MONSANTO LEARNING CENTER AT MONMOUTH, IL

2017 DEMONSTRATION REPORTS

MONSANTO®

Thank you

for visiting the Monsanto Learning Center at Monmouth, IL this past summer!

2017 was another interesting year. We were somewhat short on total rainfall, but what we did get came at the right times during the season. Corn yields were excellent, and soybeans performed well also. The Roundup Ready 2 Xtend® Soybean System was a big topic for us throughout the tour season along with nematodes, nitrogen management, and cover crop systems. Nearly 5,000 people from all over the world came to visit us here in Monmouth and learn about modern agriculture technologies!

As always, our goal here at the Monsanto Learning Center is to provide you with up-to-date, relevant agronomic information that will benefit you and your operation. With that goal in mind, this booklet contains summaries from a number of our key trials and demonstrations around corn and soybean management systems.

For 2018, we will continue to strive to meet that goal with new trials and demonstrations around cover crops, nitrogen management strategies, insect and weed resistance management, high yield management systems approaches, and many other aspects of crop production research. We also plan to continue showcasing our current and future technologies.

We hope you find this information, as well as the rest of our field trials and demonstrations, to be valuable to you and your operation. Please contact us if you have any questions about these summaries, or any of the other projects here at the Monmouth Learning Center.

Thank you once again, and we look forward to hosting you in 2018!

Troy Coziahr, Manager
Monsanto Learning Center - Monmouth

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Stay in touch. We'd love to host you for a visit and share knowledge throughout the year.

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2017 FANTASY FARMING CHALLENGE

TRIAL OVERVIEW

- In 2013, the Monsanto Learning Center at Monmouth, IL created an educational competition opportunity (Fantasy Farming Challenge) for high school agricultural programs in the area. The Fantasy Farming Challenge program has grown each year and in 2017, 18 Illinois schools participated. The program provides an opportunity for hundreds of students to learn more about crop production and the agriculture industry.
- In February, students in the participating schools attended a presentation to learn about basic corn production, the key decisions a grower must make every season, and the risks and costs associated with those decisions.
- The participating students from each school designed a corn plot and based on their decisions, the plot was planted at the Monsanto Learning Center by their staff.
- During the growing season, each school took a field trip to the Monsanto Learning Center to review their plot, learn more about agronomy, and be introduced to career opportunities in agriculture.
- A Fantasy Farming Challenge achievement award was given to the school that achieved the highest yield and to the school that produced the highest profit based on their agronomic and production decisions.

Figure 1. Fantasy Farming Challenge Plot

RESEARCH OBJECTIVE

- Students from each participating school were to design a corn plot based on key agronomic and financial decisions that help maximize yield potential and net profitability. Decisions included the determinations of:
  - Corn product selection from a list of several genetic families and trait packages.
  - Should a soil-applied insecticide be used?
  - Planting time (Early, Mid, or Late).
  - Row spacing for the plot (20 or 30 inches).
  - Planting rate (seeds/acre).
  - Timing (Preplant, or split application) and rate (lbs/acre) of nitrogen to be applied.
  - Should a foliar fungicide be considered?
  - Variable and fixed costs associated with their decisions.
- Plots are to be harvested, the grain adjusted to 15% moisture content and sold on the cash market at harvest to determine yields and net profit/acre.

School	Yield @ 15% (bu/acre)	Net Profit ($)	Product Relative Maturity (RM)	Trait	Soil Applied Insecticide? (Y/N)	Seeding Rate (000's)	Row Spacing	Nitrogen Rate (lbs/acre) (Pre-plant/Sidedress)	Planting Date	Foliar Fungicide? (Y/N)
Monmouth-Roseville	304.0	18.83	116	SmartStax® RIB Complete® corn blend	N	42	20	80/200	5/10	Y
Eureka	299.0	87.94	114	SmartStax® RIB Complete® corn blend	N	36	30	85/100	5/10	Y
United	291.6	53.14	114	SmartStax® RIB Complete® corn blend	N	40	20	140/60	4/21	Y
Farmington	290.8	90.91	114	SmartStax® RIB Complete® corn blend	N	37	30	150/50	4/21	N
AlWood	290.3	82.59	114	SmartStax® RIB Complete® corn blend	N	39	30	230/0	5/10	N
West Central	290.2	43.14	114	SmartStax® RIB Complete® corn blend	N	36	30	150/100	4/21	Y
Stark County	288.4	36.57	117	VT Double PRO® RIB Complete® corn blend	Y	38	30	125/125	4/21	Y
Galva	284.6	52.52	114	SmartStax® RIB Complete® corn blend	Y	38	30	130/70	5/10	N
Sherrard	284.2	65.62	114	SmartStax® RIB Complete® corn blend	N	38	20	160/60	4/21	N
VIT	276.6	36.79	114	SmartStax® RIB Complete® corn blend	N	37	20	100/150	5/10	N
Abingdon-Avon	274.8	86.30	111	VT Double PRO® RIB Complete® corn blend	N	37	30	160/80	4/21	N
Mercer County	271.3	44.11	112	Genuity® VT Triple PRO® RIB Complete® corn blend	N	35	30	90/135	4/21	Y
Spoon River Valley	262.9	50.21	114	SmartStax® RIB Complete® corn blend	N	37	20	100/70	4/21	N
ROWVA	257.6	41.57	114	SmartStax® RIB Complete® corn blend	N	37	20	80/80	4/21	N
Orion	256.6	13.84	114	SmartStax® RIB Complete® corn blend	N	36	20	110/40	4/21	Y
Geneseo	254.0	36.87	112	Genuity® VT Triple PRO® RIB Complete® corn blend	N	36	30	120/80	4/21	N
Rockridge	251.3	(2.85)	112	Genuity® VT Triple PRO® RIB Complete® corn blend	N	38	20	115/60	4/21	Y
Cambridge	246.7	(59.71)	108	SmartStax® RIB Complete® corn blend	Y	35	30	130/90	4/21	Y

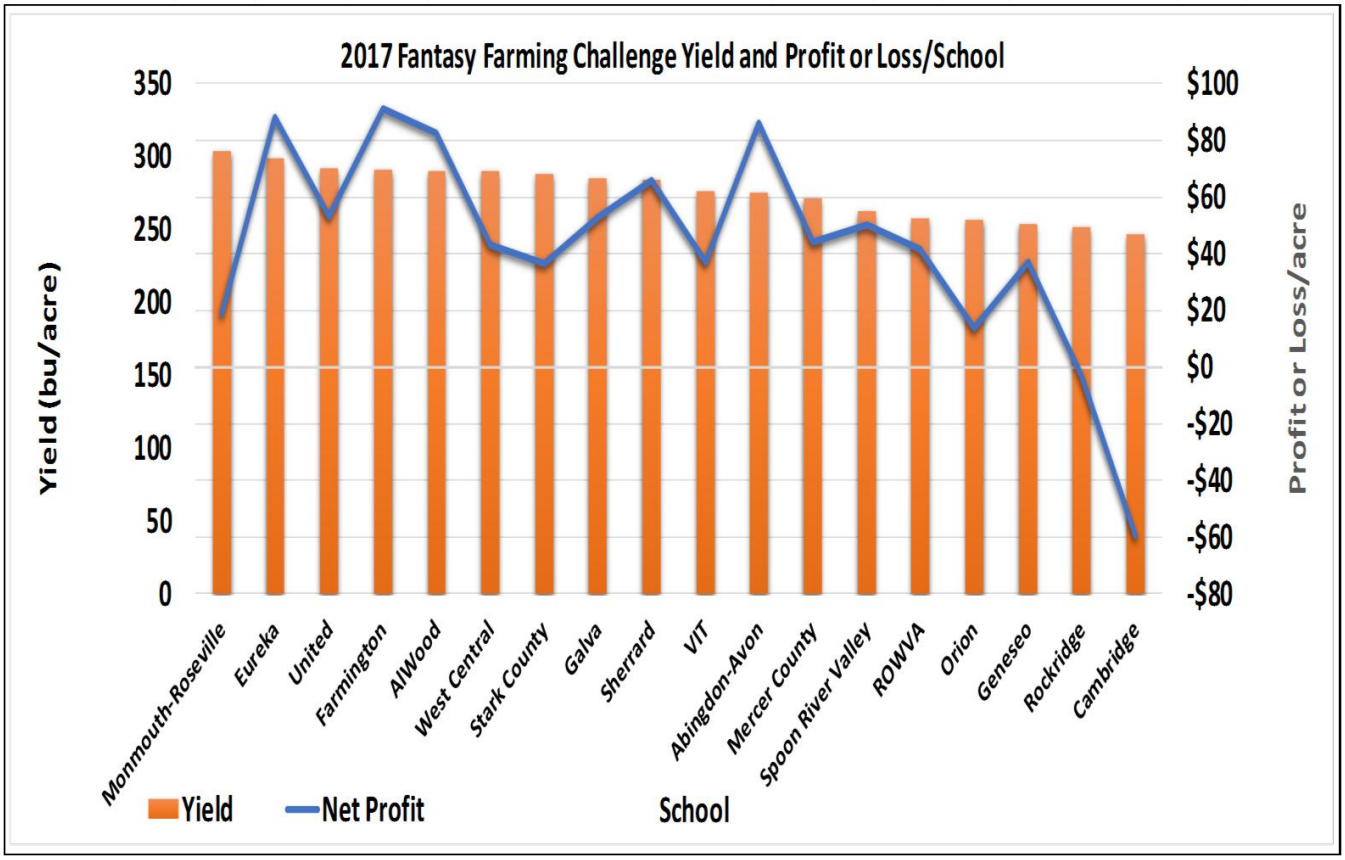

Figure 2. (Top) Yields, net profitability, and input decisions made by each school. Planting date choices were early (4/21), mid (5/10), and a later date that was not selected by any school. (Bottom) Yield and net profit for each school.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	soybean	Conventional		10/05/2017		See Figure 2

