

Drs. P.M. Porter, D.R. Hicks, W.E. Lueschen, J.H. Ford, D.D. Warnes, and T.R. Hoverstad

# Row Width/Plant Population Affect Corn Response

Hybrid choice also influenced grain yield in three-year studies conducted by University of Minnesota scientists.

**Summary:** At Lamberton and Waseca, yields in 10- and 20-inch rows exceeded yields in 30-inch rows by 7.2 percent, when averaged over all hybrids and plant populations. At Morris, the advantage was 8.5 percent. Hybrid choice influenced grain yield. All hybrids responded similarly to change in row width and change in plant population. Grain yield increased at Lamberton and Waseca with higher plant populations in 1992 and 1994 but not in 1993 when yields were limited by climatic conditions. Yield regression analysis versus harvest plant population showed yields were

highest at or above 35,000 plants/A at Lamberton in 1992/1994 and highest at Waseca in 1994. They were unaffected by plant populations in 1992 at Waseca and at both locations in 1993. At Morris, yield regression analysis versus harvest plant population in 1993 and 1994 showed yields highest at 32,000 plants/A, the highest population studied at that location. Effects of hybrid choice and growing season climatic conditions were greater than row width or plant population on grain moisture, test weight, and ear length. In some years, maximum yields were obtained at harvest plant populations substantially higher than the current Minnesota population of 26,400 plants/A.

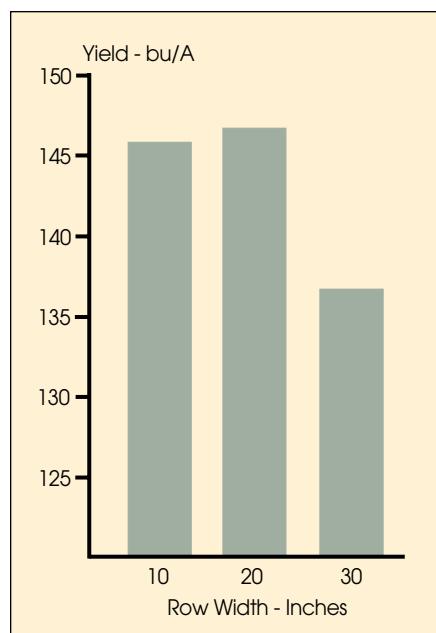


Figure 1. Effect of row width on corn yield, Lamberton and Waseca, Porter et al., University of Minnesota, 1992-94.

Primary reason given for the increase in yields in narrow-row corn is decreased competition among plants within rows for light, water, and nutrients due to a more equidistant spatial arrangement of plants.

Relative ease of converting 12- and 16-row planters on 30-inch row widths to 18- to 24-row planters on 20-inch row widths has been another reason for interest in narrower row corn production.

Research also is showing that hybrid selection and maturity interact with row width.

Objectives of this study were to:

- determine whether current corn hybrids respond similarly to row width
- determine whether hybrid response to row width is affected by plant population.

## Yield averages good

Averaged over three years, the narrowing of rows and increased plant populations had a beneficial effect on yields. However, in 1993 growing conditions were abnormal at each location. Rainfall during the growing season exceeded long-term average by approximately 50 percent. Growing degree day accumulations in May and

June were also approximately 13 percent below long-term averages at all three locations. These climatic

**M**ost corn in the northern Corn Belt is grown in 30-inch rows or wider. Recommended populations range from 24,000 to 28,000 plants/A. Average population at harvest for corn grown in Minnesota in 1995 was 26,400 plants/A, up from 18,200 plants/A in 1975 and 22,200 plants/A in 1985.

The trend has been toward narrower row width and an increase in plant population. Between 1930 (12,400 plants/A) and 1979 (20,200 plants/A), average yields in Minnesota increased from 32 to 100 bu/A.

conditions resulted in below normal yields in 1993. This is accounted for in our three-year average.

