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Corn Plant Population

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Abstract
Producers continue to plant corn at higher plant populations each year. Seeding rates have increased about 425 seeds per acre per year since 2001 in Iowa. The ability of today's hybrids to manage this extra plant-to-plant competition has been a catalyst for higher yields. During this same time, seed costs have risen dramatically. The purpose of this study was to look at different corn plant populations and the effect these populations have on yield and economics.

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Introduction

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Materials and Methods

Five plant populations were evaluated in this study: 27,700, 32,000, 35,600, 37,700, and 43,600 seeds per acre. This research was conducted in a corn-soybean rotation with four replications. This plot location was selected because of its high fertility and its high yield potential. Agrigold 6325VT3 was planted on April 21 following pre-plant disking and field cultivating. Plots were planted with a John Deere 7100 planter. Weeds were managed with pre- and post-emergent herbicide applications.

Individual plot size was 10 ft wide (4 rows) by 44 ft long. Stand counts were done on June 18 and again on September 22. The plot was harvested for yield on November 2. Corn grain yields were adjusted to 15.5% moisture. Statistical analysis was used to analyze the yield data, with a significance level of $P \leq 0.05$.

Economic return on increased seeding rates was calculated using corn prices of $3.00/bushel, $3.50/bushel, and $4.00/bushel. Return on seed investment was figured for each treatment when comparing it with the 27,700 seeding rate. A seed cost of $250 per bag was used in this analysis, which equals $3.13 per 1000 seeds.

Results and Discussion

Early season and late season stand counts increased with higher seeding rates (Table 1). Ideal planting conditions led to high emergence rates among all treatments. Similar survival rates were found between all treatments when comparing early- and late-season plant populations.

Grain yields increased as the seeding rate increased from 27,700 to 43,600 seeds per acre (Table 1). Larger yield increases were found with increasing seeding rates up to a seeding rate of 37,700 seeds per acre. A smaller increase in yield was noted between 37,700 and 43,600 seeds per acre.

Seed investment analysis indicated that planting at 37,700 seeds per acre would bring the highest return when corn prices were $3.00 and $3.50 per bushel (Table 2). Corn prices of $4.00 per bushel favor planting at 43,600 seeds per acre.

Results of this study show that highly fertile and productive soils have the capacity to increase corn yields and returns at high plant populations. This represents data from only one year at a high yielding site. This study will continue in the future.

Table 1. Seeding rate influence on plant population and grain yields.

Seeding rate	Plant population June 18	Plant population Sept. 22	Grain yield adjusted to 15.5% moisture	Grain yield significance[1]
	plants/acre	plants/acre	bushels/acre	
27,700	28,400	27,700	205.8	d
32,000	32,400	30,700	206.4	cd
35,600	35,600	34,200	217.9	bc
37,700	38,100	35,900	227.8	ab
43,600	45,500	43,300	232.8	a

[1]Treatment means with any letter in common are not significantly different from one another.

Table 2. Return on seed investment when increasing seeding rates at different corn prices.

Seeding rate	Seed cost	Return on seed with $3.00 / bushel	Return on seed with $3.50 / bushel	Return on seed with $4.00 / bushel
	dollars/acre	dollars/acre	dollars/acre	dollars/acre
27,700	$86.70	0	0	0
32,000	$100.16	-$11.66	-$11.36	-$11.06
35,600	$111.43	$11.57	$17.62	$23.67
37,700	$118.00	$34.70	$45.70	$56.70
43,600	$136.47	$31.23	$44.73	$58.23