2001

Row Width and Plant Density Effects on Corn Yield in Iowa

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Abstract
During the late 90s, research in the northern Corn Belt comparing 15- and 30-inch row corn illustrated yield benefits to narrow rows. In addition, many Iowa producers found soybean yields were optimized when soybean row widths were decreased below 30-inches. As a result, Iowa producers questioned whether benefits to narrow row corn (< 30 inches) existed in Iowa. To answer these questions, research was conducted to evaluate the effect of row spacing and related planting decisions on the yield of modern high-yielding corn hybrids. During the 1997, 1998, and 1999 growing seasons, the effects of row width and harvest plant density were evaluated. The objective of the study was to identify the optimum plant density for corn planted in 15-inch rows compared with 30- inch rows. In addition to this site, this study was conducted on five other university research farms.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

Row Width and Plant Density Effects on Corn Yield in Iowa

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Introduction

During the late 90s, research in the northern Corn Belt comparing 15- and 30-inch row corn illustrated yield benefits to narrow rows. In addition, many Iowa producers found soybean yields were optimized when soybean row widths were decreased below 30-inches. As a result, Iowa producers questioned whether benefits to narrow row corn (< 30 inches) existed in Iowa. To answer these questions, research was conducted to evaluate the effect of row spacing and related planting decisions on the yield of modern high-yielding corn hybrids. During the 1997, 1998, and 1999 growing seasons, the effects of row width and harvest plant density were evaluated. The objective of the study was to identify the optimum plant density for corn planted in 15-inch rows compared with 30-inch rows. In addition to this site, this study was conducted on five other university research farms.

Materials and Methods

The experimental layout was a randomized complete block design with split plots and three replicates. Whole plot treatments were row widths (15- or 30-inch) and split plot treatments were plant densities (24,000, 28,000, 32,000, and 36,000 plants per acre). A single 102- to 106-day relative maturity European corn borer-resistant hybrid, N4640Bt (Syngenta Seeds), was evaluated. Individual plots were 6 rows (30-inch) or 11 rows (15-inch) by 40 feet long. A White 6100 series corn planter outfitted with a 6900 series splitter attachment was used to plant all plots. Planting dates were 1 May 1997, 29 April 1998, and 1 May 1999. Plots were over planted to approximately 44,000 ppa. Plots were hand-thinned to desired target stand levels on 26 June 1997, 10 June 1998, and 7 June 1999 while corn was near the fifth vegetative stage of development (ISU Extension Special Report No. 48). All plots were mechanically harvested on 30 October 1997, 30 October 1998, and 11 November 1999. Reported plot yields (corrected to 15.5% moisture) are shown in Table 1.

Results and Discussion

Summarized in Table 1 are the results from 1997-1999. Averaged across plant densities and years, 15-inch rows produced a 3% yield advantage over 30-inch rows. During 1998, a favorable yield response to 15-inch rows was observed for all plant densities; however, this response was not consistent during 1997 and 1999. When averaged across years, a 7% yield benefit at 32,000 ppa was produced in15-inch rows. The yield benefit to 15-inch rows was less (3%) at the two lowest plant densities, and no row width response was observed at 36,000 ppa. The optimum yield in 15-inch rows was produced at 32,000 ppa, and 36,000 ppa produced the highest yield in 30-inch rows. Figure 1 illustrates an increasing yield response to both row widths as plant density is increased to 32,000 ppa. Producers are advised to consider the increased seed cost associated with increasing plant density. Finally, grain moistures remained similar between row widths in this study.

In summary, yield advantages to narrow rows were evident; however, the greatest yield benefit was observed at 32,000 ppa, a plant density higher than currently planted by most corn producers in Iowa. Furthermore, observed yield benefits to 15-inch rows at the two lowest plant densities would

not likely offset the associated cost of switching equipment to narrow rows.

Acknowledgments

We would like to thank John Harker and Syngenta Seeds for providing the seed used in this study.

Table 1. Effect of row width and plant density on corn grain yield and moisture at Sutherland, IA (1997-1999).

	1997		1998		1999		Average	
Plant Density	15-inch	30-inch	15-inch	30-inch	15-inch	30-inch	15-inch	30-inch
	----------Grain yield (bu./acre)----------							
24,000	148	148	153	143	172	169	157	153
28,000	145	155	160	137	171	171	159	154
32,000	150	149	179	155	181	170	**170***	**158**
36,000	145	153	167	159	175	177	162	163
Average	147	151	**165**	**149**	175	172	**162**	**157**
	----------Grain moisture (%)----------							
24,000	18.6	18.0	17.1	16.6	13.1	12.8	**16.3**	**15.8**
28,000	18.3	18.5	16.8	16.9	13.0	13.0	16.0	16.1
32,000	18.3	18.1	16.6	16.8	12.9	13.1	15.9	16.0
36,000	17.8	18.2	16.8	16.6	13.1	13.0	15.9	15.9
Average	18.2	18.2	16.8	16.7	13.0	13.0	16.0	16.0

*Differences between bold faced yield means were statistically significant ($P < 0.05$).

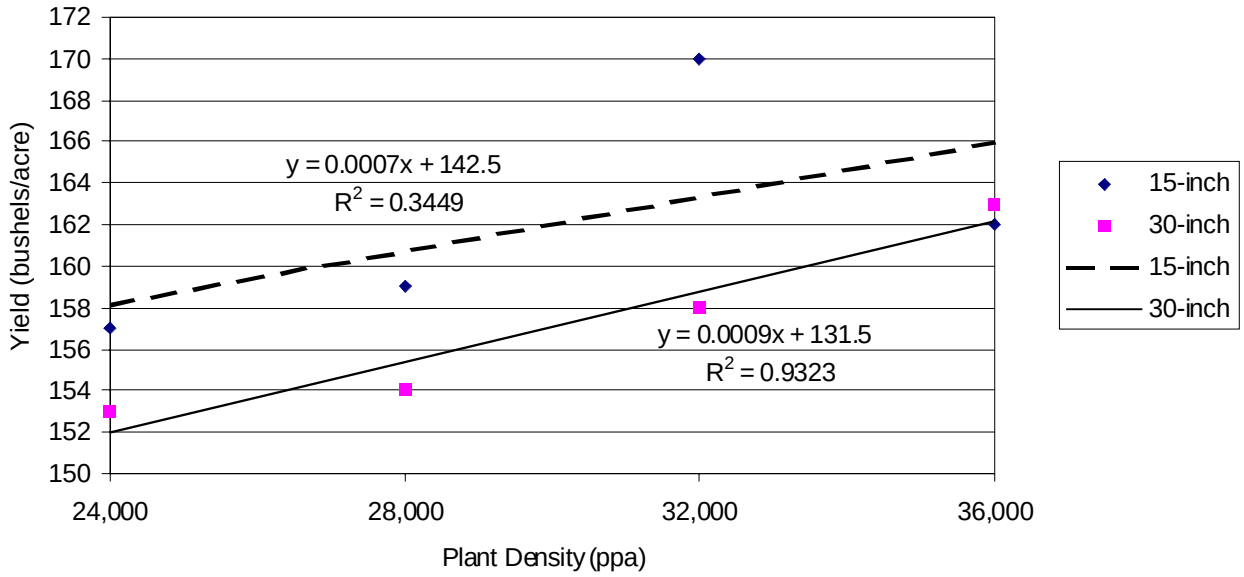

Figure 1. Mean yield response of 15- and 30-inch rows to plant density (1997-1999) at Sutherland, IA.