



Tailored Solutions – Corn Systems Management

Trial Objective

- Farm operations aim to maximize yield potential and profitability by careful deployment of inputs and practices with the best return on investment (ROI).
- With the current market trend, growers contemplate cutting production costs by eliminating or reducing some inputs.
- The objective of this trial was to determine the economic value of two production systems:
 1. Grower standard system
 2. Premium system (higher inputs)

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Planting Rate (seeds/acre)
Huxley, IA	Clay loam	Soybean	Strip tillage	5/16/19	10/28/19	220	33K, 38K

- Three SmartStax® RIB Complete® corn blend products with different relative maturities (RMs) were used for this trial:
 - 108 RM
 - 112 RM
 - 114 RM
- Each product was planted at both the premium and grower standard systems.
 - Grower Standard
 - 33,000 seeds/acre seeding rate
 - 160 lb/acre nitrogen applied pre-plant
 - Premium
 - 38,000 seeds/acre seeding rate
 - 160 lb/acre nitrogen applied pre-plant
 - 40 lb/acre nitrogen side-dressed at V6
 - Foliar fungicide and insecticide application at VT/R1
- The trial was carried out in 30-inch row spacing, 6 rows/treatment with 2 replications.
- Tillage and weed management were the same in both systems.



Tailored Solutions – Corn Systems Management

Table 1. Inputs and costs associated with the two production systems				
Treatment	Input	108 RM Cost (\$/acre)	112 RM Cost (\$/acre)	114 RM Cost (\$/acre)
Grower Standard	Seed	137.94	133.98	137.94
	Nitrogen	36.8	36.8	36.8
	Total	174.7	170.8	174.7
Premium	Seed	158.84	154.28	158.84
	Nitrogen	46.0	46.0	46.0
	Fungicide + Insecticide	22.0	22.0	22.0
	Total	226.8	222.3	226.8

32% UAN was used as the nitrogen source. Delaro® 325 SC fungicide was the fungicide used and Mustang® Maxx was the insecticide used.

Understanding the Results

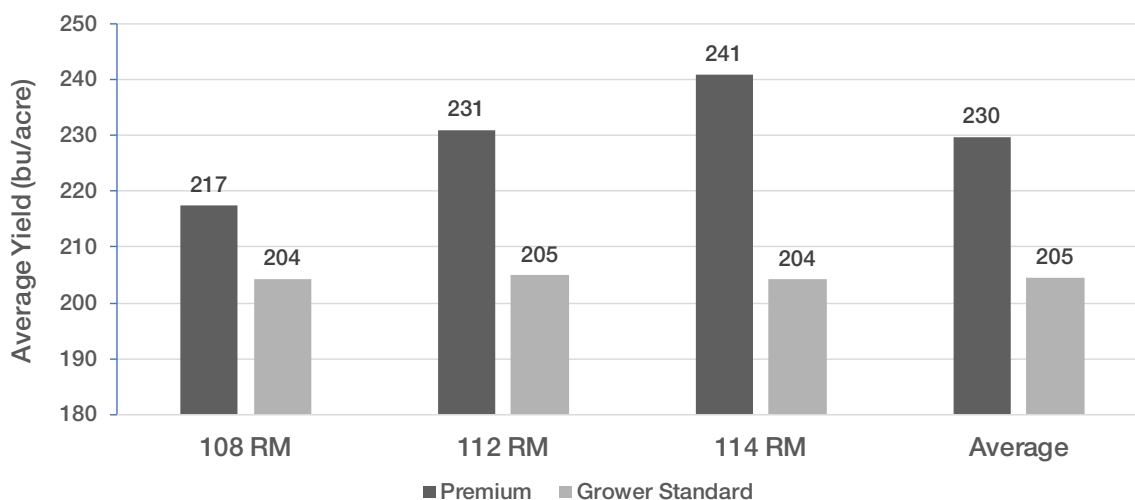


Figure 1. Yield response of the corn products to two different production systems. Average represents the average yield of the three corn products for each production system.

- The premium system out-yielded the grower standard, producing an average of 25 bu/acre more yield across all three corn products.
- In this trial, as we increased product relative maturity (RM), we saw a better response to higher management (greater inputs).
- With the current grain price of \$3.50/bu, about 15 bu/acre is required to break even with the extra inputs in the premium system in all three corn products.

