

Influence of Seeding Rate, Nitrogen Rate, and Irrigation on Corn Yield on Mississippi River Alluvial Soils

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Introduction

Corn has become an important crop in various rotation schemes in northeast Louisiana. The recognition of rotational benefits and availability of adapted hybrids have increased interest in corn production. To ensure highest yield potential, cultural practices must be followed that maximize the utilization of soil water, nutrient supply and sunlight. Optimum nitrogen (N) rate and seeding rate may vary depending on a large extent to yield potential. With irrigation, yield potential is usually higher and the required N rate and seeding rate for maximum yield may be higher. Objective of these experiments was to evaluate the influence of N rate and seeding rate on Mississippi River alluvial soils.

Procedures

Field experiments were conducted in 2007 on Sharkey silty clay and Commerce silt loam at the Northeast Research Station (NERS) near St. Joseph to evaluate the influence of N rate and seeding rate on corn yield. Dekalb DKC69-71 was planted at seeding rates of 25,000, 30,000, 35,000, and 40,000 seed/acre with a John Deere 1700 planter on March 31 on Commerce silt loam and April 9 on Sharkey silty clay. Nitrogen rates of 150, 180, 210, and 240 lb/acre were injected using a variable-rate applicator soon after emergence. The trial on Sharkey silty clay also had an irrigation treatment. The two irrigation treatments evaluated were a non-irrigated control and a furrow-irrigated treatment, which was scheduled using the Arkansas Irrigation Scheduler. Irrigations were triggered at a soil moisture deficit of 1.5 inches. Previous crop was cotton. All cultural practices as recommended by the LSU AgCenter were followed.

Experimental design was a randomized complete block with a split-split plot arrangement of treatments with four replications. Irrigation was the main plot, seeding rate the split plot, and N rate the split-split plot. Grain yield was machine-harvested from the two middle rows of four-row plots. Data was analyzed using the GLM procedure of SAS. The LSD (0.10) was used to evaluate treatment differences when the F-test indicated significance ($P \leq 0.10$).

Results and Discussion

Rainfall for April through June was below the long-term average (Table 1). For the critical month of June, rainfall was only 0.53 inches. There were seven furrow-irrigations beginning on May 16 and terminating on July 2. Rainfall in July was excessive, totaling over 16 inches.

Sharkey silty clay: Grain yields were ranged from 94.0 to 110.1 bu/acre with no irrigation and 144.8 to 171.0 bu/acre with irrigation. Even though maximum yield was about 110 bu/acre for the irrigated plots and about 175 bu/acre for the irrigated plots, optimum N rate was between 180 and 210 lb/acre and optimum seeding rate about 25,000 seed/acre for both under non-irrigated (Fig. 1) and irrigated conditions (Fig. 2).

Commerce silt loam: Grain yields ranged from 100.2 to 135.1 bu/acre. Maximum yields were about 125 bu/acre and optimum N rate was 150 lb/acre and optimum seeding rate 25,000 seed/acre (Fig. 3).

Table 1. Rainfall received at St. Joseph, 2007

Month	Rainfall
	Inches
March	1.30
April	3.33
May	1.80
June	0.53
July	16.03
August	3.55

