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Abstract
Increased seeding rates have ignited corn yield increases over the years. If seeding rates are the spark, hybrid genetics fuel the increase. It takes both high seeding rates and high-yielding hybrids that can tolerate increased plant-to-plant competition to maximize yields. If hybrids were not bred to tolerate increased seeding rates, we would have fields of flat corn at harvest. Older hybrids simply cannot tolerate today's seeding rates without severe lodging and/or barrenness.

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Seeding Rates in Relation to Maximum Yield and Seed Costs

May 5, 2008

By Roger Elmore and Lori Abendroth, Department of Agronomy

Increased seeding rates have ignited corn yield increases over the years. If seeding rates are the spark, hybrid genetics fuel the increase. It takes both high seeding rates and high-yielding hybrids that can tolerate increased plant-to-plant competition to maximize yields. If hybrids were not bred to tolerate increased seeding rates, we would have fields of flat corn at harvest. Older hybrids simply cannot tolerate today's seeding rates without severe lodging and/or barrenness.

As seeding rates and seed prices both increase, we must assess whether adding an additional unit of seed covers the cost of that seed. We discussed this topic in an article last year. Yet, dramatic changes have occurred since then because of high prices for both
grain and seed. In our February 2007 version we used a corn price of $3.00 per bushel and seed prices ranging between $1.00 and $2.50 per 1,000 seed; this equated to $80 to $200 per 80,000 seed unit.

Today, an 80,000 seed unit of hybrid corn containing a triple stack of resistant traits is priced at over $200 per unit; with discounts that are available at times, the seed may cost approximately $160 per unit in the end. Hybrid seed costs have increased, for multiple reasons, with grain prices to an all-time high.

In addition to these price changes, new research data has accumulated concerning the response of today’s hybrids to seeding rates. Our previous analysis of seed costs related to maximum yield was based on seeding rate data collected by Dale Farnham (former ISU corn agronomist) at six locations over four years.

Our research group continues to conduct seeding rate studies around the state, with ten locations planned for 2008. The data summarized here is from ten research locations in 2006. Averaged across all locations, corn yield was maximized when seeding rates were near 36,000 seeds per acre (see Figure 1).

![Figure 1. Corn grain yield at varying seeding rates](image)

**Figure 1. Corn yield as a percent of maximum at varying seeding rates. Data is averaged across 10 locations in 2006. Iowa State University.**

Given this relationship and a range in seed prices we can generate figures to better understand where we obtain the optimum value from the seed; or instead we could say, the maximum return to seed. Figures 2 and 3 identify the net income associated with the variation of seeding rates and seed prices. Figure 2 displays the interaction of these multiple factors when yield levels are near 180 bushels per acre. Figure 3 is for yield levels near 220 bushels per acre.
Figure 2. Variable seed prices alter the net income associated with different seeding rates for a field that yields 180 bushels per acre corn. Net income derived by using a corn grain price of $5.50 per bushel and is based solely on the seed price, seeding rate, estimated yield at specific seeding rates, and price per bushel. Each colored line represents the net income relative to a specific seeding rate, with 48,000 = 48,000 seeds/acre planted. Iowa State University.

Figure 3. Variable seed prices alter the net income associated with different seeding rates for a field that yields 220 bushels per acre corn. Net income derived by using a corn grain price of $5.50 per bushel and is based solely on the seed price, seeding rate, estimated yield at specific seeding rates, and price

per bushel. Each colored line represents the net income relative to a specific seeding rate with \(48,000 = 48,000\) seeds per acre planted. Iowa State University.

A few things are evident in an examination of Figures 1-3.

- The 36,000 seeding rate results in maximum yield (Figure 1) and maximum net income in yield scenarios, regardless of seed price. This is seen with the red line being at the top in Figure 2 and 3. This was true across all yield ranges between 180 and 240 bushels per acre (not all data is shown here).
- The 30,000 seeding rate provided a slightly lower net return than 36,000 but was not drastically different. Producers may need to lower their seeding rates to compensate for higher seed costs. Notice that as seed prices increase towards $3.00 per 1000 seed unit ($240 for 80,000 unit), the difference in net income lessens between 30,000 and 36,000.
- Profitability is reduced with higher seeding rates. Note that 42,000 (blue line) and 48,000 seeds per acre (brown line) have significantly lower net returns in both yield levels.
- A 24,000 seeding rate results in lower returns and lower yields but does not cause as serious of loss of income as the 48,000 seeding rate.
- Given our current data base for seeding rate responses and the current grain and seed price relationship, it appears that a seeding rate of approximately 36,000 seeds per acre will maximize not only yield but also net income. Net income will change when seeding rates vary from this 36,000 targeted seeding rate.

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