Key Learnings

- Crop yield response to production inputs can be highly variable, often impacted by the environmental conditions during the growing season. Farmers are therefore advised to consult their trusted crop advisors when making such decisions.



Corn Yield Response to Row Spacing and Seeding Rate

Trial Objective

- Row spacing is usually a standardized or fixed practice in most operations. Unlike nitrogen and weed management, which can be altered from year to year, most farmers don't vary their row spacing between years. This is due, in part, to high capital investment in farm equipment.
- Proper row spacing allows plants room to explore for nutrients and minimizes the adverse effects of competition from neighboring plants. In Iowa, and in most regions of the Midwest, 20 inches and 30 inches are the most common row spacing configurations.
- Coupled with seeding rate, row spacing impacts canopy closure and weed control, disease development, late-season plant standability, and ultimately yield potential. The objective of this trial was to evaluate the effects of 20- and 30-inch row spacings on corn yield at three different seeding rates.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Fungicide Timing	Seeding Rate (seeds/acre)
Atlantic, IA	Silty clay loam	Soybean	Minimum	4/26/19	10/14/19	230	30K 35K 40K
Huxley, IA	Clay loam	Soybean	Conventional	5/16/19	10/28/19	220	30K 35K 40K
Storm Lake, IA	Clay loam	Soybean	Conventional	5/3/19	10/24/19	250+	30K 35K 40K
Victor, IA	Silty clay loam	Soybean	Conventional	4/24/19	10/16/19	250	30K 35K 40K

- Forty-five corn products were chosen to represent the northern, central, and southern corn-growing regions of Iowa. Products were planted at 30,000 (30K), 35,000 (35K), and 40,000 (40K) seeds/acre seeding rates in both 20- and 30-inch row spacings.
- Tillage, weed management, and nitrogen management were the same for all products at the respective locations.
- The trial was conducted in 10-ft by 30-ft plots with two replications at each location.

Understanding the Results

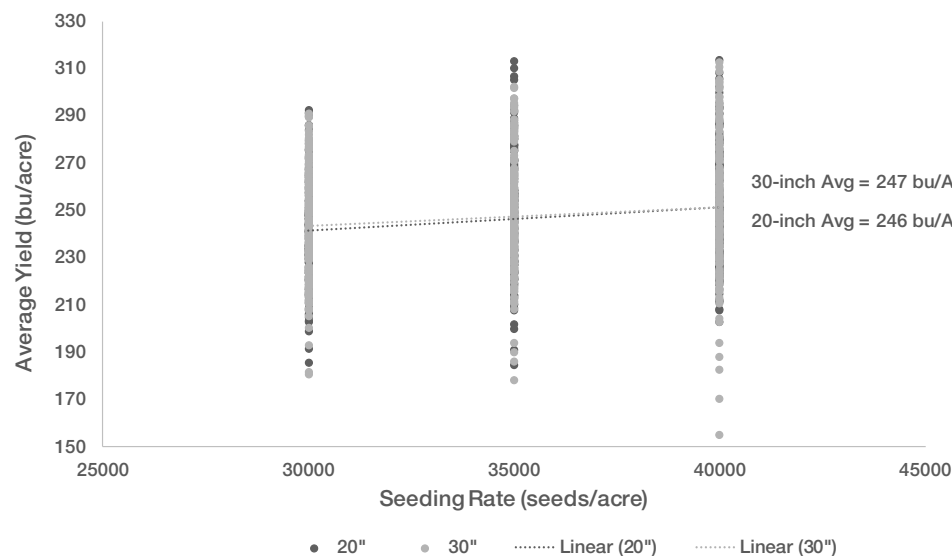


Figure 1. Effects of row spacing and seeding rate on the yield of corn products. Data represent 45 products from five growing regions in Iowa. The average yield represents the overall average across locations, products, and seeding rates.



