Effect of Row Spacing on Corn Yield Potential

- Potential yield increases due to narrow rows have been more consistent in northern regions.
- Variability in yield potential from narrow row spacing can occur from year-to-year.
- Corn product selection and population are important to consider with respect to row configuration.

Background

Prior to mechanization, row spacing was determined by the amount of space needed for farm animals to pull equipment between rows. In the 1960's, adoption of narrower rows started when research showed potential yield increases in 30-inch corn rows compared to 38-inch rows.[1] Due to the on-going goal of increasing yield potential, research continues to compare the pros and cons of 30-inch rows to corn rows with narrower spacing.

Pros of Narrow Corn Spacing

The potential benefits of narrow row spacing (< 22.5 inches) can include:

- Equidistant in-row plant spacing. In theory, a more equidistant spacing within the row will help minimize competition among plants for water, nutrients, and light.[2] Less competition among plants can help when stress factors are present.
- Better weed control. Narrow rows can allow for faster canopy closure and more shading, which can improved weed control.[3]
- Less water loss to evaporation. Narrow rows shade the soil surface earlier in the season, keeping soil moist longer due to less evaporation.[4]
- Consolidating farm equipment. Narrow rows may allow growers to use one planter for multiple crops.
- Higher yield potential. The benefits mentioned above may help to increased yield potential.

Cons of Narrow Corn Spacing

Potential disadvantages of narrow row spacing can include:

- Increased compaction from farm equipment when planting in narrow rows.[1]
- Mechanical cultivation and postemergence herbicide applications may be more difficult in narrow rows.[3]
- Extra expenses associated with switching to narrow rows, which can include: a new or modified planter, rims and tires, increased rates of insecticide and starter fertilizer.[3]

Twin Rows

An alternate option to narrow row spacing is planting in twin row configuration. Twin rows have a 30- or 38-inch center, which is flanked by twin rows that are 7.5 inches apart and synchronized to have uniform triangular spacing (Figure 1). The benefits of twin row spacing are similar to those of narrow row spacing. For cotton growers, twin row spacing allows corn and soybean to be planted in twin rows with the same equipment used to plant cotton in a single row formation.

Research

Overall, the northern Corn Belt has shown the most consistent increase in yield potential due to narrow row spacing. Research from the northern states of Minnesota, Wisconsin, and Michigan indicated a 7-10% yield advantage for corn grown in 15- or 20 -inch rows compared to a 30-inch row spacing.[2,4]

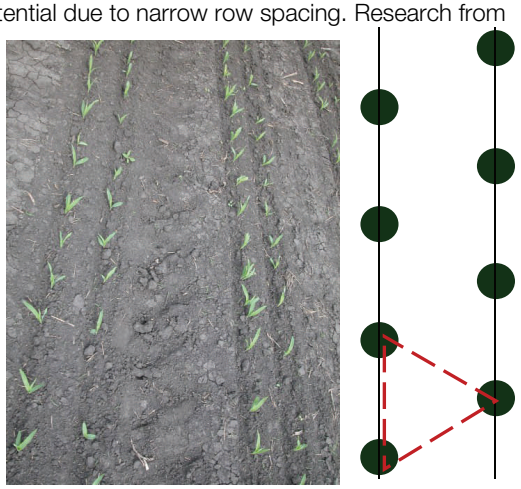

Figure 1. (Left) A twin row planting with a 38-inch row center. (Right) Twin row planting that is correctly staggered or synchronized forms a triangle between plants in the twin rows.

University of Minnesota indicates the more consistent yield increases from narrow rows in the north can be attributed to the shorter growing season and the need for earlier maturing corn products.[2] The earlier maturing corn products produce fewer leaves and requires less time from emergence to silking, which results in less leaf area available to intercept sunlight. Narrow rows help to reduce plant competition and optimize sunlight interception which benefits shorter-season corn products.

Effect of Row Spacing on Corn Yield Potential

Research from the central Corn Belt has shown a lower and more variable potential yield response, due to year-to-year variability. Purdue University reported an average yield increase of 2.7% for the 15-inch row spacing compared to 30-inch row spacing in a three year, three location study.[3] However, a year-to-year look at the data showed yield increases ranging from -3.1% to +8.2% for the 15-inch row spacing compared to the 30-inch row spacing. In a three year study, Iowa State University reported no yield differences for narrow row spacing at all locations and corn products, while other research has reported yield increases in the central Corn Belt up to 5%.[1,3]

The Monsanto Learning Centers have conducted demonstrations comparing various single and twin row spacings. The three-year average (2008-10) from demonstration plots at the Monsanto Learning Center at Gothenburg, NE, the 30-inch twin row spacing and a single row 36-inch spacing both out yielded the 15- and 30-inch single row configurations (Figure 2). A similar non-replicated, one-year demonstration conducted at the Monsanto Learning Center at Scott, MS compared a 114 relative maturity (RM) corn product and a 116 RM corn product at 30- and 38-inch single row spacings and 38-inch twin row spacings (Figure 3). The study indicated that the 30-inch single rows had the highest yield potential, but growers can increase yield potential with narrow rows if a corn product is selected that responds to higher plant populations. The contrasting results of these studies indicate the variable nature of yields from year-to-year in different row spacings. However, the most important decisions to make, regardless of row spacing, are product selection with relation to planting population.

