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Corn Row Spacing, Plant Density, and Maturity Effects

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Abstract
Historically, corn was grown in rows wide enough to allow draft animals to fit between the rows. With the advent of powered equipment, improved hybrids, fertilizers, and pesticides, corn rows have become narrower. Research in the 1960s showed a 5% yield advantage by growing corn in 30-inch rows compared with 38-inch rows. More recent research suggests that the yield benefit has decreased to a 3% advantage for 30-inch rows. By the early 1990s, there was interest in growing corn in rows narrower than 30 inches. Currently, about 1% of the total corn acreage in Iowa is planted in rows narrower than 30 inches. Research in Minnesota and Michigan showed a 7–10% advantage for corn grown in 15- or 20-inch rows compared with 30-inch row spacings. Tests in the central Corn Belt have indicated a smaller response (up to 5%). The Northeast Research and Demonstration Farm has tested corn row spacings for the past 8 years.

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Corn Row Spacing, Plant Density, and Maturity Effects

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Introduction

Historically, corn was grown in rows wide enough to allow draft animals to fit between the rows. With the advent of powered equipment, improved hybrids, fertilizers, and pesticides, corn rows have become narrower. Research in the 1960s showed a 5% yield advantage by growing corn in 30-inch rows compared with 38-inch rows. More recent research suggests that the yield benefit has decreased to a 3% advantage for 30-inch rows. By the early 1990s, there was interest in growing corn in rows narrower than 30 inches. Currently, about 1% of the total corn acreage in Iowa is planted in rows narrower than 30 inches. Research in Minnesota and Michigan showed a 7–10% advantage for corn grown in 15- or 20-inch rows compared with 30-inch row spacings. Tests in the central Corn Belt have indicated a smaller response (up to 5%). The Northeast Research and Demonstration Farm has tested corn row spacings for the past 8 years.

Materials and Methods

The experimental design for the 2000–2002 test was a randomized complete block with split-split plots and four replications comparing three hybrid maturities, two row spacings (15-inch and 30-inch), and four final stand populations (20K, 28K, 36K, and 44K plants/acre). The experimental design for the 1997–1999 tests were a randomized complete block with split plots and three replications. The experimental design for the 1995–1996 test was a randomized complete block with split-split plots and three replications comparing three hybrids maturities, two row spacings (15-inch and 30-inch), and three final stand populations (24K, 28K, and 32K plants/acre). An effort was made to manage the experiments in an optimum manner and not bias the test in favor of either spacing. The 1995–1996 study was prepared by planting an area twice with a 30-inch planter to create 15-inch rows. The 1997–1999 study was planted with a planter outfitted with a row splitter attachment. The 2000–2002 study was planted with both a 15-inch row planter and a 30-inch row planter. The 1997–2002 plots were planted at an initially high population and hand thinned to desired stand levels during June of each year. Plots were combined and dropped ears were counted and added to the yield data.

Results and Discussion

There was no yield trend comparing 15- and 30-inch rows in the 2000–2002 study. Corn yields (for the 2000–2002 period) increased as plant densities increased to 36,000 plants/acre (Table 1). However, yields did not differ for final harvest stands from 28,000–44,000 plants/acre. Yields increased as relative maturity of hybrids increased from shorter season to fuller season. For the 1997–1999 period, corn yield trends increased as plant densities increased (Table 2). Yields did not differ by row width. Again, yields increased as hybrid maturity increased from shorter season to fuller season. Finally, when hybrid yields were averaged across row widths, no differences were found. In spite of a yield-reducing hailstorm in 1995, no clear interaction between stand level and hybrid or stand level and row spacing occurred (Table 3). There was a 3 bushel/acre trend in favor of the 15-row spacing in 1995, but a 8 bushel/acre reduction in 1996. Biologically, there is no reason that yields should be less with 15-inch rows because plants are more equidistant than in 30-inch rows. Greater tractor/planter compaction during planting, disease pressure, and plant lodging may play a factor in 15-inch row corn. A significant benefit to either row width was not observed with any hybrid or population in the various studies over the 8-year

test span. Yields generally were greater for the fuller season hybrids. When yields of hybrids were averaged across individual row widths, no benefits to either row width was found.

Acknowledgments

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Table 1. Effect of row spacing, plant density, and hybrid maturity on corn yield (2000–2002).

	Harvest stand density				
Row width	20,000	28,000	36,000	44,000	00–02 avg
15-inch	149	172	175	174	168
30-inch	152	171	172	168	166
Average	151	171	174	171	

	Hybrid variety maturity			
Row width	95 CRM	105 CRM	110 CRM	00–02 avg
15-inch	153	166	184	168
30-inch	155	168	174	166
Average	154	167	179	

Table 2. Effect of row spacing, plant density, and hybrid maturity on corn yield (1997–1999).

	Harvest stand density				
Row width	24,000	28,000	32,000	36,000	97–99 avg
15-inch	163	173	177	179	173
30-inch	163	169	178	180	173
Average	163	171	178	180	

	Hybrid variety maturity						
Row width	94 CRM	100 CRM	102 CRM	105 CRM	110 CRM	112 CRM	97–99 avg
15-in.	154	158	178	171	181	182	171
30-in.	161	167	172	175	180	179	172
Average	158	158	175	173	181	181	

Table 3. Effect of row spacing, plant density, and hybrid maturity on corn yield (1995–1996).

	Harvest stand density			
Row width	24,000	28,000	32,000	95–96 avg
15-inch	143	147	143	144
30-inch	145	152	144	147
Average	144	150	144	

	Harvest stand density			
Variety Maturity	24,000	28,000	32,000	95–96 avg
100 CRM	144	153	147	148
105 CRM	144	150	147	147
108 CRM	145	145	138	143
Average	144	149	144	