Corn Yield Response to Row Spacing and Seeding Rate

Table 1. Summary of corn product performance due to row spacing and seeding rate.						
Row Spacing	Average Yield (bu/acre)			Grain Moisture Content (%)		
	30K	35K	40K	30K	35K	40K
20 inches	241	248	251	19.8	19.7	19.6
30 inches	243	248	251	19.9	19.8	19.8
Average	242	248	251	19.9	19.8	19.7

- There was a wide range of yield responses to seeding rate at each row spacing for the various products (Figure 1).
- In general, the average yield increased as the seeding rate increased in both row spacings. However, the two row spacings yielded nearly the same at each seeding rate, with an overall yield difference of just 1 bu/acre between them.
- Neither seeding rate nor row spacing had an impact on grain moisture content.
- In this trial, 58% of the products yielded higher in 30-inch row spacing than in 20-inch spacing at both the 30K and 35K seeding rates; whereas at the 40K seeding rate, 64% of the products yielded higher in 30-inch spacing than in 20-inch spacing.

Key Learnings

- In the past, each trial location has carried out several row spacing trials in which 20-inch row spacing consistently out-yielded 30-inch row spacing. However, those trials usually consisted of a limited number of products and that may, in part, be the reason for the different outcome of this study year.
- By virtue of plant configuration, 20-inches is expected to perform better than 30-inches, especially at higher seeding rates. It should be mentioned that with a few products, 20-inch row spacing out-yielded 30-inch row spacing at all seeding rates.
- Crop yield response to farm operations can be highly variable, often impacted by the environmental conditions during the growing season. Growers should make it a habit of testing new products/concepts on a small scale on their farm to see how it fits in their operation.
- Growers are also advised to consult their trusted agronomists and dealers in choosing the best products for their operation.



Corn Yield Response to Seeding Rate

Trial Objective

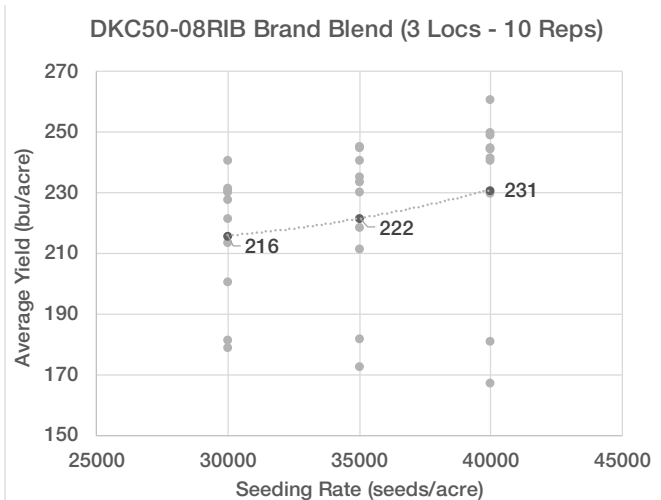
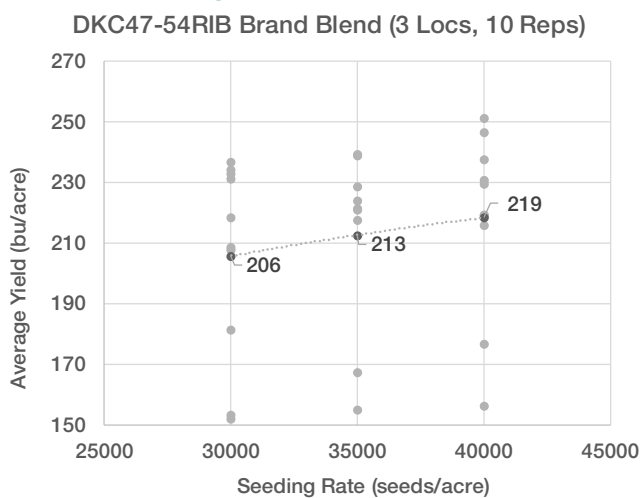
- In general, corn yield potential has continued to improve in the United States. Research has shown that corn yield has a positive correlation with planting density until a threshold is reached, beyond which yield decreases.¹ Defining the optimal density threshold for each corn product is difficult as it's highly affected by management practices and the environmental conditions during the growing season.
- Understanding the threshold is critical as it forms the basis for management decisions, such as nitrogen rate. The objective of this trial was to determine the optimum yield response of corn products to different seeding rates.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Atlantic, IA	Silty clay loam	Soybean	Minimum	04/26/19	10/14/19	230	30K 35K 40K
Huxley, IA	Clay loam	Soybean	Conventional	05/16/19	10/28/19	220	30K 35K 40K
Marble Rock, IA	Silty loam	Soybean	Strip tillage	05/07/19	10/18/19	200	30K 35K 40K
Storm Lake, IA	Clay loam	Soybean	Conventional	05/03/19	10/24/19	250+	30K 35K 40K
Victor, IA	Silty clay loam	Soybean	Conventional	04/24/19	10/16/19	250	30K 35K 40K

