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Abstract

Corn yields were affected by tillage and nitrogen (N) side-dress options in 2016. Corn yields were 12% greater with conventional tillage than with no-till. Side-dress applications of N at V10 resulted in greater corn yield than side-dress N applications at V6.

Keywords

nitrogen, side-dress, corn, tillage, no-till

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Timing of Side-Dress Applications of Nitrogen for Corn in Conventional and No-Till Systems

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Summary

Corn yields were affected by tillage and nitrogen (N) side-dress options in 2016. Corn yields were 12% greater with conventional tillage than with no-till. Side-dress applications of N at V10 resulted in greater corn yield than side-dress N applications at V6.

Introduction

Environmental conditions vary widely in the spring in southeastern Kansas. As a result, much of the N applied prior to corn planting may be lost before the time of maximum plant N uptake. Side-dress or split applications to provide N during rapid growth periods may improve N use efficiency while reducing potential losses to the environment. The objective of this study was to determine the effect of timing of side-dress N fertilization compared with preplant N applications for corn grown on a claypan soil.

Experimental Procedures

The experiment was established in spring 2015 on a Parsons silt loam soil at the Parsons unit of the Kansas State University Southeast Agricultural Research Center. The experiment was a split-plot arrangement of a randomized complete block design with four blocks (replications). Whole plot tillage treatments were conventional tillage (chisel, disk, and field cultivate) and no-till. Sub-plot nitrogen treatments were six preplant/side-dress N application combinations that include 1) a no-N control, 2) 150 lb N/a applied preplant, 3) 100 lb N/a applied preplant with 50 lb N/a applied at the V6 (six-leaf) growth stage, 4) 100 lb N/a applied preplant with 50 lb N/a applied at the V10 (ten-leaf) growth stage, 5) 150 lb N/a applied preplant with 50 lb N/a applied at the V6 growth stage, and 6) 150 lb N/a applied preplant with 50 lb N/a applied at the V10 growth stage. The N source for all treatments was liquid urea-ammonium nitrate (28% N) fertilizer. Preplant N fertilizer was applied on April 4, 2016, side-dress N at V6 on May 22, 2016, and side-dress N at V10 on June 6, 2016 to appropriate plots. Corn was planted on April 5 and harvested on August 29, 2016.

Results and Discussion

In 2016, corn yielded 12 bu/a more with conventional tillage than with no-till (Table 1). Even though yield components were not significantly affected by tillage, the com-

bined trend for greater stand, kernel weight, and kernels/ear likely accounted for the yield response to tillage. Adding N fertilizer more than tripled yields obtained in the no-N control. Applying 100 lb N/a preplant followed by 50 lb N/a at the V6 growth state did not improve yields above that obtained with all 150 lb N/a applied preplant. However, delaying the 50 lb N/a side-dress application to the V10 stage improved yield by 8.4 bu/a compared to all N preplant. A similar increase in yield was found by delaying N side-dress to the V10 stage instead of the V6 stage when adding 50 lb N/a extra to a 150 lb N/a preplant application. These effects of N timing on corn yield in 2016 appeared to be related to responses in kernel weight and kernels/ear.

Table 1. Tillage and N side-dress application effects on yield and yield components of corn in 2016

Treatment	Yield	Stand	Kernel weight	Ears/plant	Kernels/ear
	bu/a	#/a	mg		
Tillage (T)[1]					
Conventional	110.5	22600	231	0.99	529
No-till	98.3	21700	222	0.99	508
LSD (0.05)	6.3	NS	NS	NS	NS
Nitrogen Timing (N)[2]					
No-N control	34.4	22000	172	0.99	235
150 PP	111.2	22000	219	0.99	592
100 PP/50 V6	112.0	22200	234	0.99	553
100 PP/50 V10	119.6	22400	240	0.99	570
150 PP/50 V6	118.9	22200	240	1.00	569
150 PP/50 V10	130.3	22100	255	0.99	594
LSD (0.05)	7.0	NS	15	NS	34

[1]Conventional tillage: chisel, disk, and field cultivate.
[2]Nitrogen treatments: Control, no N fertilizer; 150 PP, 150 lb N/a applied preplant with no side-dress N; 100 PP/50 V6, 100 lb N/a applied preplant with 50 lb N/a side-dress applied at V6 (six-leaf) growth stage; 100 PP/50 V10, 100 lb N/a applied preplant with 50 lb N/a side-dress applied at V10 (ten-leaf) growth stage; 150 PP/50 V6, 150 lb N/a applied preplant with 50 lb N/a side-dress applied at V6 growth stage; and 150 PP/50 V10, 150 lb N/a applied preplant with 50 lb N/a side-dress applied at V10 growth stage.