UNDERSTANDING THE RESULTS

- Four of the schools (United, Farmington, AlWood, and West Central) were within 1.4 bu/acre (291.6 - 290.2) of each other in regard to yield (Figure 2). However, they were separated by as much as $47.77 ($90.1 - $43.14) in profitability (Figure 2).
- The school with the highest yielding plot (Monmouth-Roseville High School) was 15th out of the 18 participating schools in regards to profitability. The school also produced the highest yielding plot in the 2015 Fantasy Farming Challenge.

- The school with the most profitable plot (Farmington High School) did not have the lowest cost/acre because the students did not cut back on seed or nitrogen inputs.

WHAT DOES THIS MEAN FOR YOUR FARM?

- Farmers must evaluate each agronomic and financial input that they can control as well as costs and production risks that are out of their control prior to planting a crop to help establish a crop production budget with a realistic projection of net income/acre.

ADVANTAGES OF PRODUCTS WITH SMARTSTAX® TECHNOLOGY FOR CORN ROOTWORM PROTECTION

TRIAL OVERVIEW

- Corn rootworm (CRW) (*Diabrotica virgifera*) is dubbed the billion-dollar pest due to the significant annual yield losses and control costs associated with its infestation.[1]
- Crop rotation to a non-host crop, scouting, insecticide applications (soil- and/or foliar-applied), and corn product selection are major management strategies.
- Use of dual mode of action corn products for CRW protection can prove to be more efficient than using a soil-applied insecticide on a corn product without *Bacillus thuringiensis* (*B.t.*) CRW protection.

RESEARCH OBJECTIVE

- To demonstrate the advantages of a dual-mode *B.t.* CRW protected corn product, such as products with SmartStax® technology.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	04/24/2017	09/28/2017	240 bu/acre	36,000 seeds/acre

SITE NOTES:

- Two treatments with 4 replications were established using two 108 RM corn products with the same genetic background.
  - A product with SmartStax® technology.
  - A product with VT Double PRO® technology + Force® 3G soil-applied insecticide.

UNDERSTANDING THE RESULTS

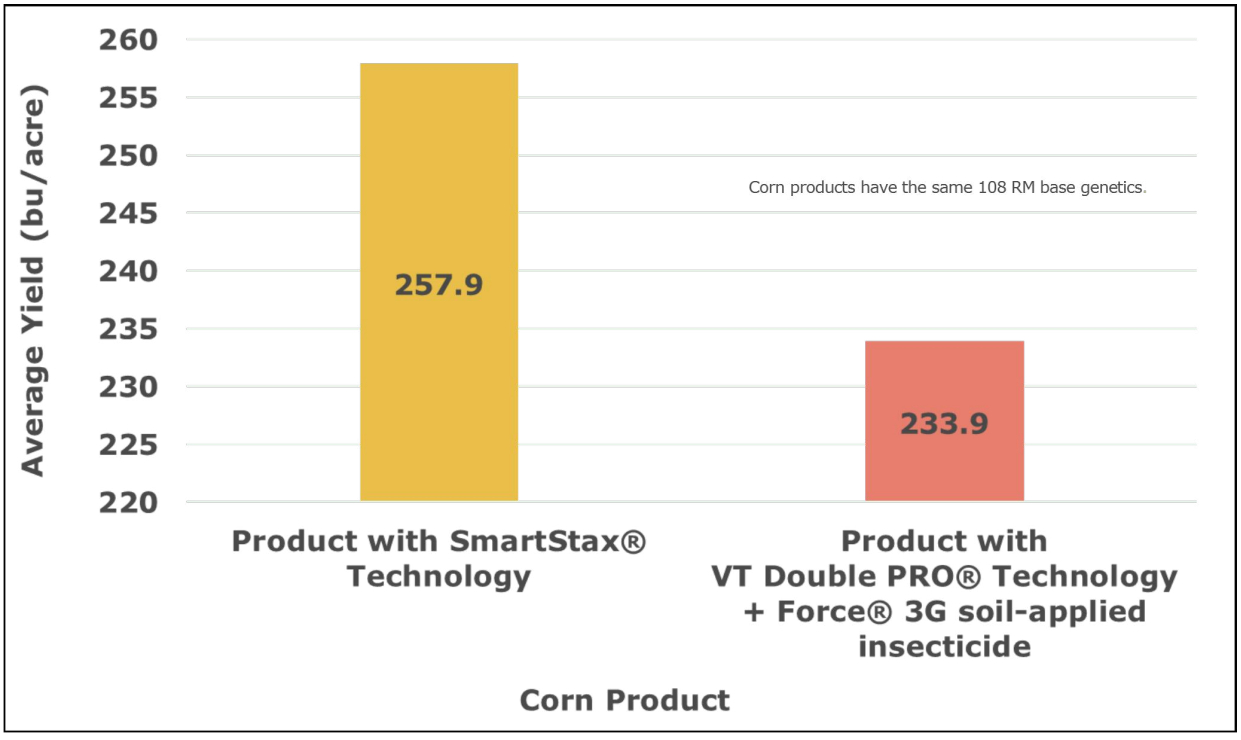

Figure 1. Average yield comparison of a product with SmartStax® technology compared to a product with VT Double PRO® technology + Force® 3G soil-applied insecticide at the Monsanto Learning Center at Monmouth, IL in 2017 (4 replications).

- Low levels of CRW pressure were observed at the Monsanto Learning Center at Monmouth, IL in 2017.
- Regardless of the low incidence of CRW, the product with SmartStax® technology demonstrated a yield advantage in this situation compared to the product with VT Double PRO® technology + Force® 3G soil-applied insecticide in a corn-on-corn situation (Figure 1).
- Yield advantages for *B.t.* protected CRW products with the same base genetics as products without *B.t.* CRW trait protection, especially when CRW pressure is low, are not always attributable to the *B.t.* trait.

WHAT DOES THIS MEAN FOR YOUR FARM?

- In a corn-on-corn situation, the use of a product with SmartStax® technology can provide more protection against CRW than the use of a soil-applied insecticide alone.
- Products with SmartStax® technology continue to provide assurance against CRW when planting into a corn-on-corn environment.
- Corn products for an operation should be selected based on needed agronomic characteristics for the fields for which the products will be grown. Characteristics include disease resistance, root and stalk strength, drought tolerance, adaptability for final use, and the use of *B.t.* insect protection when appropriate.

SOURCES
1 Gassmann, A. 2015. Management of western corn rootworm and other insect pests of corn. Iowa State University and USDA. http://portal.nifa.usda.gov/web/crisprojectpages/1007123-management-of-western-corn-rootworm-and-other-insect-pests-of-corn.html.
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EFFECT OF STARTER FERTILIZER ON CORN GROWTH, DEVELOPMENT, AND YIELD

TRIAL OVERVIEW

- There are several reasons for applying starter fertilizer; it is important to study the outcome of an application of starter fertilizer in fields.
- These data did not support a clear yield benefit for starter fertilizer in corn; although, height and vigor seemed to improve with the use of starter fertilizer.

RESEARCH OBJECTIVE

- The objective of this research was to evaluate the effect of starter fertilizer on corn growth and yield.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt loam	Soybeans	Conventional	05/10/2017	10/02/2017	N/A	36,000 seeds/acre

SITE NOTES:

- There were 10 replicates.
- Half of the plots received 3.5 gal/acre of 10-34-0 fertilizer plus 1 qt of a chelated 0.7% zinc (Zn) product in-furrow at planting time. The other half received no starter fertilizer. All other conditions were the same between the two sets of plots.
- A 114-day relative maturity SmartStax® RIB Complete® corn blend product was used in all plots.