- Thirteen DEKALB® corn brand blends were selected to represent the northeast, northwest, central, southeast, and southwest growing regions of Iowa. Products were planted at 30,000, 35,000, and 40,000 seeds/acre.
- Tillage, weed control, and nitrogen management were the same for all products at the respective locations.
- The trial was conducted in 30-inch row spacing, with 10-ft x 30-ft plots per product and seeding rate at various replications based on the product (Figure 1).

Understanding the Results



Corn Yield Response to Seeding Rate

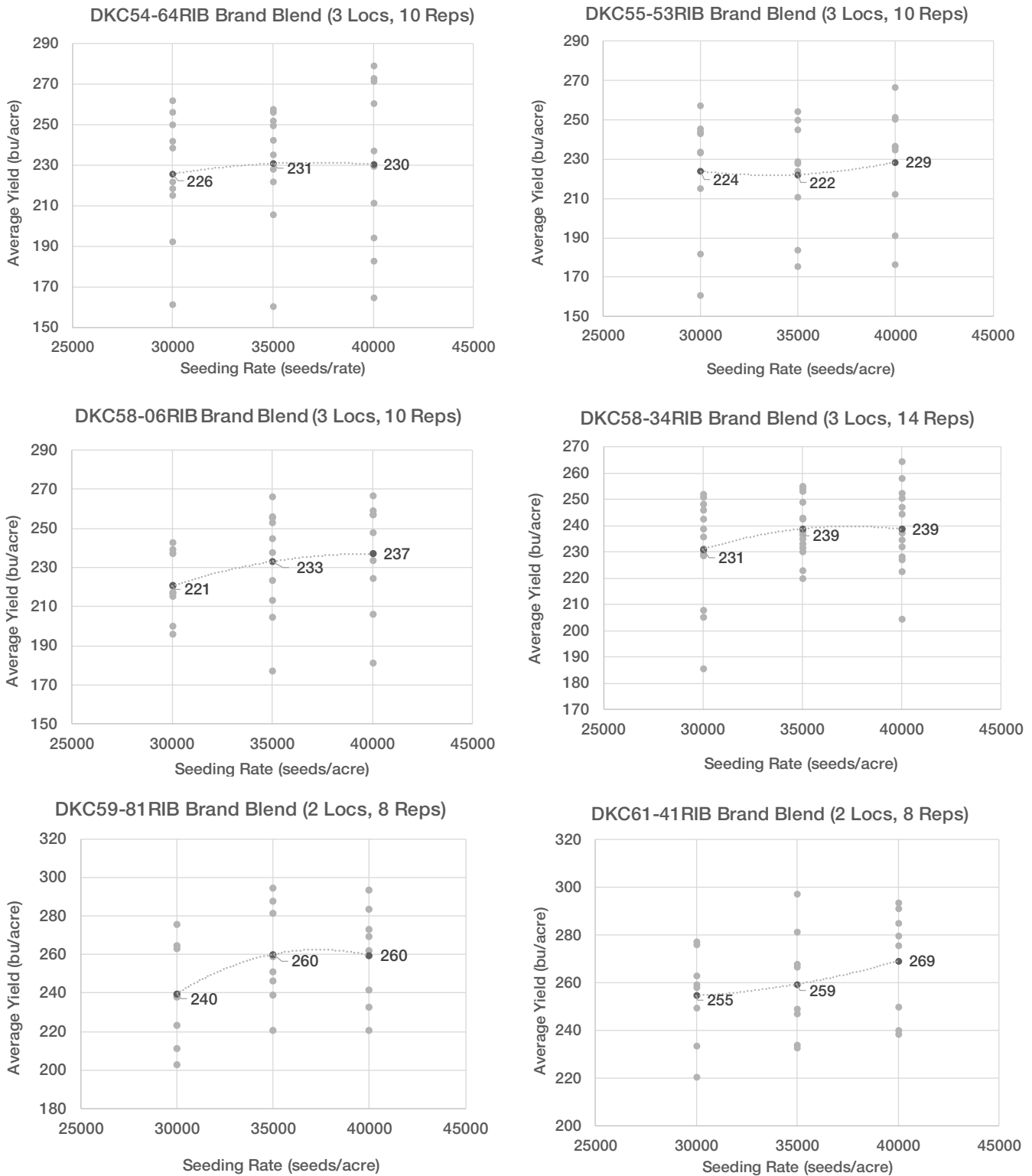


Figure 1. Yield response of DEKALB® corn brand blends to seeding rate in Iowa. The trendline indicates the average yield response at each seeding rate across the respective locations.



Corn Yield Response to Seeding Rate

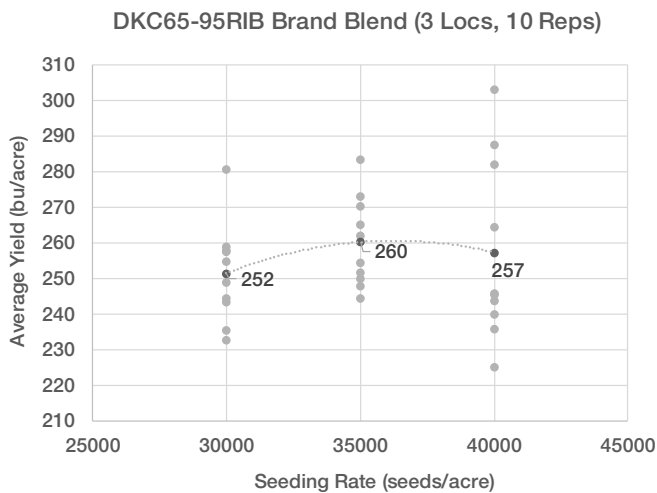
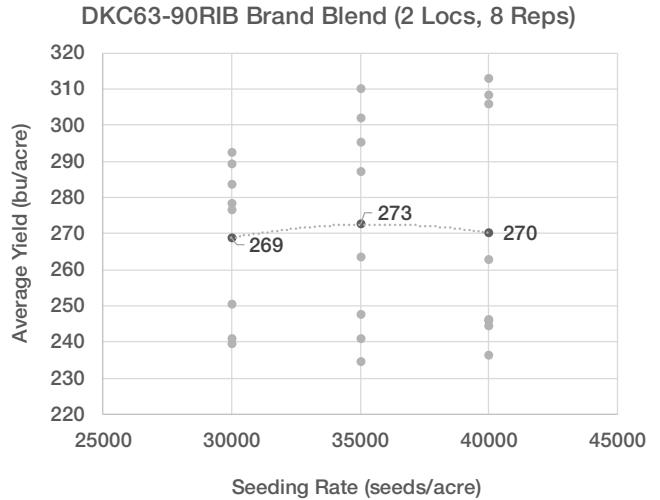
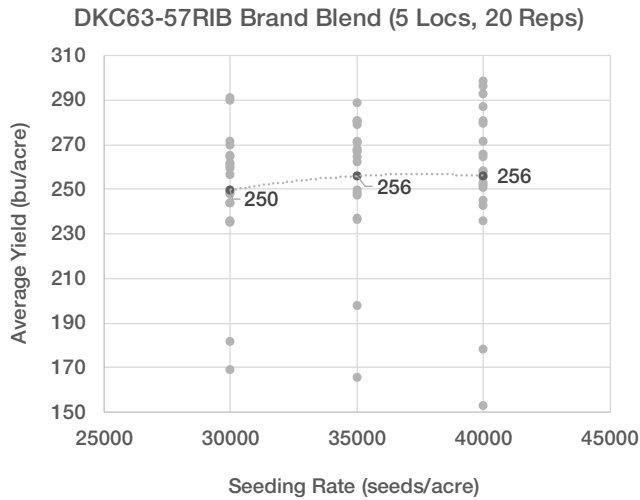
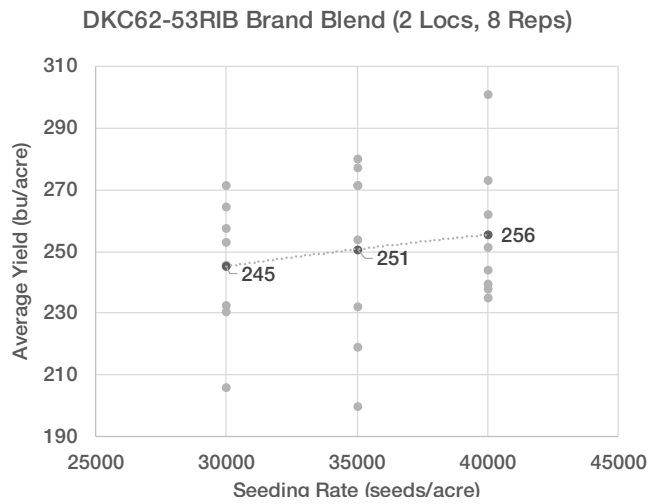
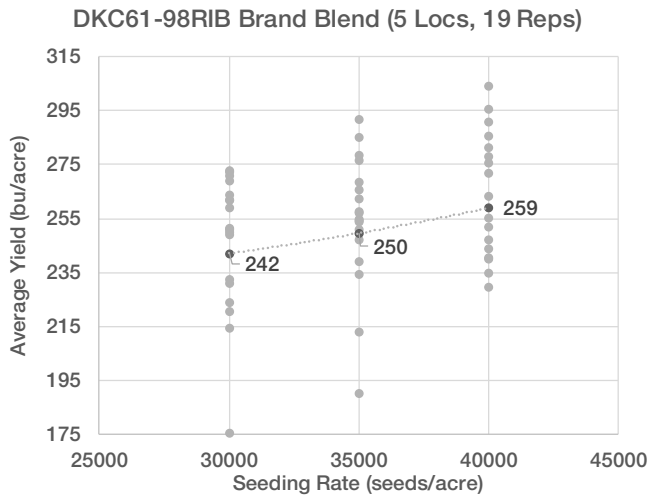


