Corn Population and Nitrogen Trial

RFR-A1773

Matt Schnabel, farm superintendent
Mark Licht, assistant professor
Department of Agronomy

Introduction

Corn plant populations have increased at approximately 400 plants/acre per year over the last two decades. Seeding rates are now commonly in the 32,000 to 38,000 seeds/acre range with some hybrids being recommended at higher seeding rates. Because corn plant populations and grain yields are increasing, there has been a renewed interest in looking at corn seeding rate and nitrogen rate interactions.

Materials and Methods

This trial was conducted beginning in 2016 and repeated in 2017, using Stine 9538-20 planted April 19, 2016 and May 8, 2017. This trial was set up in a randomized complete block design. It was designed to compare seeding rates (35,000 and 45,000 seeds/acre, and added 40,000 seeds/acre in 2017) and two nitrogen rates (160 and 210 lb N/acre). Pre-planting 160 lb N/acre of UAN was applied to all plots, an additional sidedress of 50 lb N/acre of UAN was applied to specific plots on June 9, 2016, and June 12, 2017.

Results and Discussion

The main effects and interaction effects of seeding rate and nitrogen rate were not found to be statistically significant in 2016 (Table 1). However, in 2017, the nitrogen rate ($P = 0.0452$) and seeding rate ($P < 0.0001$) main effects were statistically significant and the interaction of these variables was not significant (Table 2). In both years there was a 2.2 and 2.1 bushels/acre difference between the 160 lb N/acre and 210 lb N/acre plots. In 2017, there was a 9.4 and 13.9 bushels/acre difference for 35,000 seeds/acre versus the 40,000 seeds/acre and 45,000 seeds/acre, respectively. This was quite different from the previous year, 2016, where there was only 3.4 bushels/acre difference between 35,000 and 45,000 seeds/acre.

The 45,000 seeds/acre and 210 lb N/acre treatment were higher yielding, however, only occasionally was there a high enough yield response to cover the additional cost of seed and nitrogen.

Acknowledgements

This trial would not have been possible without contributions from Stine Seed Company.

Table 1. Corn grain yields and cost of added inputs for the seeding rate x nitrogen trial in 2016.[1]

	160 lb N/ac	**210 lb N/ac**	**35,000 seeds/ac**	**45,000 seeds/ac**		**160 lb N/ac**	**210 lb N/ac**
	Grain yield (bushels/acre)					[2]Difference in cost	
160 lb N/ac	192.4				35,000 seeds/ac		$15.50
210 lb N/ac		194.6			45,000 seeds/ac	$34.30	$49.80
	P = 0.5467						
35,000 seeds/ac	192.3	191.4	191.8				
45,000 seeds/ac	192.5	197.8		195.2			
	P = 0.3983		P = 0.3611				

[1]P-values within boxes are used to compare yields of the main effects or interaction effects within each box.
[2]Difference in cost between the baseline treatment 35,000 seeds/ac and 160 lb N/ac and added input.
Note: Difference in cost was calculated based on $3.43/1,000 seeds and $0.31/lb N (Source: Estimated Cost of production FM1712 publication). The difference in cost was then divided by the calendar year corn price of $3.40 (Source: Ag Decision Maker File A2-11 for Iowa Cash Corn & Soybean Prices).

Table 2. Corn grain yields and cost of added inputs for the seeding rate x nitrogen trial in 2017.[1]

	160 lb N/ac	**210 lb N/ac**	**35,000 seeds/ac**	**40,000 seeds/ac**	**45,000 seeds/ac**	**160 lb N/ac**	**210 lb N/ac**
	Grain yield (bushels/acre)					Difference in cost[2]	
160 lb N/ac	230.8						
210 lb N/ac		233.0					
	P = 0.0452						
35,000 seeds/ac	224.1	224.1	224.1[a]				$15.50
40,000 seeds/ac	231.9	235.1		233.5[b]		$16.50	$32.00
45,000 seeds/ac	236.3	239.7			238.0[c]	$33.00	$48.50
	P = 0.3409		P < 0.0001				

[1]P-values within boxes are used to compare yields of the main effects or interaction effects within each box. Mean values with different superscript letters (a, b, or c) were statistically different from the other treatments.
[2]Difference in cost between the baseline treatment 35,000 seeds/ac and 160 lb N/ac and added input.
Note: Difference in cost was calculated based on $3.30/1,000 seeds and $0.31/lb N (Source: Estimated Cost of production FM1712 publication). The difference in cost was then divided by the calendar year corn price of $3.40 (Source: Ag Decision Maker File A2-11 for Iowa Cash Corn & Soybean Prices).