UNDERSTANDING THE RESULTS

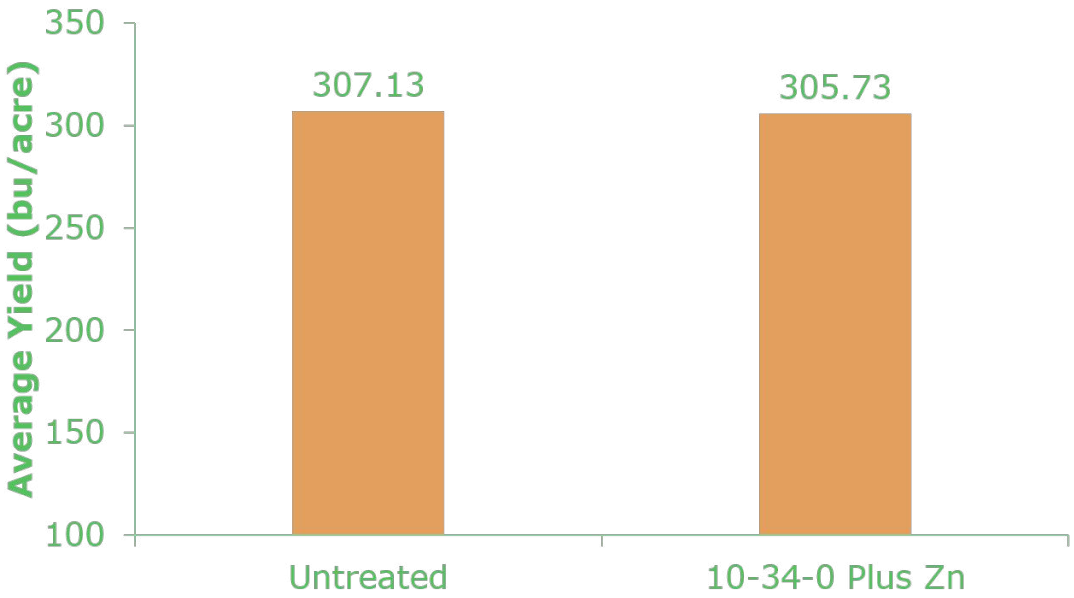


Figure 1. Effect of starter fertilizer on corn yield when comparing the untreated check (UTC).

- During the early season, plots with starter fertilizer were taller and exhibited more vigor. This was visually apparent through the majority of the growing season.
- However, this difference in seedling height and vigor did not translate into a yield difference.
- These results are similar to university trials, which generally indicate starter fertilizer may benefit yield in fields with an underlying fertility issue, reduced tillage systems, and cool soils.[1]

Figure 2. Corn receiving starter fertilizer may have a visual difference (left) compared to untreated check (UNT).

WHAT DOES THIS MEAN FOR YOUR FARM?

- Starter fertilizer can increase seedling height and vigor, but this does not necessarily translate into a yield benefit.
- Starter fertilizer may increase yield in soils with an underlying fertility issue. In these cases, it is important to try to identify and treat the underlying issue.

SOURCES
1 Hoeft, R. 2000. Will starter fertilizer increase yield? University of Illinois. bulletin.ipm.illinois.edu.

EFFECTS OF PLANTING RATE AND ROW SPACING ON CORN YIELD

TRIAL OVERVIEW

- Optimum corn planting rates have steadily increased over time.
- As planting rates increase, narrower row configurations should be considered to increase space between plants and reduce stress.

Figure 1. Row spacings for the trial were 20-inch, 30-inch, and twin-row with 30-inch centers.

RESEARCH OBJECTIVE

- This trial was designed to evaluate the effects of three different row spacings and three planting rates.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	05/18/2017	10/26/2017	240 bu/acre	35, 40, and 45 (000's) seeds/acre

SITE NOTES:

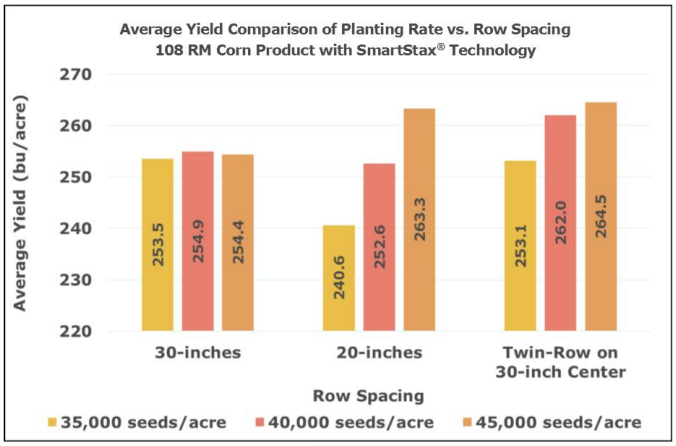
- This trial was replicated twice using two corn products:
  - A 108 RM product with SmartStax® technology
  - A 114 RM product with SmartStax® technology
- Row spacings used were 20-inches, 30-inches, and twin-rows with 30-inch centers (Figure 1).
- Seeding rates within each row spacing were 35,000, 40,000, and 45,000 seeds/acre.

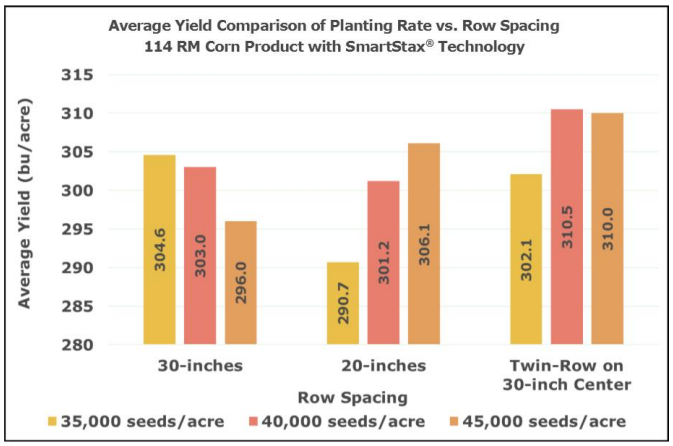
UNDERSTANDING THE RESULTS

- The 20-inch and twin-row 30-inch center spacings appeared to relieve stress as planting rates increased.
- The two corn products responded similarly; however, the 108 RM product appeared to show somewhat of an increased stress tolerance in the 30-inch rows.

WHAT DOES THIS MEAN FOR YOUR FARM?

- Row configurations narrower than 30-inch may provide some stress relief, especially at higher planting rates.
- Corn products respond differently to stress; therefore, contact your local seed representative for information on adapted corn products.





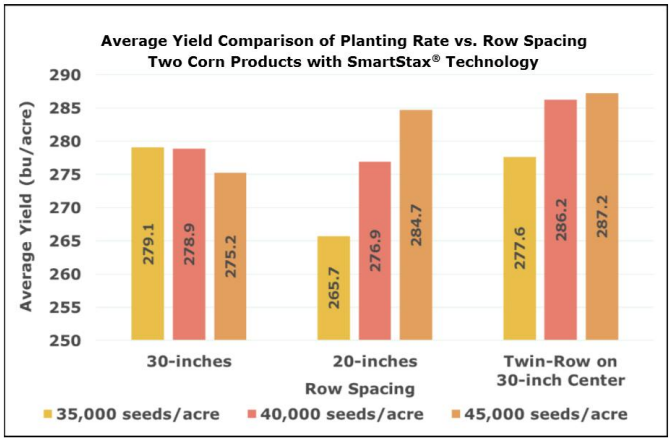


Figure 2. Average yield of products, row spacings, and planting rates. (Top Left) 108 RM product, (Top Right) 114 RM product, and (Bottom) both products.

EVALUATING THE RESPONSE TO FUNGICIDE IN DIFFERENT TILLAGE SYSTEMS

TRIAL OVERVIEW

- Fungicide application to corn is a relatively common practice in Illinois.
- Low commodity prices are calling the return on investment (ROI) for a fungicide application into question.
- Different tillage systems may provide different environments that are more or less preferable to disease development.

RESEARCH OBJECTIVE

- This trial was established to evaluate the yield response to fungicide in different tillage systems.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Various	04/24/2017	09/29/2017	240 bu/acre	36,000 seeds/acre

SITE NOTES:

- A large land block was divided into three different tillage zones:
  - Vertical Tillage
  - Strip Tillage
  - Conventional Tillage
- Within each of the three tillage zones, two corn products were planted:
  - 108 Day RM SmartStax® RIB Complete® Corn Blend
  - 114 Day RM SmartStax® RIB Complete® Corn Blend
- Each product had treatments consisting of an untreated check and an application of a foliar fungicide that contained strobilurin and triazole active ingredients (A.I.). There were two replications of all treatments. The fungicide was applied at the R1 growth stage.

