

TILLAGE AND POTASSIUM EFFECTS ON POTASSIUM USE EFFICIENCY IN A CORN-SOYBEAN ROTATION¹

S.A. Ebelhar and E.C. Varsa²

ABSTRACT

A field study was conducted from 1994 through 1996 at the Dixon Springs Agricultural Center (DSAC) on a Bonnie sil soil and at the SIU Belleville Research Center (BRC) on a Herrick sil soil. No-till (NT) and spring chisel tillage (CT) systems were compared in a corn-soybean rotation. Within each tillage system, potassium (K) rates of 60, 120 and 180 lb K₂O per acre were combined with four placement methods that included surface broadcast, 10-inch surface band over the intended row, surface dribble 6 inches to the side of the intended row, and starter placement of 30 lb K₂O per acre 2 inches to the side and 2 inches below the seed (with the remainder of the K rate surface broadcast).

The whole plant K composition of corn or soybean tissue collected within a month following emergence was most often the lowest for the broadcast method of K placement. This was an indication that the broadcast treatment was not as efficient as other placement methods in getting K into the plant early. However, by the silking or flowering stages of development of the corn or soybeans there were no differences in the leaf K concentrations for the various placement methods.

Increasing K rates almost always increased concentrations of K in the ear leaves of corn and the trifoliolate leaves in soybeans. Increasing K rates generally increased early plant growth and yields, but more so for corn than soybeans. Soybeans seemed to maximize yields at the 60 lb K₂O rate, whereas corn often showed higher yields (although not always significant) with K rates of 120 and 180. Corn usually requires more K than soybeans, which would explain its responsiveness to K.

With corn the placement method of K was not as critical as rate, even for no-till, across the six site-years of this study. Some problems occurred in 1996 with the long term banding of K fertilizers as 10-inch bands over the intended rows of soybeans. This is in contrast to a yield benefit from banding at other locations or crops as reported in the literature. Weather problems related to a wet spring followed by very dry conditions late in the season may have contributed to the atypical results in 1996.

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²Agronomist, Dixon Springs Agricultural Center, University of Illinois, Simpson, IL, and Associate Professor, Department of Plant, Soil and General Agriculture, Southern Illinois University-Carbondale.

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**Dr. David Franzen
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