Influence of Row Configuration (Single versus Twin-Row), Seeding Rate and Nitrogen Rate on Corn Yield on a Mississippi River Alluvial Soil

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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. Research in the Corn Belt has found a consistent increase in corn yield when rows are narrowed from the traditional 36 to 40-inch spacing. Narrowing the rows provides a more equidistant spacing between plants which increases the efficiency of light and moisture utilization.

In recent years, planters have been introduced that have the capability of planting twin-rows on raised beds. For example, commercial planters are available that plant two rows, 9.5-inches apart, on top of raised beds. Planting narrow rows on raised beds improves drainage, particularly on clay soils, and permits the use of furrow irrigation. Optimum seeding rate and N rate may need to be modified using this production system. Objective of this experiment was to evaluate the influence of row configuration (RC) (single versus twin-rows), seeding rate and nitrogen (N) rate on corn yield.

Procedures

A field experiment was conducted on Commerce silt loam in 2005 at the Northeast Research Station (NERS) near St. Joseph to evaluate the influence of row configuration, seeding rate and N rate on corn yield. Single-rows were planted with a John Deere 1700 planter and twin-rows with a Monosem planter on March 31. Single-rows were centered and twin-rows centered, 9.5-inches apart, on raised 40-inch wide raised beds. Dekalb DKC69-71 was planted at seeding rates of 25,000, 30,000, 35,000, and 40,000 seed/acre. Nitrogen rates of 150, 180, 210, and 240 lb/acre were injected using a variable-rate applicator soon after emergence. Single and twin knives were used for injecting N fertilizer for the single and twin-row configurations, respectively.

Experimental design was a randomized complete block with a split-split plot arrangement of treatments. Main plot was row configuration, split plot was seeding rate and split-split plot was N rate. Measurements included grain yield and plant population at harvest. 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 was near normal, except for June, which had a monthly total of only 0.38 inches, well below the long-term average of 3.89 inches (Table 1) .

Although not statistically significant, average grain yields were higher for the twin rows compared to single rows, 132.0 versus 127.5 bu/acre (Table 1). Optimum seeding rate was about 25,000 seed/acre (Table 1), which was equivalent to 26,270 plants/acre. Average grain yields

across N rates ranged from 120.6 to 136.0 bu/acre, with the optimum rate between 180 and 210 lb N/acre (Table 3).

Table 1. Long-term average and 2006 rainfall at St. Joseph.

Month	Long-term average[1]	Rainfall
	----------inches----------	
April	5.02	3.49
May	5.27	5.09
June	3.89	0.38
July	4.07	4.62
August	3.36	4.1

[1]Forty-year average at St. Joseph

Table 2. Influence of row configuration (RC) and seeding rate (SR), averaged across N rate, on grain yield and plant population on Commerce silt loam at the NERS in St. Joseph, 2006.

	Grain yield			Plant population		
Seed rate	Single row	Twin-row	Average	Single row	Twin-row	Average
seed/acre	----------bu/acre----------			----------plants/acre----------		
25,000	126.5	131.3	128.9	26,120	26,410	26,270
30,000	132.7	136.0	134.4	28,910	29,570	29,240
35,000	128.3	131.5	129.9	31,650	32,100	31,880
40,000	122.5	129.0	125.8	32,220	34,990	33,610
Average	127.5	132.0		29,720	30,770	
LSD (0.10):						
RC		NS[1]			NS	
SR		4.6			1,070	
RC x SR		NS			NS	

[1]NS = Non-significant at 0.10 probability level

Table 3. Influence of row configuration (RC) and nitrogen rate (NR), averaged across seeding rate, on grain yield on Commerce silt loam at the NERS in St. Joseph, 2006.

	Row configuration		
Nitrogen rate	Single row	Twin-row	Average
lb/acre	----------bu/acre----------		
150	116.1	125.1	120.6
180	125.8	130.8	128.3
210	133.5	134.7	134.1
240	134.7	137.2	136.0
Average	127.5	132.0	
LSD (0.10):			
NR	3.2		
RC x NR	NS		