UNDERSTANDING THE RESULTS

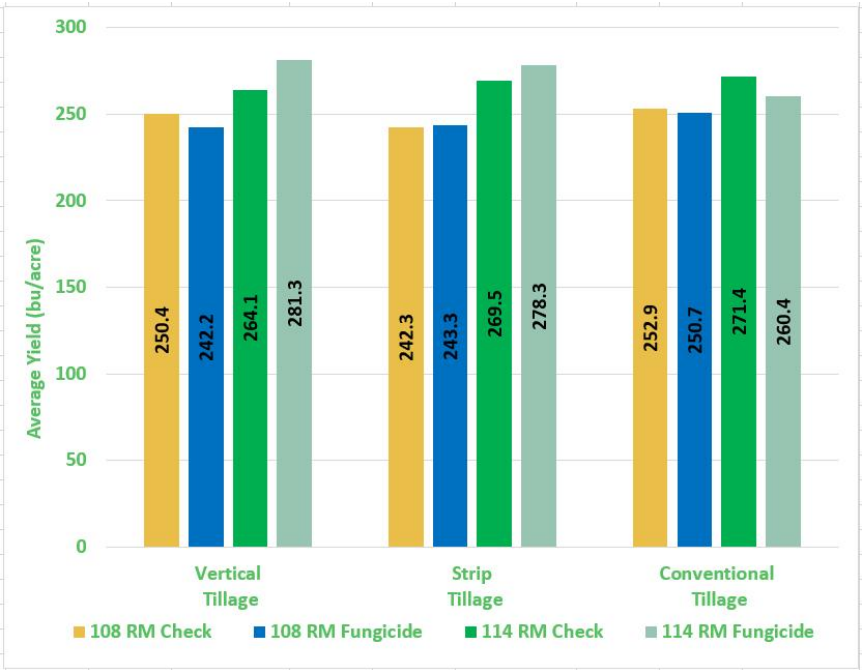


Figure 1. Average yield response (bu/acre) for fungicide application to three tillage systems at Monmouth, Illinois (2017, 2 Replications).

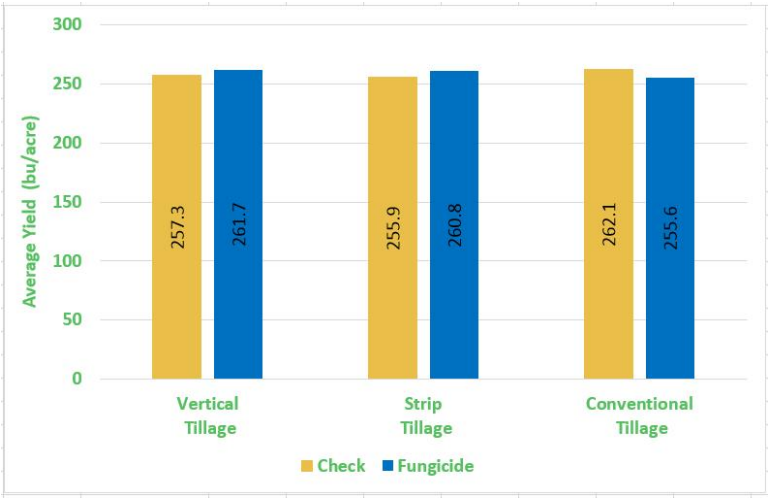


Figure 2. Average yield response (bu/acre) of a fungicide application on two corn products and three tillage systems at Monmouth, Illinois (2017, 2 Replications).

Figure 3. Gray leaf spot, Monmouth, Illinois - 2017.

- Disease incidence was low; however, the disease symptoms that appeared were generally very late in the season and likely had little to no impact on yield.
- No differences in symptomology were seen between the treated and untreated plots.
- Because of these factors, no discernible differences or trends were observed in the final yield results (Figures 1 and 2).
- Three factors are required for disease development: a pathogen, a susceptible host, and favorable environmental conditions.
- In 2017, the cool, dry conditions in July and August likely held disease pressure to a minimum at the Monsanto Learning Center at Monmouth, IL. An example is the minimal number of gray leaf spot lesions found on corn leaves (Figure 3).

WHAT DOES THIS MEAN FOR YOUR FARM?

- Various methods for preventing disease development in corn include planting resistant genetics, crop rotation, and good residue management practices.
- A good scouting program is crucial to identify whether a disease is a problem in any given field.
- If all three factors for disease development are present, a fungicide application may help protect yield potential.

FIELDVIEW™ NITROGEN MANAGEMENT RECOMMENDATIONS

TRIAL OVERVIEW

- Nitrogen (N) is the number one fertilizer that farmers must manage in a corn crop.
- Previous crop, growing conditions, product genetics, commodity price, and N cost are factors to consider when determining the highest return for N investment.
- Weather plays an important role in how farmers manage N.

RESEARCH OBJECTIVE

- To help determine how FieldView™ nitrogen management recommendations can help farmers manage N.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, Illinois	Silt loam	Corn	Conventional	05/19/2017	10/05/2017	240 bu/acre	36,000 seeds/acre

SITE NOTES:

- Five 32% UAN N Treatments Consisting of Three Replications
  - Treatment 1: 200 lbs/acre 32% UAN applied Pre-Plant on 5/9/17 = Standard Rate (SR)
  - Treatment 2: SR-15% or 170 lbs/acre followed by (fb) 30 lbs/acre applied 2 weeks pre-tassel on 7/5/17
  - Treatment 3: SR-15% fb a FieldView nitrogen management recommendation of 35 lbs/acre applied 2 weeks pre-tassel to tassel on 7/5/17 (Figure 2, Top)
  - Treatment 4: Half SR fb 100 lbs/acre applied by sidedress on 6/19/17
  - Treatment 5: Half SR fb a FieldView nitrogen management recommendation sidedress rate of 75 lbs/acre on 6/9/17 (Figure 2, Bottom).

UNDERSTANDING THE RESULTS

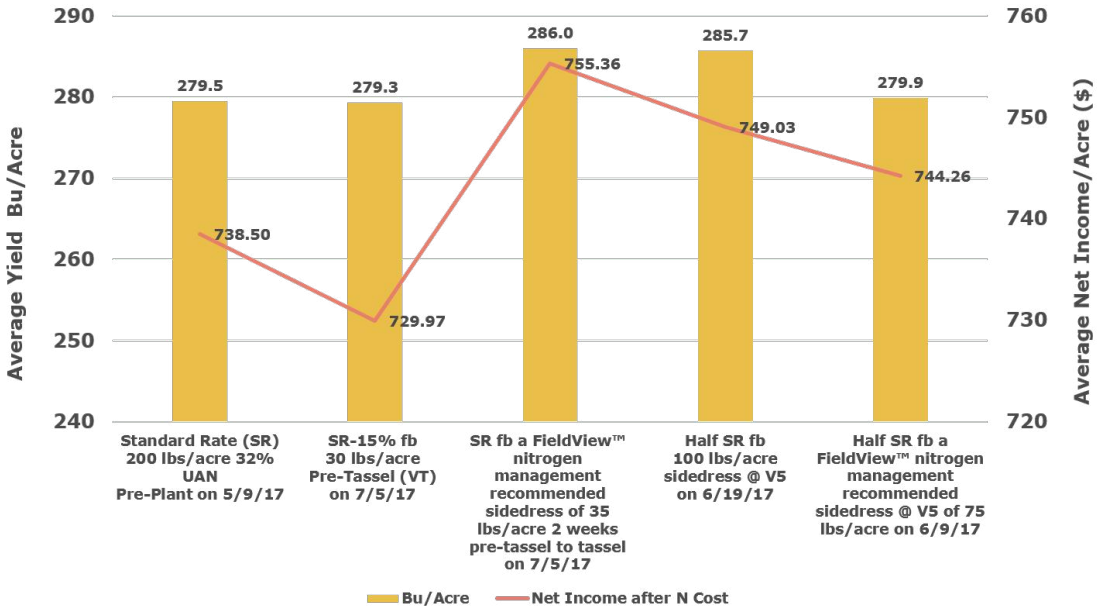


Figure 1. Average yield and net income/acre after nitrogen cost for five different nitrogen application treatments at Monmouth, IL in 2017 (3 Replications)

- Yields were good across the five treatments (Figure 1); however, FieldView nitrogen management recommendations provided a higher gross profit/acre and the highest yielding treatment (Figure 1).
- The Monsanto Learning Center at Monmouth, IL will continue to examine ways FieldView nitrogen management recommendations can provide farmers with information to help manage N and in-season N application decisions.