Corn Product Selection

When planting narrow rows and/or higher populations, product selection is essential to help achieve maximum yield potential. Stalk breakage may become more prevalent for some corn products when planted in narrow rows and/or at higher populations. Choose corn products that are rated with a high yield potential when planted in narrow and/or high populations. Typically, newer corn products are able to withstand higher plant density levels than older corn products. Contact your local area agronomist for more information.

Summary

Potential yield increases due to narrow row spacing are higher and more consistent in the northern Corn Belt. Growers should recognize the potential year-to-year variability of yield response to narrow rows in the central Corn Belt and southern regions that can occur. Selecting the best product and planting at the optimal population are the most important decisions regardless of row spacing. Additional considerations when adopting narrow row spacing are: equipment consolidation, cost of new or modified equipment, and changes to management practices.

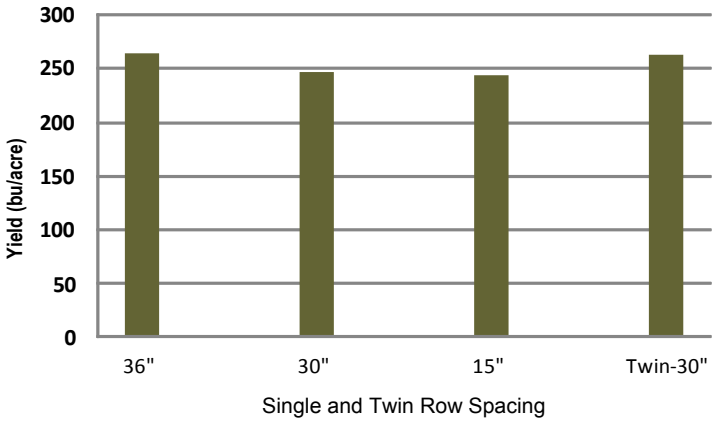

Figure 2. Yield response of corn to 15-, 30-, and 36-inch single row and 30-inch twin row spacings at the Monsanto Learning Center at Gothenburg, NE 2010.

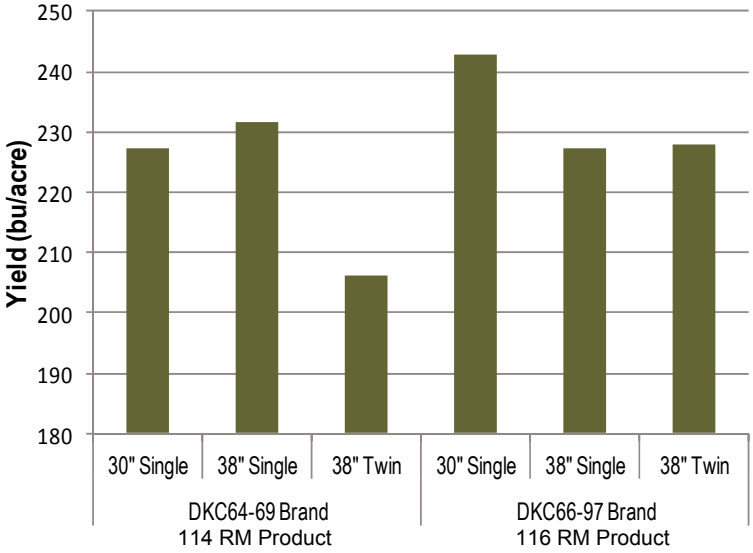

Figure 3. Yield response of a 114 relative maturity (RM) corn product and a 116 RM corn product to single and twin row spacing at the Monsanto Learning Center at Scott, MS 2012.

Sources: [1] Pecinovsky, K.T., Benson, G.O., and Farnham, D.E. 2002. Corn row spacing, plant density, and maturity effects. Iowa State University. Northern Research and Demonstration Farm. Publication No. ISRF02-13. [2] Stahl. L., Coulter, J., and Bau, D.2009. Narrow row corn production in Minnesota. University of Minnesota Extension. Publication No. M1266 2009. [3] Nielsen, R.L. 1997. Perspectives on narrow row spacings for corn (less than 30 inches). Purdue University. Publication No. AGRY-96-17. [4] Laurer, J. 1996. Planting corn in rows narrower than 30-inches. University of Wisconsin. Agronomy Advice. Publication No. Field Crops 28.423-8 [5] Gothenburg, NE Learning Center Summary. 2010. Corn row spacing and equidistant planting in 2010. Monsanto Technology Development. The Learning Center at Gothenburg, NE Demonstration Report. [6] Scott, MS Learning Center Summary. 2012. Evaluation of three corn row configurations. Monsanto Technology Development. The Learning Center at Scott, MS Demonstration Report. Web sources verified 10/6/15. 130922070109

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development, & Agronomy by Monsanto.