early in the growing season in 1992 and especially in 1991. Availability of fertilizer N for early-season growth was limited in the extremely wet 1991 season. The deep-rooting sugarbeet crop, however, absorbed this leached N later in the season. Fall application of fertilizer N at recommended rates to "clay" and "loam" soils is unlikely to result in appreciable NO_3^- -N contamination of groundwater in the Red River Valley.