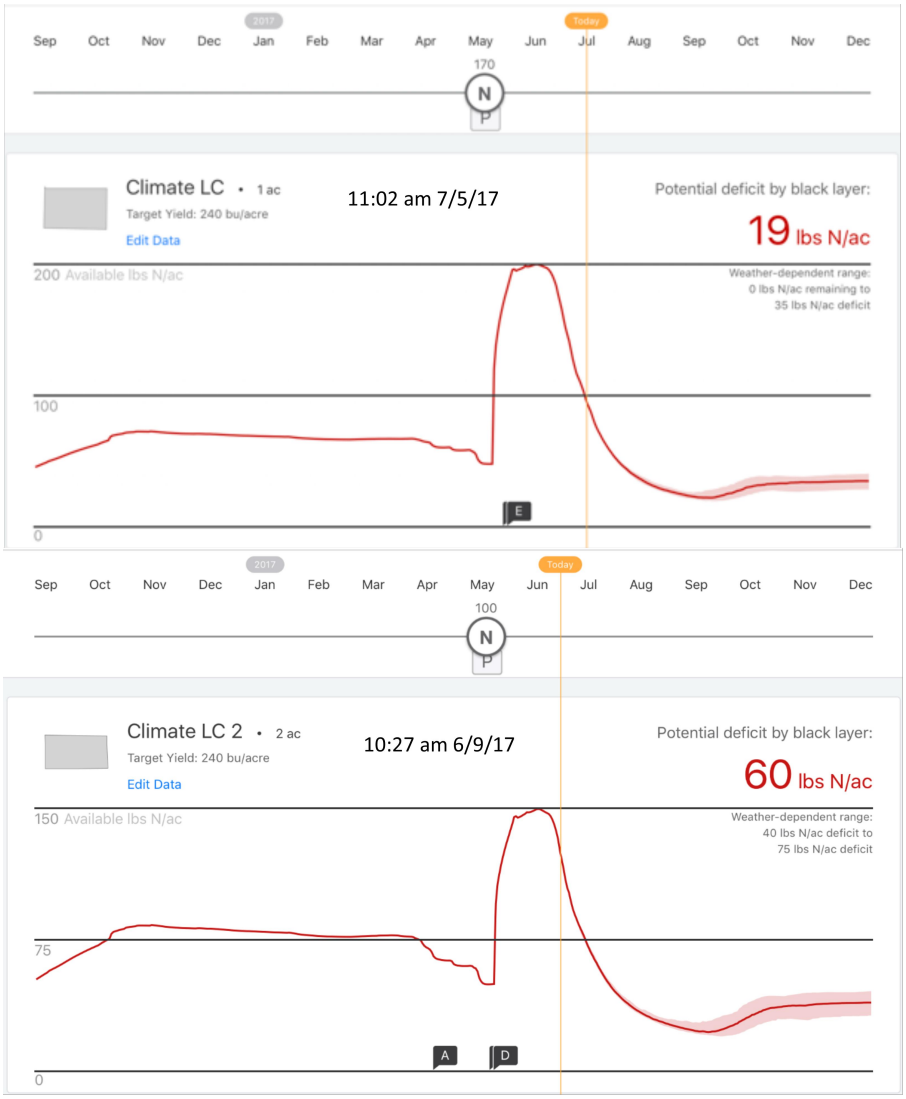


Figure 2. Screen shots of FieldView™ nitrogen management recommendations: **Top** - 7/5/17 when 35 lbs/acre of 32% UAN was sidedress applied to Treatment 3; **Bottom** - 6/9/17 when 75 lbs/acre of 32% UAN was sidedress applied to Treatment 5. The high end of the deficit was used for both applications.

WHAT DOES THIS MEAN FOR YOUR FARM?

- When used by farmers, FieldView™ nitrogen management recommendations can provide valuable information that can potentially increase yields and net income.
- Yields were good across the five treatments; however, FieldView nitrogen management recommendations provided a higher gross net income/acre and the highest yielding treatment.
- Because of the advantage that FieldView nitrogen management recommendations provide over other online N management calculators, farmers can react quickly to changing weather patterns.

PLACEMENT OF NITROGEN DURING SIDEDRESSING

TRIAL OVERVIEW

- Nitrogen (N) placement and its effect on N uptake and potential yield is a management concern of farmers.
- Nitrogen is a major investment in corn production. Knowing where to place sidedressed N can help farmers decide which method of application is best for their operation.

RESEARCH OBJECTIVE

- The objective of this study was to determine if an advantage exists for placing N at the base of the plants vs. down the center of the row at the V6 growth stage (six leaf collars).

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	04/25/2017	09/28/2017	290 bu/acre	36,000 seeds/acre

SITE NOTES:

- A 114 RM SmartStax® RIB Complete® corn blend product was planted.
- The N form used for all treatments was 32-0-0 UAN.
  - 80 lbs/acre was applied before planting and incorporated.
  - 100 lbs/acre was sidedressed with a urease inhibitor.
- Two sidedress application methods were used on 6/16/17 when plants were at the V6 growth stage.
  - A rolling coulter with a shallow knife in the center of the row (Figure 3 - top right).
  - 360 Y-Drop® (Figure 3 - bottom pictures).
- The trial consisted of 4 replications.
- The data from 2016 was added to show 2 years of data.

UNDERSTANDING THE RESULTS

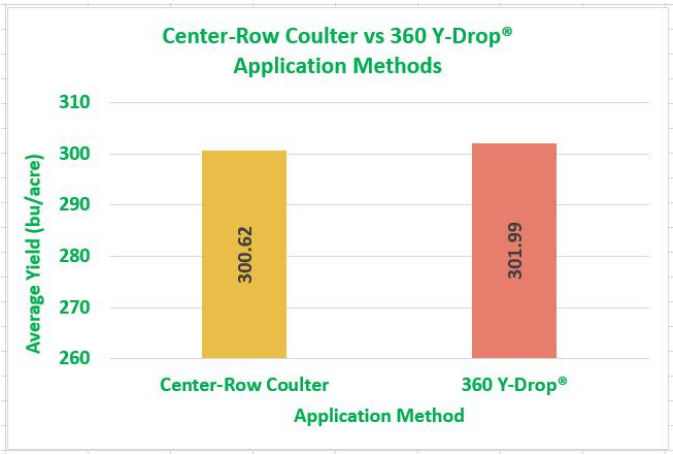


Figure 1. Average Yield in 2017 for Center-Row Coulter vs. 360 Y-Drop® Application Methods

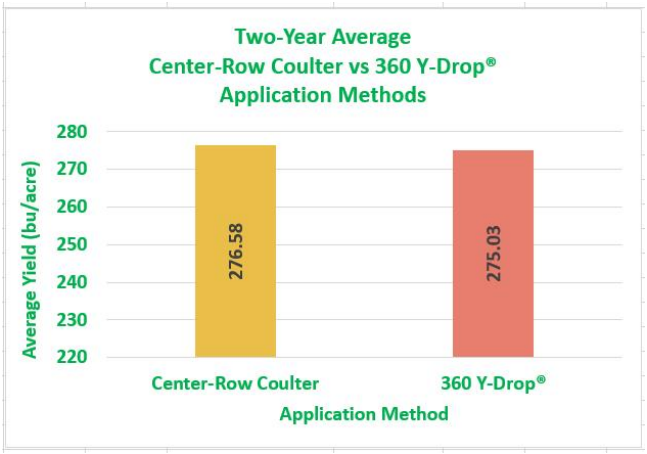


Figure 2. Two-year (2016 and 2017) Average Yield for Center-Row Coulter vs. 360 Y-Drop® Application Methods

- The average yields for both methods were similar in 2017 (Figure 1).
- The two-year average yields for both methods are similar (Figure 2).
- Application at the V6 growth stage by either method showed no clear advantage.
- Rolling coulter applications should be made before plant height exceeds toolbar height.
- Individual corn products may respond differently to application timing.

Figure 3. The 360 Y-Drop® unit applies nitrogen (N) to the base of the plants (top left), rolling coulter applicator applies the N behind the coulter as it cuts through the soil (top right), 360 Y-Drop® unit (bottom left), and 360 Y-Drop® applicator (bottom right).

WHAT DOES THIS MEAN FOR YOUR FARM?

- The use of a rolling coulter with a shallow knife is limited due to corn height.
- 360 Y-Drop® applicators allow a wider application window and are not limited to early-season sidedressing.
- The ideal placement of sidedressed N could change from year to year due to weather and environment.
- Individual products may respond differently to the timing of N application. Consult your local seed specialists for recommendations.
- Yield differences may not be economically feasible when all costs are considered. Local costs should be evaluated when making N management decisions.

THE VALUE OF PROPER PLANTER SETTINGS

TRIAL OVERVIEW

- Previous work at the Learning Center has shown the importance of even emergence in corn:
  - Impact of Uneven Emergence in Corn.[1]
  - Uneven Emergence in Corn.[2]
- Various planter attachments and settings can affect seed placement, seed/soil contact, and the quality of the seedbed. These factors can impact the evenness of seedling emergence and stand establishment.

RESEARCH OBJECTIVE

- This trial was designed to measure the yield impact of seed firmers and properly-set row cleaners.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt loam	Corn	No-till	05/17/2017	10/17/2017	240+ bu/acre	36,000 seeds/acre

SITE NOTES:

- Four treatments were tested:
  - Properly-set row cleaners with seed firmers.
  - Properly-set row cleaners without seed firmers.
  - Improperly-set row cleaners (not enough pressure) with seed firmers.
  - Improperly-set row cleaners (not enough pressure) without seed firmers.
- The trial was replicated twice.