*Row width.* Averaged over three years, corn planted at Lamberton and Waseca in 10- and 20-inch row widths yielded 7.2 percent more than 30-inch

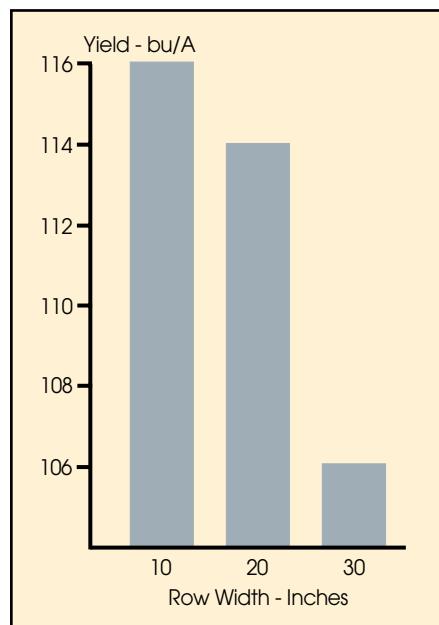


Figure 2. Effect of row width on corn yield, Morris, Porter et al., University of Minnesota, 1992-94.

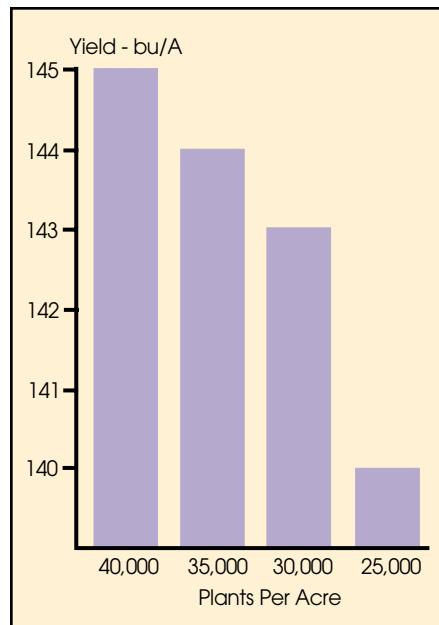


Figure 3. Effect of plant population on corn yield, Lamberton and Waseca, Porter et al., University of Minnesota, 1992-94.

row widths (Figure 1). Note there was no significant difference in grain yield between 10- and 20-inch row widths. At Morris, average yield increase for 10- and 20-inch row width, compared with 30-inch, was 8.5 percent (Figure 2).

*Plant population.* At Lamberton and Waseca, average yield increase was highest with densest population (40,000 plants/A) as seen in Figure 3. Regression analysis of yield versus harvest plant population was significant in 1992 and 1994 at Lamberton, and in 1994 at Waseca, with maximum yields obtained at



Figure 4. Effect of plant population on average corn yield, Morris, Porter et al., University of Minnesota, 1992-94.

populations of approximately 41,000, 35,000, and 31,000 plants/A, respectively. At Morris, effect of plant population on yield was not consistent across row widths. Yields at 10- and 20-inch row widths were essentially the same across the three plant populations, whereas yields on 30-inch rows were lower at 27,000 plants/A compared to yields of 10- and 20-inch rows. Regression analysis of yield versus harvest plant population was

significant in 1993 and 1994, the only years harvest plant populations were recorded. In averaging both years a harvest population of 32,000 plants/A, the highest population tested, resulted in the highest yield (Figure 4).

*Hybrid* influenced grain yield at all three locations. Hybrid effect on yield was consistent regardless of row width and plant population. At Lamberton and Waseca, DK512 had the highest average yield, followed by P3563 then G4372 (Figure 5). However, these results were not consistent across locations and years. In 1993, the year with the lowest yields, G4372 yielded less than the other two hybrids at Lamberton, but more than the two other hybrids at Waseca. At Morris, P3751 yielded more than either N3624 or DK421 when averaged over the three years (Figure 6).