Figure 1. Yield response of DEKALB® corn brand blends to seeding rate in Iowa. The trendline indicates the average yield response at each seeding rate across the respective locations.



Corn Yield Response to Seeding Rate

- In 54% (7 out of 13) of the products, yield increased as seeding rate increased with the highest seeding rate (40,000 seeds/acre) having the highest yields.
- With the remaining products, yields were similar between the 35,000 and 40,000 seeds/acre seeding rates in three products (e.g. DKC58-34RIB brand blend), whereas yields decreased in the other three products (e.g. DKC63-90RIB brand blend) above the 35,000 seeds/acre seeding rate.
- Yields were lowest at the lowest seeding rate (30,000 seeds/acre) in all products except for DKC55-33RIB brand blend for this trial.

Key Learnings

- Several factors should be considered when selecting the seeding rate for a corn product. Key among these factors are plant standability, nitrogen fertility, and economic feasibility.
- In the current market environment, a 5 bu/acre yield increase is required for every 5,000 seeds/acre increase in seeding rate. Only 38% (5 out of 13) of the products tested produced an economic yield at the highest seeding rate (e.g. DKC50-08RIB and DKC61-98RIB brand blends).
- Crop yield response to operation inputs can be highly variable, often substantially impacted by the environmental conditions during the growing season. Growers should consider testing new products and concepts on a small scale on their farm to see how it fits in their operation.
- Bayer Crop Science uses an innovative planter technology called the Genetic Environment Narrative (GEN) planter to characterize corn product performance by evaluating yield response to plant density across different environments. The GEN planter provides the ability to simultaneously plant multiple corn products and quickly and accurately change planting populations as it moves across a field. These unique planting capabilities generate over one hundred thousand detailed yield observations each season across diverse growing conditions. This provides data to optimize product management recommendations for key corn growing regions in the United States. Please visit the population optimizer tool at <https://www.dekalbasgrowdeltapine.com/en-us/dekalb/tools/optimize-my-seed.html> for plant density recommendations for your region.
- Growers are also advised to consult their trusted agronomists and dealers in selecting the best products for their operation.