UNDERSTANDING THE RESULTS

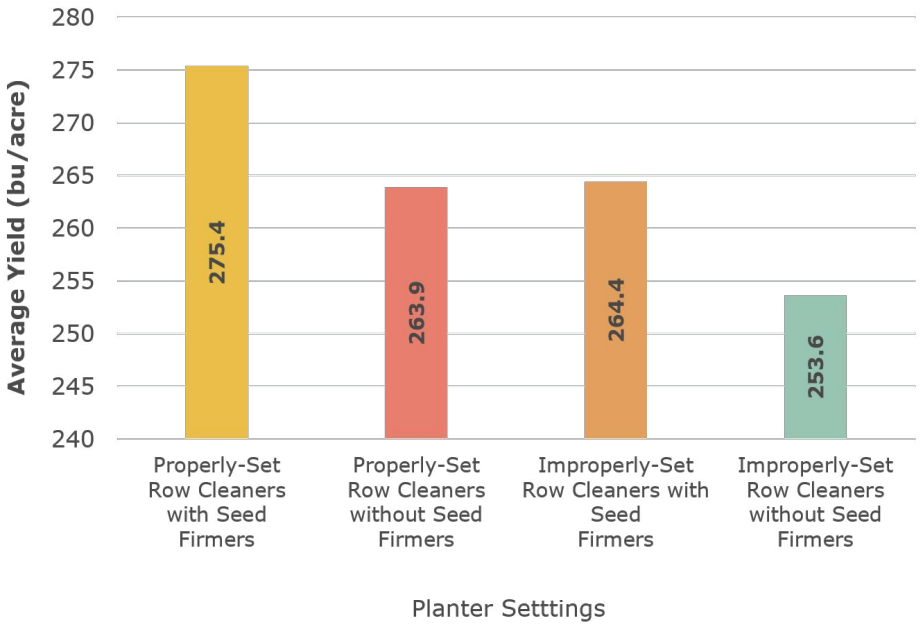


Figure 1. Value of Proper Planter Settings

- In this trial, each missing component resulted in a loss of approximately 10 bu/acre (Figure 1).
- Both components combined resulted in a loss of approximately 20 bu/acre (Figure 1).
- Visual differences in plant stand and height were apparent throughout the season (Figures 2 and 3).

Figure 2. Improperly-set row cleaners without seed firmers (left) and properly-set row cleaners with seed firmers (right).

Figure 3. Improperly-set row cleaners without seed firmers (left) and properly-set row cleaners with seed firmers (right).

WHAT DOES THIS MEAN FOR YOUR FARM?

- Accurate seed placement, good seed/soil contact, and a clean seed bed are important factors in enabling corn seedlings to establish quickly and begin growing vigorously.
- Attachments such as seed firmers can help improve seed/soil contact, leading to better establishment, even emergence, and potentially higher yields.
- Properly-set row cleaners can also provide an environment where seedlings can emerge quickly and evenly. This can have a positive impact on yield potential.

SOURCES
1 Impact of Uneven Emergence in Corn. 2016. https://monsanto.com/app/uploads/2017/05/impact-uneven-emergence-corn.pdf
2 Uneven Emergence in Corn. 2016. https://vimeo.com/214841338

TIMING OF NITROGEN APPLICATION

TRIAL OVERVIEW

- There is considerable interest in applying nitrogen (N) later in the growing season; therefore, farmers and agronomists want to know when is the best time to sidedress N in a later-season application.
- Because N is a major and required investment in corn production, knowing when corn plants are most responsive to an application of N can help farmers determine the application time for the best return on their investment.

RESEARCH OBJECTIVE

- To compare the effectiveness of different N application times during the growing season.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	04/25/2017	09/28/2017	290 bu/acre	36,000 seeds/acre

SITE NOTES:

- A 114 RM SmartStax® RIB Complete® corn blend product was utilized in the trial.
- Nitrogen in the form of 32% UAN (32-0-0) was used as the N source.
- 80 lbs/acre of N was applied before planting and incorporated.
- Nitrogen was sidedressed with a high-clearance sprayer using 360 Y-DROP® at an application rate of 100 lbs/acre with a urease inhibitor at three growth stages:
  - V4 (4 leaf collars) on 6/09/17
  - V8 (8 leaf collars) on 6/19/17
  - V12 (12 leaf collars) on 7/05/17
- The trial consisted of 3 replications.
- Data from 2016 was added for supporting information.

UNDERSTANDING THE RESULTS

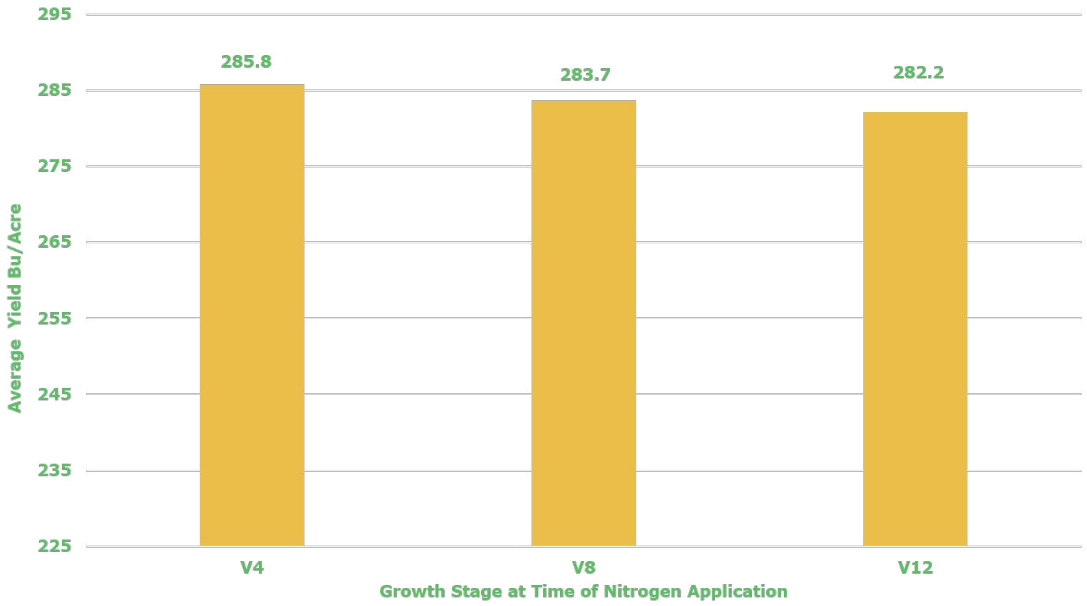


Figure 1. Average yield (bu/acre) response to nitrogen application timing in 2017 at Monmouth, IL (3 replications).

- Individual corn products may respond differently to the timing of an application of N.

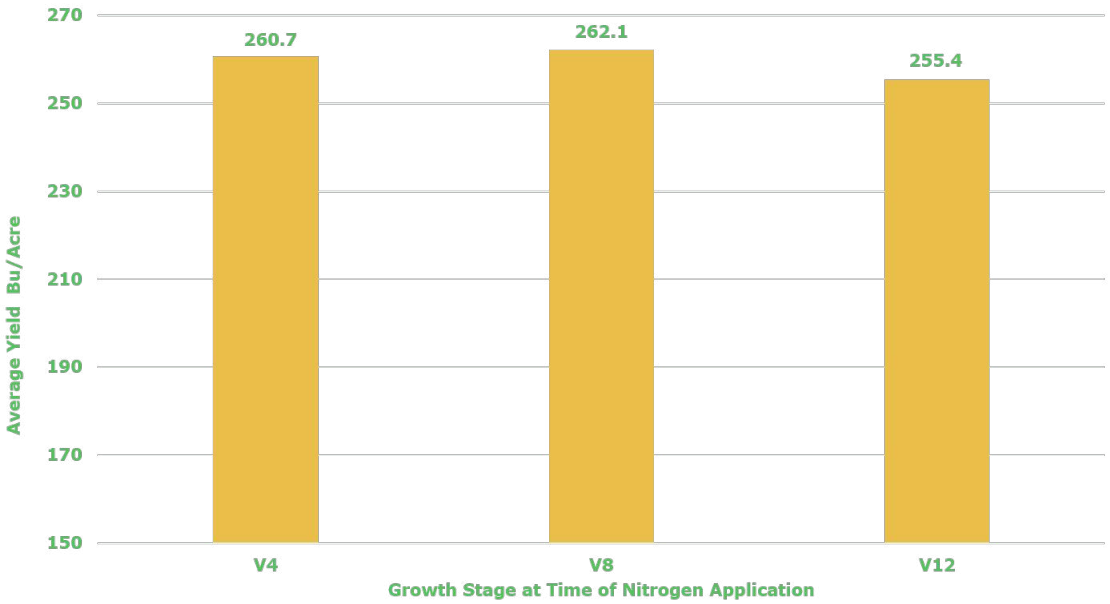


Figure 2. Two-year (2016 - 2017) average yield (bu/acre) response to nitrogen application timing at Monmouth, IL.

- The cost to potentially obtain greater yields, based on the timing of an application of N, may not be economically feasible when all costs are considered.
- The ideal timing of a later-season application could change yearly because of weather and environmental challenges.
- In 2016, the V8 application demonstrated a larger response (2016 response: V4 = 235.7, V8 = 240.4, and V12 = 228.7).[2] However, the average differences for the combination of 2016 and 2017 were minimal (Figure 2).

