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Late-Season Nitrogen Fertilizer Application in Soybean

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Abstract

Field experiments were conducted at the Kansas River Valley Experiment Field, located near Rossville and Topeka, KS, in the summer of 2014 to evaluate effects of late-season nitrogen (N) fertilizer application on modern soybean genotypes. A unique fertilizer N source (urea) was applied at five N rates (0, 40, 80, 120, and 160 lb N/a) to soybean at the R3 growth stage. The main objective was to determine if late-season N application has an agronomical benefit to soybean producers. Overall soybean yields ranged from 43.7 to 57.5 bu/a considering both experimental fields. At Rossville, sudden death syndrome (SDS) affected the final soybean yield potential. Application of late-season N fertilizer did not significantly increase soybean yields at the evaluated sites. Maximum soybean yields, 46 bu/a at Rossville and 57 bu/a at Topeka, were documented at the 0-N fertilizer rate.

Keywords

soybean, late-season nitrogen fertilizer, yield

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Late-Season Nitrogen Fertilizer Application in Soybean

D. Hodgins, E. Adee, and I.A. Ciampitti

Summary

Field experiments were conducted at the Kansas River Valley Experiment Field, located near Rossville and Topeka, KS, in the summer of 2014 to evaluate effects of late-season nitrogen (N) fertilizer application on modern soybean genotypes. A unique fertilizer N source (urea) was applied at five N rates (0, 40, 80, 120, and 160 lb N/a) to soybean at the R3 growth stage. The main objective was to determine if late-season N application has an agronomical benefit to soybean producers. Overall soybean yields ranged from 43.7 to 57.5 bu/a considering both experimental fields. At Rossville, sudden death syndrome (SDS) affected the final soybean yield potential. Application of late-season N fertilizer did not significantly increase soybean yields at the evaluated sites. Maximum soybean yields, 46 bu/a at Rossville and 57 bu/a at Topeka, were documented at the 0-N fertilizer rate.

Introduction

Increasing soybean yields is associated with larger N demand. The ability to sustain N fixation by the rhizobia during the late season can be compromised, restricting the capability of the crop to supply all of the N required for optimum grain-filling and final grain N content. Previous studies investigating the effects of late-season N fertilizer application have shown contrasting outcomes. A common pattern is to report fertilizer N responses in sites where average soybean yields were above 50 to 60 bu/a. Therefore, the effects of extra N application late in the crop growing season might be important to consider in high-yielding soybean systems.

Procedures

The Topeka experiment was conducted on Eudora silt loam soil. The soybean variety was Asgrow 3833, which was planted on May 21 with a Kinze split-row planter in 15-in. rows at a population 140,000 seeds/a, with no fertilizer applied before planting. Fertilizer N rates were applied at 0, 40, 80, 120, and 160 lb/a. Each fertilizer treatment was replicated four times, providing a total of 20 plots per experiment. Plot size was 20 ft (16 rows) × 30 ft. Fertilizer N was applied close to the R3 growth stage (August 18). The soybean was harvested on October 15.

The Rossville experiment was conducted on Eudora silt loam soil. Midland 3633N soybean was planted on May 14 with a Kinze split-row planter in 15-in. rows at a popu-

lation 140,000 seeds/a, with no fertilizer applied before planting. Fertilizer N rates were applied at 0, 40, 80, 120, and 160 lb/a. Each fertilizer treatment was replicated four times, providing a total of 20 plots per experiment. Plot size was 10 ft (8 rows) × 20 ft. Fertilizer N was applied close to the R3 growth stage (August 18). The soybean was harvested on September 24.

Results

Late-season N fertilizer application did not statistically increase soybean yield in either location (Table 1). Overall yield level was 45 bu/a at Rossville and 56 bu/a at Topeka. In these environments, the application of extra N late in the season did not increase soybean yields over the no-N application check (0-N) treatment.

Table 1. Late-season nitrogen (N) application rates and yields at Rossville and Topeka, Kansas River Valley Experiment Field, 2014

N rates, lb/a	Rossville	Topeka
	----- Yields at 13% moisture, bu/a -----	
0	46.1	57.5
40	46.1	57.0
80	46.0	55.6
120	45.3	55.0
160	43.7	55.3
<i>P</i> > 0.05	NS ¹	NS

¹ Not significant, *P* > 0.05.