#### Procedure

*Locations.* Field research was conducted in Minnesota from 1992 through 1994 at the West Central, Southwest, and Southern Experiment Stations at Morris, Lamberton, and Waseca, respectively.

*Soil type* at Lamberton and Waseca is a fine, loamy, mixed, mesic Typic Haplaquoll. At Morris it is a fine, loamy, mixed noncalcareous Typic Haplaquoll.

*Plots.* At Lamberton and Waseca, factorial experiments were established in a randomized complete block design with a split plot layout where three row widths were randomly assigned to main plots in each of four replicates. All combinations of four plant populations and three corn hybrids were randomly assigned to subplots. At Morris, experimental design was a 3 x 3 x 3 factorial with four replicates in a randomized complete block design. Size of each subplot was 10 by 30 feet

at Lamberton and Morris, and 10 feet by 26 feet at Waseca.

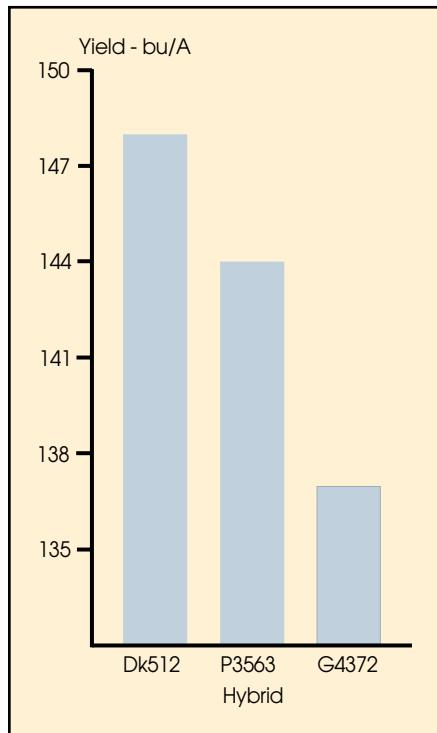


Figure 5. Effect of hybrid on corn yield, Lamberton and Waseca, Porter et al., University of Minnesota, 1992-94.

*Seeding rate* at Lamberton and Waseca was 125 percent of the target plant population, and stands were hand-thinned to the target population. At Morris, seeding rate was 110 percent of the target population with no thinning.

*Tillage*. All fields were fall chiseled, except at Lamberton, in the fall of 1992 when no fall tillage was performed. Spring tillage prior to planting was with a field cultivator.

*Fertilizer*. Nitrogen rates were based on previous crop. P and K fertilizations were based on soil tests to achieve optimum yields. Nitrogen was spring-applied prior to planting.

---

Dr. Porter is assistant professor, and Drs. Hicks, Lueschen, Ford, and Warnes are professors, and Hoverstad is agronomist in the Department of Agronomy, University of Minnesota.

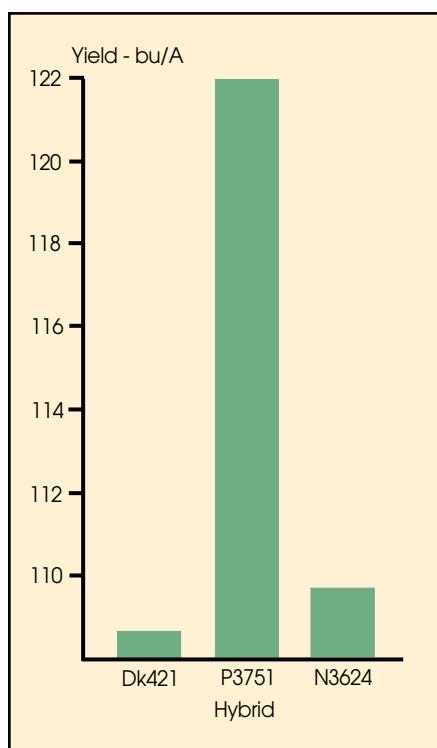


Figure 6. Effect of hybrid on corn yield, Morris, Porter et al., University of Minnesota, 1992-94.