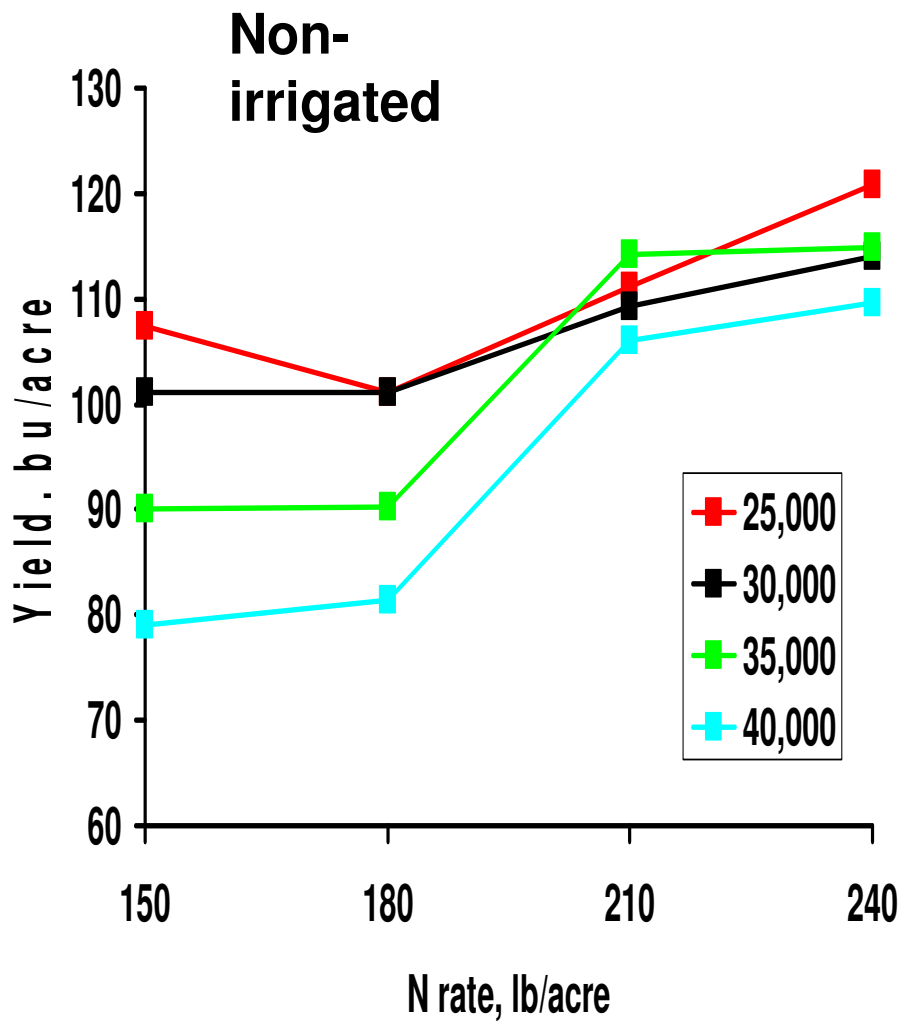


Fig.1. Influence of N rate and seeding rate on non-irrigated corn yield on Sharkey silty clay at St. Joseph, 2007.

