

EFFECT OF POTASSIUM RATES AND PLACEMENT ON SOIL TEST VARIABILITY ACROSS TILLAGE SYSTEMS¹

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ABSTRACT

Experiments were conducted from 1994 through 1996 at the Dixon Springs Agricultural Center and the Belleville Research Center to evaluate K rates (60, 120, and 180 lb K₂O per acre) and placement methods in a corn and soybean rotation using chisel tillage (CT) and no-till (NT) practices. Four placement methods were used: surface broadcast, dribble, 10-inch wide surface band over each row, and banding 30 lbs K₂O per acre 2 inches to the side and 2 inches below the planted seed (remainder of the K rate was surface broadcast). In April of 1997, soil cores in incremental depths of 0-2, 2-4, and 4-8 inches were collected in a 2-inch spaced transect across and perpendicular to the two center rows of plots that received 120 lb K₂O per acre. Four transects were taken from each plot with the soil composited by layer and by position across the transect.

Nutrient stratification was evident with both the chisel and no-tillage systems. However, no-till showed higher levels of K in the 0-2 inch depth than chisel, but the chisel treatment had higher K levels in the 2-4 inch depth. This reflected the degree of mixing of applied K into the soil with tillage, whereas, the no-till system resulted in higher K levels at the surface.

All of the placement methods had higher K levels near the row rather than mid-row - even the broadcast treatment. This is an indication that K was being redeposited near the row after the plants matured. This could have been associated with leaching from the plant after physiological maturity or from the breakdown and release of K from the plant after harvest, or both. The starter treatment with chisel tillage showed a definite K band near the row in the 2-4 inch depth that did not show up in the no-till plots. This may have been an indication that no-till utilized more of the starter K than chisel tillage, perhaps because of more restricted root growth in no-till.

The banded and dribble treatments with no-till showed very sharp peaks in the 0-2 inch depths due to lack of incorporation via tillage but this may also indicate a less efficient system for K uptake later in the season when surface roots are less active in nutrient uptake.

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