

BETWEEN THE ROWS

April 26, 2012

KEY AGRONOMIC PRACTICES THAT IMPACT A GROWER'S SUCCESS

ISSUE: 13

Introduction and Background

Many growers take traditional agronomic practices for granted. But this report uncovers the true impact of some agronomic decisions and may cause growers to rethink their traditional practices and the impact each may have on corn performance.

State average corn yields continue to trend upward every year, but are substantially behind yields reported by National Corn Growers Association's corn yield contest. Winning entries for 2011 ranged from 288 Bu/Ac to an incredible 429 Bu/Ac. The hybrids used by these contest winners are the same hybrids planted by many corn growers across the Corn Belt. Not all of the production practices used in the contest are economically feasible for most growers, but it does demonstrate the high yield potential of corn hybrids used today. How do we close the yield gap between the average grower and the contest winner?

Management Decisions That Make a Difference

Dr. Jeff Coulter, an Extension Agronomist at the University of Minnesota, recently identified key agronomic practices that impact a grower's success. Two factors not mentioned are soil fertility and pest management (both insects and diseases). He considers both to be prerequisites for high yield corn. Research illustrates the impact of these factors on performance. The list of factors along with the potential yield changes isolates items that can improve overall performance.

Rank	% Yield impact	Agronomic Factor
1	36-63%	Hybrid selection
2	5-19%	Crop rotation vs continuous corn
3	6-15%	Tillage system for continuous corn
4	5-9%	Uniform emergence and early growth
5	5%	Late and mid-season hybrids vs early hybrids

The next 4 factors had much less impact on performance:

6	2-5%	Planting date
7	1-2%	Population of 34,000 vs 30,000
8	1-2%	Within row plant spacing
9	0-3%	Narrow or twin rows vs 30 inch rows

Hybrid Selection

Four years of yield data from University of Minnesota yield trials at Rochester, MN were examined. Their findings illustrate the impact hybrid selection has on the bottom line. Return to the grower was between 36% to 63% when comparing the highest to lowest yielding hybrids. Few other decisions can make that large of an impact.



Selecting proven, well adapted hybrids with high yield potential can make a large impact on overall performance. Seldom is a single hybrid the best performer in consecutive years. But when growers plant several top performers, they effectively reduce the risk of average performance by one product while maximizing whole farm yield and chances for success.

Crop Rotation vs. Continuous Corn

Growers are aware of improved corn yield performance when corn follows soybeans. Research data from long term studies confirms this yield enhancement and demonstrates a 7-19% yield improvement for corn following soybean or alfalfa. Crop rotation also reduces some of the added nitrogen requirements to produce economical yields. However, if the price ratio of corn to soybeans is high enough and yields of continuous corn can be maintained at a high level, then economics may dictate continuous corn can be advantageous over the long term as many growers can attest.

Tillage System for Continuous Corn

Tillage systems for corn-soybean rotation have only a small impact on corn performance. However, when planting continuous corn, tillage has a much larger impact on corn performance. The impact from tillage on continuous corn performance can be different depending on soil type.

Aggressive tillage on heavier silty clay loam soils appears to make a greater impact on yield performance compared to tillage on light to medium soils (loams). Yield improvements of 13-15% from aggressive tillage were reported on heavier soils compared to about 6% on lighter soils.

Continuous corn production is greatly impacted by surface residue from the previous crop of corn. Incorporating most of the residue improves conditions on the newly planted crop as it relates to soil moisture, temperature, and aeration, and can reduce some disease potential. Residue management is key in many continuous corn production systems.

Uniform emergence and early growth

A fast-emerging uniform stand creates the potential for maximum yield. But a research study analyzed showed conditions that cause delays and non-uniform emergence can reduce yield potential. Individual plants that are two leaf stages delayed compared to the rest of the stand can yield 65% of normal plants. When these delayed plants are about 16% of the stand, overall yield is reduced by 5%, the study reveals. Larger growth stage differences cause greater yield reductions.



This study demonstrated the importance of uniform emergence. Any plant delayed compared to the rest of the stand is at a competitive disadvantage. So planting into less than optimum conditions can reduce yield potential if slow or erratic emergence occurs.

Planting Date

The optimum planting window in most of the Midwest is April 20 to May 12. No yield advantage has been identified for earlier planting but some yield reduction starts to occur in mid to late May. The optimum date is not the same every year, but generally falls within that 3 week period.

Later planting may also have top performance in some years depending on the growing season. Early planting is very common as growers want to get the corn crop through the pollination period as early as possible. An April planting usually places pollination in early July, before high temperatures and the related stresses typically prevalent in late July.

Stress that occurs during pollination may have a large impact on yield. Early planting helps reduce the risk of heat or related stress impacting the growing crop during pollination.

Plant Population

Several university trials identify the optimum plant population for maximum yield to be between 34,000 and 37,500 plants per acre. This range is for most productive Midwest soils of good water holding capacity. This range is higher than previous studies from several years ago, demonstrating the improved adaptability of newer hybrids to higher population usage.

To attain a final stand within this range, planter settings may need to be set 5-10% higher. Yield prospects from increasing plant population from 30,000 to 34,000 plants have only demonstrated a 1-2% yield increase. So, the important message is not the 4000 plants per acre stand increase, but getting your final stand into the optimum range. Maximum yield is attained when you are in the range.

Hybrids on the market today are developed and tested for use under high plant populations. Following the recommended populations for the hybrids planted can provide the best opportunity for achieving maximum yield.

Uniform within Row Spacing

With today's planting equipment, it is certainly possible to achieve near perfect picket fence stands. Many growers have excellent skills in planter maintenance and operation. But constantly changing field conditions, residue management and equipment operation can cause poor placement or erratic spacing.

Research has demonstrated that when equipment causes kernels to drop as doubles or triples causing irregular spacing, there is an impact on yield. However, only 1-2% yield reductions were documented with this spacing irregularity. A more important factor impacting yield is uneven emergence. Planters that may cause some irregularities in spacing will impact yield less compared to seed placement that may cause uneven emergence or delayed germination.

Narrow or Twin Rows Compared to 30" Rows

Row width narrower than 30" is thought to provide less plant-to-plant competition and provide higher potential yields. This is because narrow row widths may more effectively support higher overall plant populations.

Research, however, has not shown a consistent yield advantage with narrow rows compared to 30" rows. Research results are nearly the same for twin row planting compared to 30" rows.



Consistent yield increases are difficult to demonstrate when utilizing narrower rows due to the growing season interaction. So, many other agronomic practices can make a larger impact on performance. The impact from using narrow rows may only improve yield prospects from 0-3%. Growers should focus on practices that make a larger impact on performance before considering narrow rows or twin rows.

Summary and Management Considerations

In this report, several management decisions were identified that could have a large impact on overall performance for the grower.

The ability to market top performing hybrids and help growers correctly place those hybrids has the single most significant impact on corn grower success. At least two of the top five factors discussed above relate to hybrid selection and the maturities utilized by growers. Growers who consistently plant top performers will be at a competitive advantage compared to their peers.

The other key agronomic factors that can improve a grower's overall yield are related to cropping tillage, rotation, and uniform emergence and early growth. Several other factors also can help improve performance, but with much less impact. Growers need to concentrate on the agronomic factors that have the largest impact on yield first. Then the remaining management decisions can help improve a grower's prospects for high overall performance.