Source:

Nielsen, R.L. 2013. Thoughts about seeding rate for corn. Department of Agronomy, Purdue University. <https://www.agry.purdue.edu/ext/corn/news/timeless/SeedingRateThoughts.html>





Corn Product Response to Nitrogen Stress

Trial Objective

- The objective of this study was to characterize the yield response and harvest appearance of different corn products to nitrogen (N) stress.

Research Site Details

Locations	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Nitrogen Rate (low/high rate, lb/acre)
Storm Lake, IA	Silty clay loam	Soybean	Conventional	5/3/19	10/23/19	250	45/245
Marble Rock, IA	Loam	Soybean	Strip tillage	5/7/19	10/18/19	220	50/250
Huxley, IA	Clay loam	Soybean	Strip tillage	5/16/19	10/26/19	220	50/250
Victor, IA	Silty clay loam	Corn	Conventional	4/24/19	10/15/19	230	50/250
Atlantic, IA	Silty clay loam	Soybean	Conventional	4/25/19	10/14/19	250	50/250

- Sixteen DEKALB® corn brand blends were used in this study, an early relative maturity (RM) set (97-113 RM) and a late RM set (108-115 RM).
- The trial was set up as a split-plot design at each location with N rate as the blocking factor with 2 replications.
- Plot size was 4 rows at 30-inch row width, 35 feet long, and the center rows were harvested for data.
- Planting dates were near normal in the southern part of the state while slightly delayed across Northern Iowa.
- Nitrogen was applied before V3 stage. See the table above for N rates.

Understanding the Results

- Yield differences between products when grouped at the low N rate were not different statistically. The same was true of the high N rate.
- Products displayed N deficiency symptoms at the low N rate during most of the season.
- Yield differences within N rates can be attributed to germplasm by environmental interactions.
- Physical plant integrity i.e. harvest appearance of products at the high N rate aligned with the product guide rating. However, harvest appearance was slightly worse for products at the low N rate.