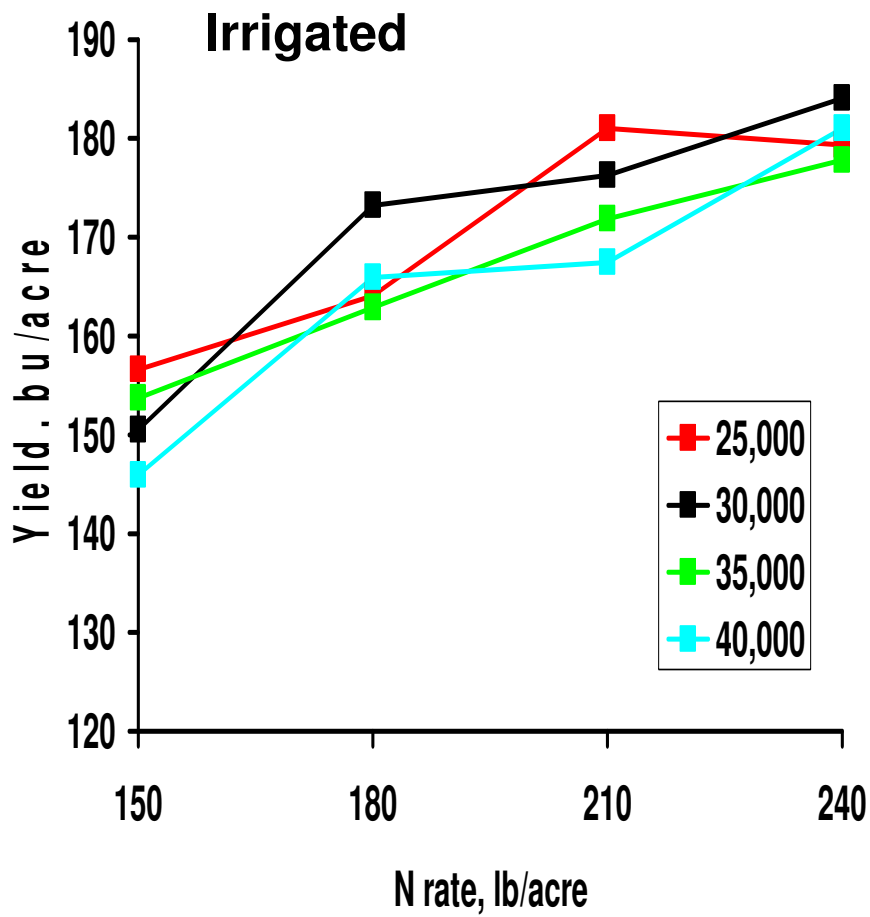


Fig. 2. Influence of N rate and seeding rate on irrigated corn yield on Sharkey silty clay at St. Joseph, 2007.

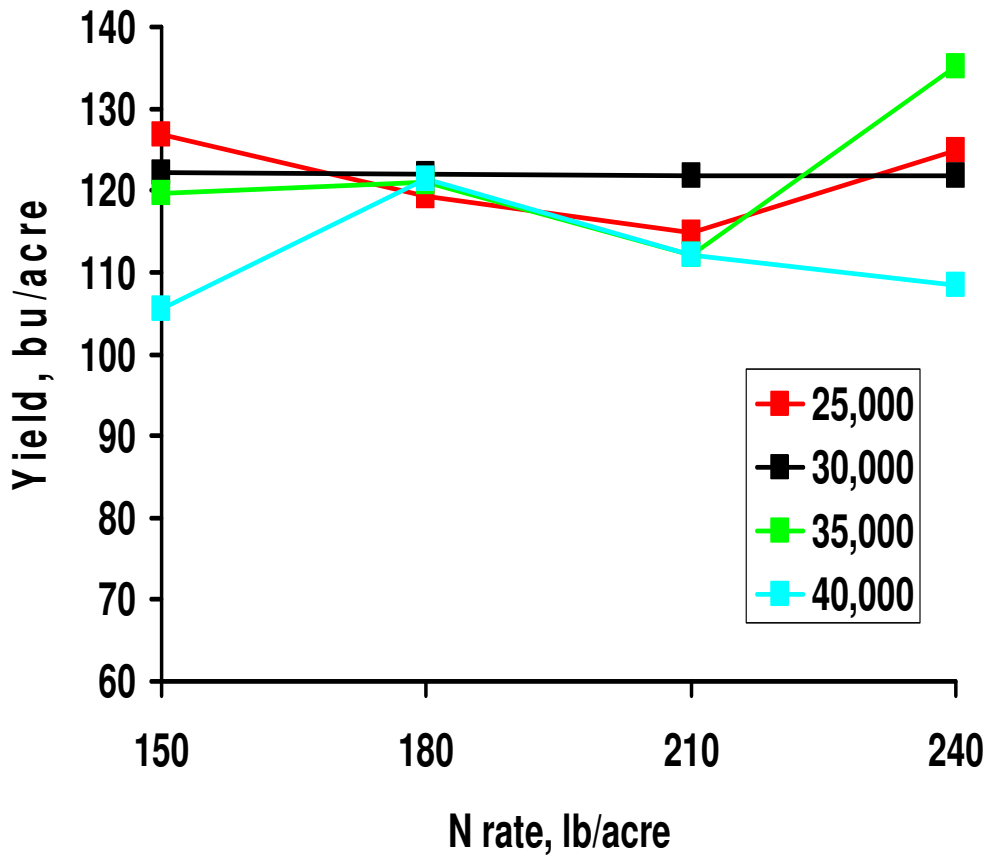


Fig. 3. Influence of N rate and seeding rate on corn yield on Commerce silt loam at St. Joseph, 2007.