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Tillage and Nitrogen Placement Effects on Yields in a Short-Season Corn/Wheat/Double-Crop Soybean Rotation

Abstract

Conventional tillage resulted in greater corn yield in 2015 than with reduced tillage or no-till. A tillage \times N fertilizer treatment interaction showed that N placement did not affect corn yield in conventional or reduced tillage systems, but subsurface knife N placement in no-till resulted in greater yield than when N was surface-applied.

Keywords

crops

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Tillage and Nitrogen Placement Effects on Yields in a Short-Season Corn/Wheat/Double-Crop Soybean Rotation

D.W. Sweeney

Summary

Conventional tillage resulted in greater corn yield in 2015 than with reduced tillage or no-till. A tillage \times N fertilizer treatment interaction showed that N placement did not affect corn yield in conventional or reduced tillage systems, but subsurface knife N placement in no-till resulted in greater yield than when N was surface-applied.

Introduction

Many crop rotation systems are used in southeastern Kansas. This experiment was designed to determine the long-term effect of selected tillage and N fertilizer placement options on yields of short-season corn, wheat, and double-crop soybean in a rotation.

Experimental Procedures

A split-plot design with four replications was initiated in 1983 with tillage system as the whole plot and N treatment as the subplot. In 2005, the rotation was changed to begin a short-season corn/wheat/double-crop soybean sequence. Use of three tillage systems (conventional, reduced, and no-till) continued in the same areas used during the previous 22 years. The conventional system consisted of chiseling, disking, and field cultivation. Chisel operations occurred in the fall preceding corn or wheat crops. The reduced-tillage system consists of disking and field cultivation prior to planting. Glyphosate (Roundup) was applied to the no-till areas. The four N treatments for the crop were: no N (control), broadcast urea-ammonium nitrate (UAN; 28% N) solution, dribble UAN solution, and knife UAN solution at 4 in. deep. The N rate for the corn crop grown in odd years was 125 lb/acre. Corn was planted on April 23, 2015.

Results and Discussion

Overall, conventional tillage resulted in 28% greater corn yield than with no-till and 18% greater yield than with reduced tillage (data not shown). In general, adding N by any placement method doubled or more the yield obtained without N (Figure 1). However, a tillage \times N fertilizer treatment interaction showed that N placement had little effect on corn yield in conventional or reduced tillage. In contrast, knife N placement in no-till resulted in more than 30% greater yield than with either surface placement method and was equivalent to N fertilized treatments in the conventional tillage system.

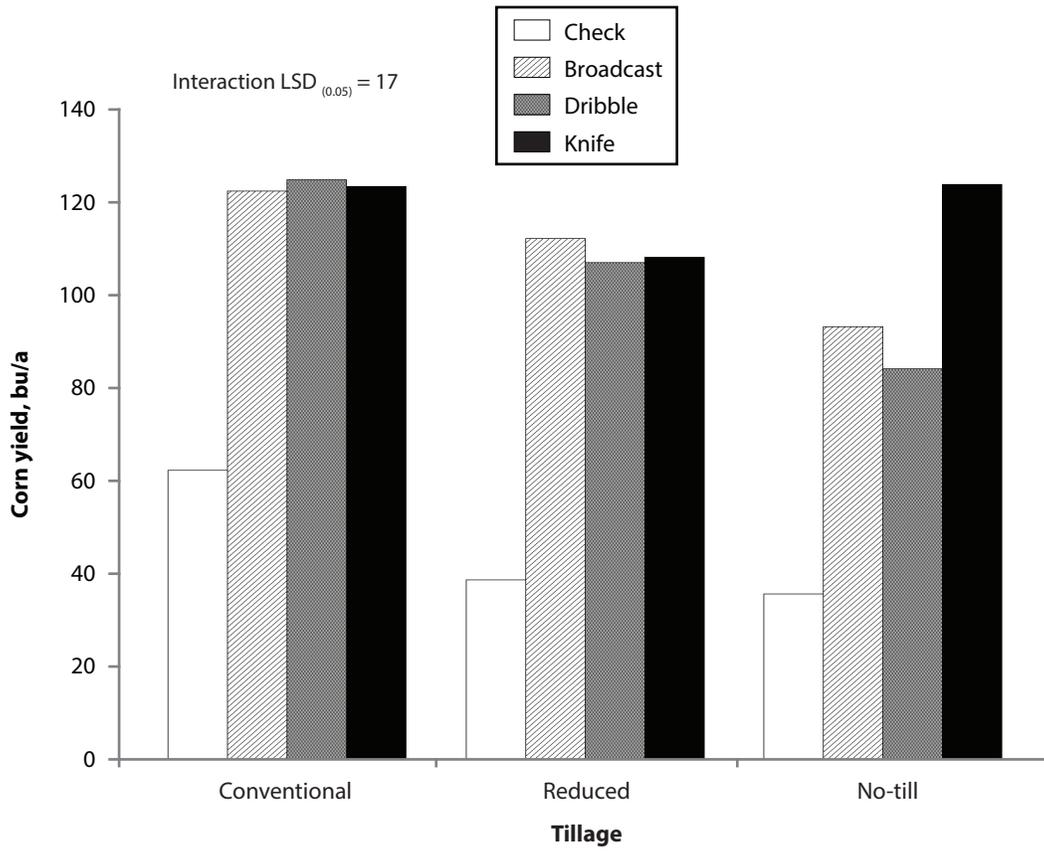


Figure 1. Effect of tillage and nitrogen placement on short-season corn yield in 2015.