Corn Product Response to Nitrogen Stress

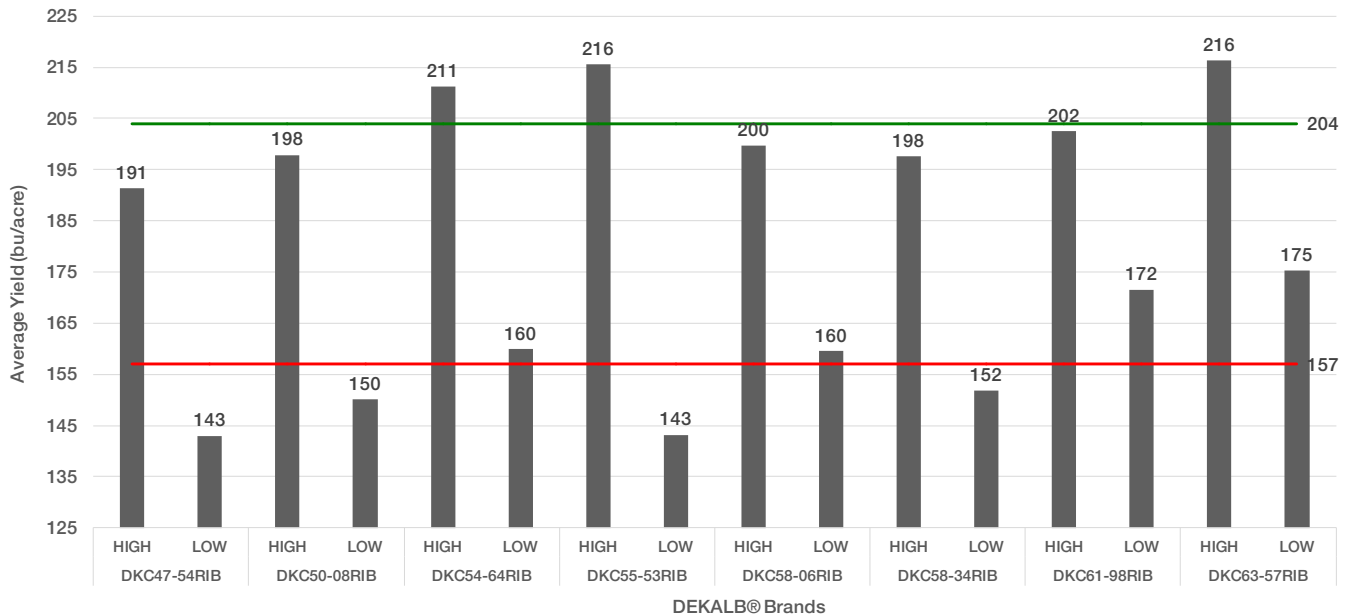


Figure 1. Performance of early RM corn products at high and low N rates in Northern Iowa. The average yield of the low N and high N treatments was 157 bu/acre (red line) and 204 bu/acre (green line), respectively.

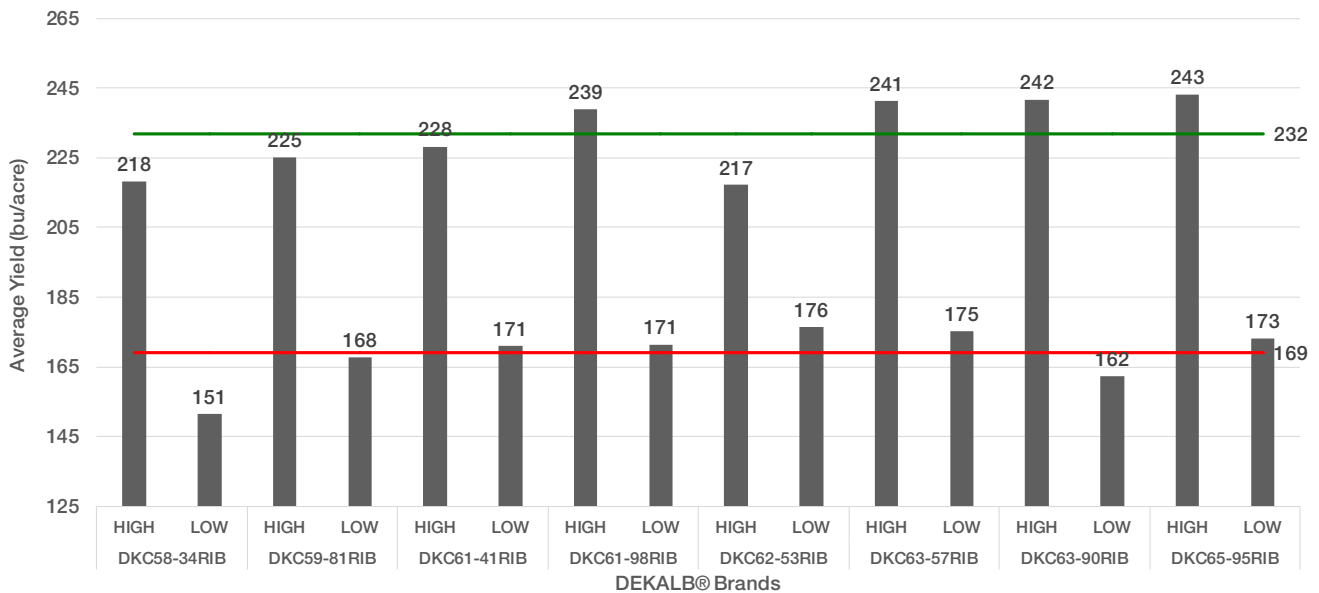


Figure 2. Performance of late RM corn products at high and low N rates in Southern Iowa. The average yield of the low N and high N treatments was 169 bu/acre (red line) and 232 bu/acre (green line), respectively.

Corn Product Response to Nitrogen Stress

Key Learnings

- This study could not confirm that there are differences in product sensitivity to either a yield-limiting low N rate or a crop-sufficient high N rate.
- This study suggests products have similar response to N rate; however, supplying adequate N and monitoring N losses is important for the best return on investment.
- Understand that environmental conditions such as seasonal rainfall, soil type, and temperature that can affect crop-available nitrogen.