WHAT DOES THIS MEAN FOR YOUR FARM?

- Nitrogen applications later in the growing season have the potential to improve yields and reduce the potential for N loss through leaching and nitrification.[1]
- Environmental conditions and the costs associated with N applications should be considered when making a N plan for each field.
- Use of 360 Y-DROP® for later growth season N applications can allow for greater flexibility in the timing of the application and use in taller corn.

SOURCES
1 Scharf, P.C. and Lory, J.A. 2006. Integrated Pest Management. Best management practices for nitrogen fertilizer in Missouri. IPM1027.
2 Timing of nitrogen sidedress application in corn. 2016. Demonstration Report. Monsanto Learning Center at Monmouth, IL.

EFFECTS OF FUNGICIDE AND PLANTING DATE ON SOYBEAN YIELD

TRIAL OVERVIEW

- In many cases, a foliar fungicide application can protect soybean plant health and help maintain the yield potential of the product.

RESEARCH OBJECTIVE

- The objective of this trial is to help determine the effect of a foliar fungicide application on soybean yield potential with respect to planting date.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	04/25/2017	10/18/2017	70 bu/acre	130,000 seeds/acre
Monmouth, IL	Silt Loam	Corn	Conventional	05/30/2017	10/18/2017	70 bu/acre	130,000 seeds/acre

SITE NOTES:

- The trial used a 3.6 RM soybean product with Roundup Ready 2 Xtend® technology.
- The trial was replicated twice.
- Two planting dates:
  - April 25, 2017
  - May 30, 2017
- Foliar fungicide application dates depended on the plants reaching the R3 growth stage:
  - April 25 planting date was sprayed on July 20, 2017
  - May 30 planting date was sprayed on August 7, 2017

UNDERSTANDING THE RESULTS

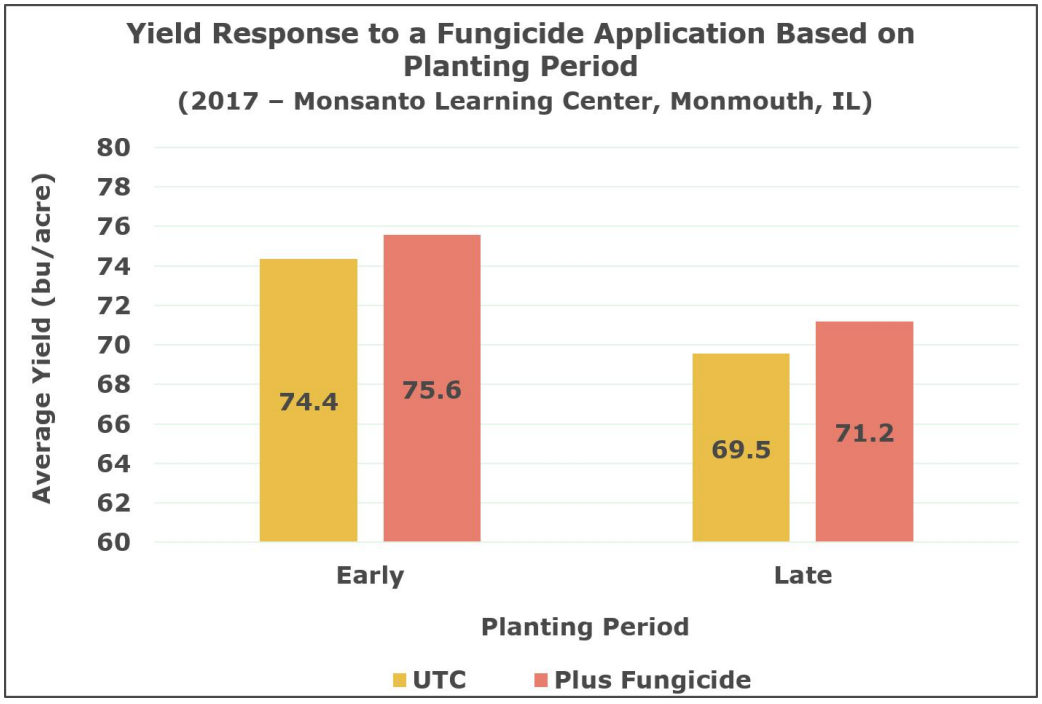


Figure 1. Yield response to a fungicide application based on planting period (2017 - Monsanto Learning Center, Monmouth, IL)

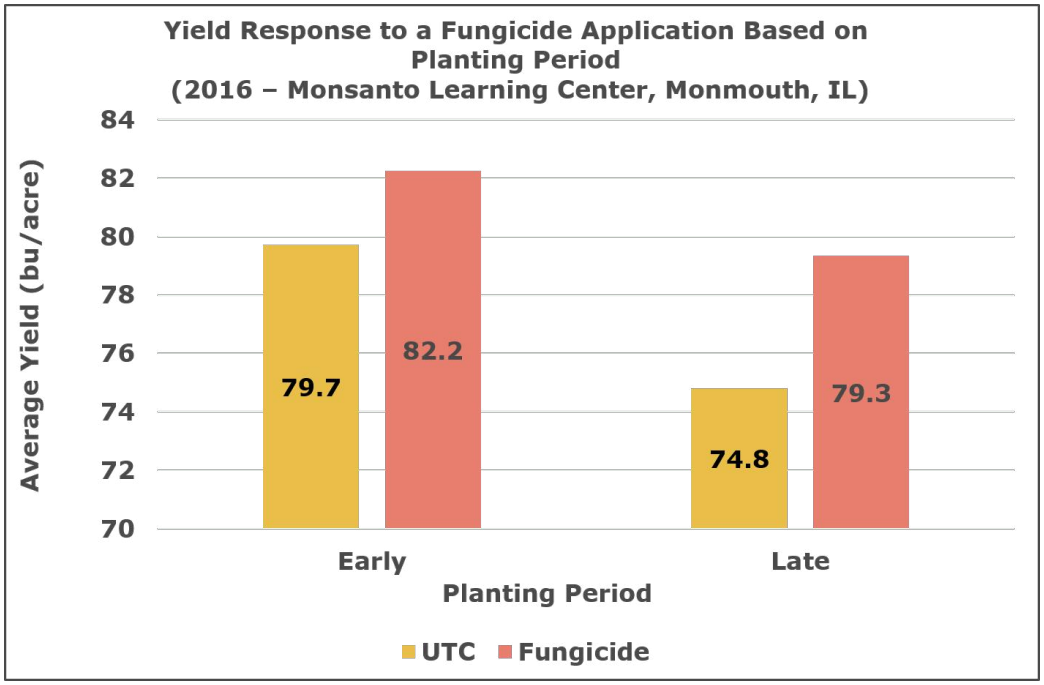


Figure 2. Yield response to a fungicide application based on planting period (2016 - Monsanto Learning Center, Monmouth, IL).

- A fungicide application showed little effect on soybean yield in 2017 (Figure 1).
- The early planting led to a substantial advantage over the late planting in 2017 (Figure 1).
- A very low disease incidence occurred in 2017 because of cooler and drier than normal conditions.
- In years such as 2016, when disease incidence was higher, a fungicide application can do more to protect yield potential (Figure 2).

WHAT DOES THIS MEAN FOR YOUR FARM?

- The benefit of fungicide applications will vary from year to year.
- Scouting regularly is the recommended way to determine if a fungicide application can be beneficial.
- Over the majority of years, early-planted soybean crops tend to out-perform later-planted crops fairly consistently.
- Early planting assumes that the soil and weather conditions are suitable for seedbed preparation and seed germination.
- Individual fungicide application results may vary based on disease presence. Consult your local seed provider for recommendations.

SOURCES
1 Fungicide response and planting date in soybean. 2016. Demonstration Report. Monsanto Learning Center at Monmouth, IL.
https://monsanto.com/app/uploads/2017/05/fungicide-response-planting-date-soybean.pdf.
2 Fungicide application yield response by soybean planting dates. 2015. Demonstration Report. Monsanto Learning Center at Monmouth, IL
https://monsanto.com/app/uploads/2017/05/fungicide-application-yield-response-by-soybean-planting-dates-mlc.pdf. Websites verified 11/9/17. 171107153903

EFFECTS OF PLANTING DATE ON SOYBEAN YIELD

TRIAL OVERVIEW

- Previous work at the Monsanto Learning Center at Monmouth, IL has shown that planting date is an important factor affecting soybean yield.[1]
- An earlier planting date could potentially be a low-risk/high-return soybean management practice.

RESEARCH OBJECTIVE

- The objective of this trial was to evaluate the impact of planting date on soybean yield.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	04/25/2017	10/18/2017	70 bu/acre	130,000 seeds/acre
Monmouth, IL	Silt Loam	Corn	Conventional	05/30/2017	10/18/2017	70 bu/acre	130,000 seeds/acre

SITE NOTES:

- A 3.6 RM Roundup Ready 2 Xtend® soybean product was planted.
- The trial included 5 replications and planting dates of April 25 and May 30, 2017.
- Data from 2015 and 2016 were included in the summaries to show a three-year average.
- Planting dates for the three-year average are recorded as early and late.

