Corn Row Spacing and Equidistant Planting in 2010

Two of the several cultural practices that can affect corn yield potential are row spacing and plant populations. The optimum row spacing and plant density in corn production continues to narrow and intensify, as corn genetics evolve. Similarly, it has been reported that narrow rows can increase corn grain yield only in the presence of both high plant populations and high soil water supply.

Background

A three-year Monsanto trial conducted from 2007 to 2009 has shown that the yield potential of corn grown in single- and twin-row configurations can vary, depending on the growing season and environmental conditions. In 2007-2008, the twin-row model outyielded the single-row configuration at all planting populations, while in 2009 the single-rows outyielded twin-rows at all populations. Generally, the twin-row and optimum plant populations are the two factors that can help attain maximum yield potential. Research has shown that corn planted in twin-rows has more equidistant (EQ) plant spacing, which should minimize the effects of water, nutrients, and light interception competition among plants, especially early in the season and before a complete canopy is formed.

This can enhance the plant’s ability to cope with stress conditions throughout the season. In 2009, Monsanto research in Gothenburg, NE has shown that yield is affected by the combination of row spacing, plant population, irrigations, and corn genetics. Additionally, results show that different hybrids prefer different plant densities.

Study Guidelines

A demonstration trial was conducted in 2010 at the Monsanto Learning Center near Gothenburg, NE to determine yield response of corn to different combinations of row spacing and plant populations. Three row spacings of 15, 30, and 36 inches and four plant populations of 24,000, 36,000, 50,000, and 70,000 plants/acre were evaluated. Two corn hybrids with relative maturities (RM) of 110 and 112 were planted on April 27th in single- and twin-row configurations.

The EQ planting system consisted of one corn hybrid planted at 24,000, 36,000, 50,000, and 70,000 plants/acre and in a row spacing of 30 inches. Plots were hand planted (Figure 1) using stencils and were hand harvested. Each plot was 145 ft x 10 ft. Plots were fertilized with 200 pounds nitrogen as urea. Irrigation of 1.5 inches was applied during the growing season.
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Additionally, corn plants received 21 inches of water through rainfall. The 2010 growing season was wetter than normal, but after slow growth and development, enough heat units were accumulated to hasten corn growth, reaching physiological maturity faster than in the 2009 season.

Results and Discussions

Figure 2. Effect of single-and-twin-row spacing on the average yield of two corn hybrids.

Figure 3. Response of an individual corn hybrid to single-and-twin-row spacing.
Regardless of the hybrids, yields in the twin-row model with 30” spacing and a single-row configuration with 36” spacing performed better than that in a single-row configuration with 30” and 15” spacing (Figure 2). The latter (15”) had the lowest yield among all treatments (Figure 2) and the lowest harvest population (data not shown), which might be due to the planting method.

Hybrid 1 (112RM) yielded better than hybrid 2 (110RM) across treatments, except in the 30” spacing treatment (Figure 3). Hybrid 1 in the 30” spacing had the highest grain moisture (17.2%) and root lodging, which may be due to replanting after (data not shown) nutrient applicator. There were no noticeable differences in corn ear size between the hybrids grown under different treatments throughout the season. Normally, late maturing hybrids intercept more light than early maturing hybrids because a late maturing hybrid has more and larger leaves. Therefore, early maturing hybrids should generally be planted thicker than late maturing hybrids to compensate for their sparse leaf canopies.

**Equidistant and 30” planting system**

Except at 36,000 plant population, the standard 30” row spacing outperformed the EQ planting system (Figure 4). The highest yield, 292.7 bu/A, was recorded with 30” rows at a planting population of 50,000 plants/acre. The lowest yield was recorded in EQ with a plant population of 24,000 plants/acre (data not shown).

Higher plant density was found to have a greater effect on yield than row width or planting system. Ear size was impacted by the planting systems. Throughout the season, differences in ears size were noticeable between the 30” row spacing and the EQ planting system, especially in the higher plant populations. Figure 5 shows that corn ears in EQ in 30” row spacing are noticeably larger that corn ears in 30” single-row spacing. In addition, corn plants in EQ system had larger stalks and were greener than plants in the 30” single-row spacing. However, there was more stalk lodging in EQ plots with the high population compared to the 30” row spacing, which might be due to the planting method. Planting depths in EQ plots were inconsistent and fertility may have needed to be higher.

![Figure 4. Response of a corn hybrid to combinations of equidistant (EQ) and 30” row spacing to three plant populations.](image-url)
It was also noted that corn plants in the EQ system with higher populations may need higher amounts of fertilizer to produce comparable yields to the 30” planting system.

**Conclusions**

- Planting populations higher than 50,000 plants/acre had a negative impact on corn yield potential.
- Corn under adequate soil moisture and a higher plant population produces more yield in narrow rows compared to corn with a lower plant population and wider row spacing.
- Selection of the right hybrids is essential to help achieve maximum yield potential. Hybrids developed in recent years are able to withstand higher plant density levels than older hybrids.


**Figure 5.** Ear size comparison between corn planting systems at equidistant (EQ) (right) and at 30” spacing (left).
Figure 6. Geometric shape of equidistant corn in the midseason and during harvest.

geometric shape in which the equidistant corn is planted.
Figure 7. Geometric shape of corn in single-and-twin-row in midseason and before harvest.

The information discussed in this report is from a single site, three-year demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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