UNDERSTANDING THE RESULTS

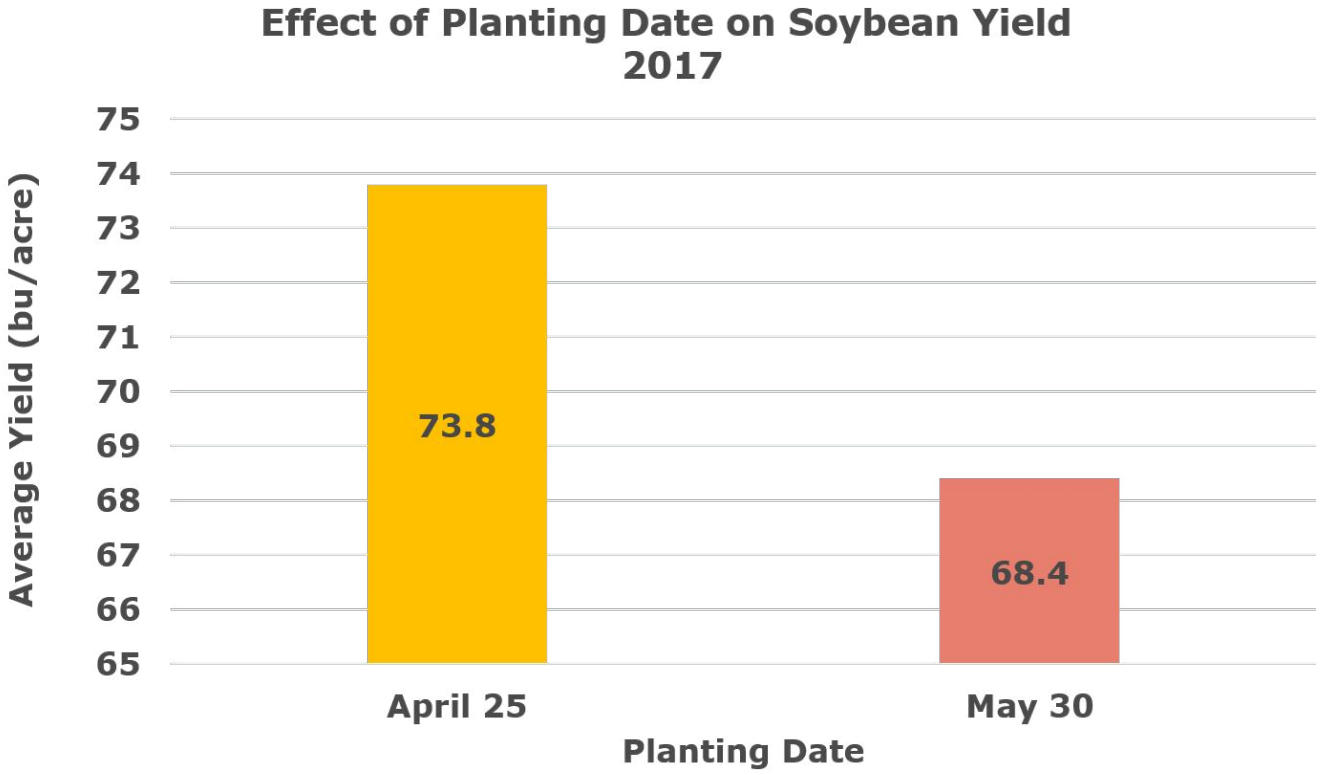


Figure 1. Soybean yield response to two planting dates at the Monsanto Learning Center at Monmouth, IL in 2017.

- The April 25 planting date in 2017 showed a 5.4 bu/acre advantage (Figure 1).

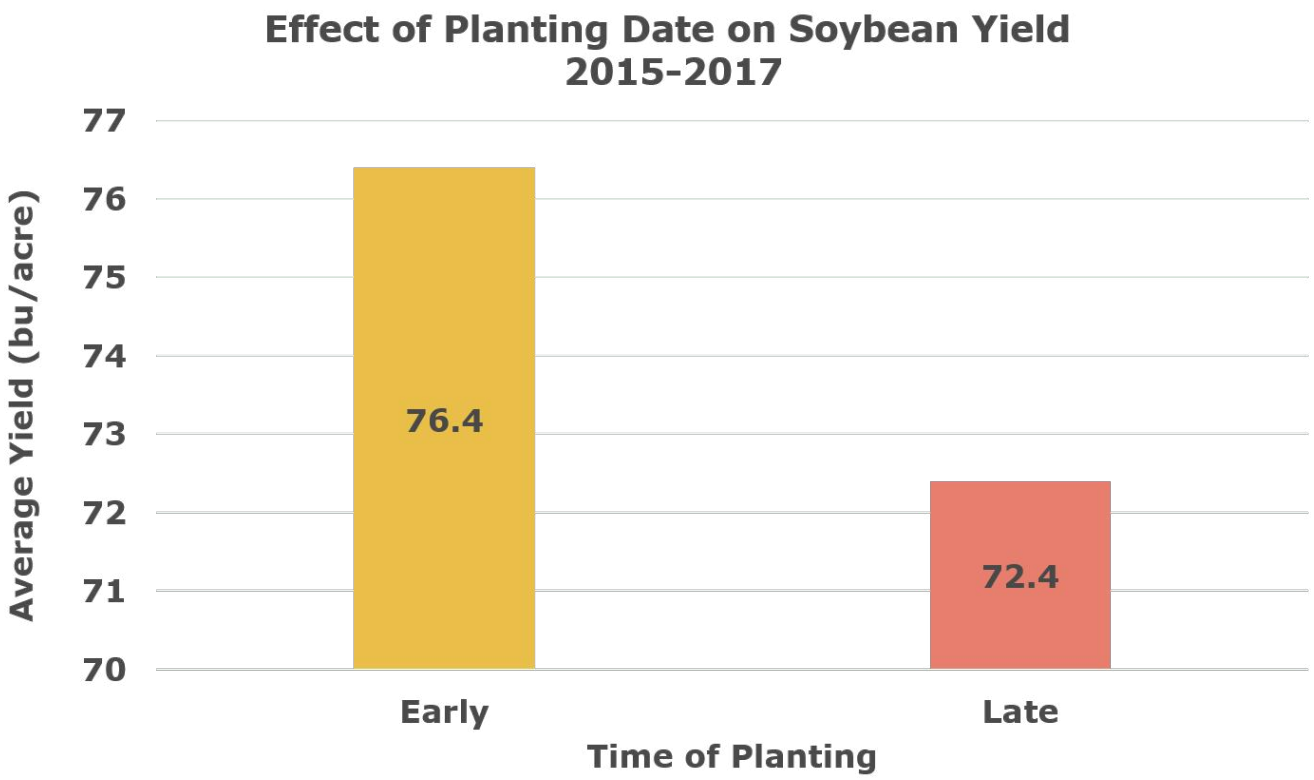


Figure 2. Soybean yield response to early and later planting dates at the Monsanto Learning Center at Monmouth, IL for the years 2015-2017.

- Early planting has resulted in consistently higher yields for the past three years (2015-2017) with an average yield advantage of 4 bu/acre (Figure 2).
- Although growing conditions change annually, the results at the Monsanto Learning Center at Monmouth, IL, generally agree with university planting date information.[2]

WHAT DOES THIS MEAN FOR YOUR FARM?

- Early-planted soybean crops tend to out-perform later-planted soybean crops fairly consistently.
- Early planting assumes that the soil and weather conditions are suitable for seedbed preparation and seed germination.

SOURCES
1 Fungicide response and planting date in soybean. 2016. Demonstration Report. Monsanto Learning Center at Monmouth, IL. https://monsanto.com/app/uploads/2017/05/fungicide-response-planting-date-soybean.pdf.
2 Nafziger, E. 2017. Planting date for corn and soybeans in Illinois. The Bulletin. University of Illinois. http://bulletin.ipm.illinois.edu/?p=3848.
Websites verified 11/9/17. 171103103817

SOYBEAN ROW SPACING BY PLANT POPULATION

TRIAL OVERVIEW

- Row spacing and plant population have the potential to influence soybean yield.

Figure 1. 20-inch rows (left); 30-inch rows (center); and twin rows on 30-inch center (right).

RESEARCH OBJECTIVE

- Evaluate different soybean row spacings and plant populations to determine their effect on yield potential.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Monmouth, IL	Silt Loam	Corn	Conventional	05/30/2017	10/19/2017	75 bu/acre	120,000 and 170,000 seeds/acre

SITE NOTES:

- The trial consisted of two replications.
  - 2.7 RM and 3.6 RM Roundup Ready 2 Xtend® Soybeans were planted.
  - Seeding rates were 120,000 and 170,000 seeds/acre.
- Row width configurations were 20-inch, 30-inch, and twin rows on a 30-inch center (FIgure 1).

UNDERSTANDING THE RESULTS

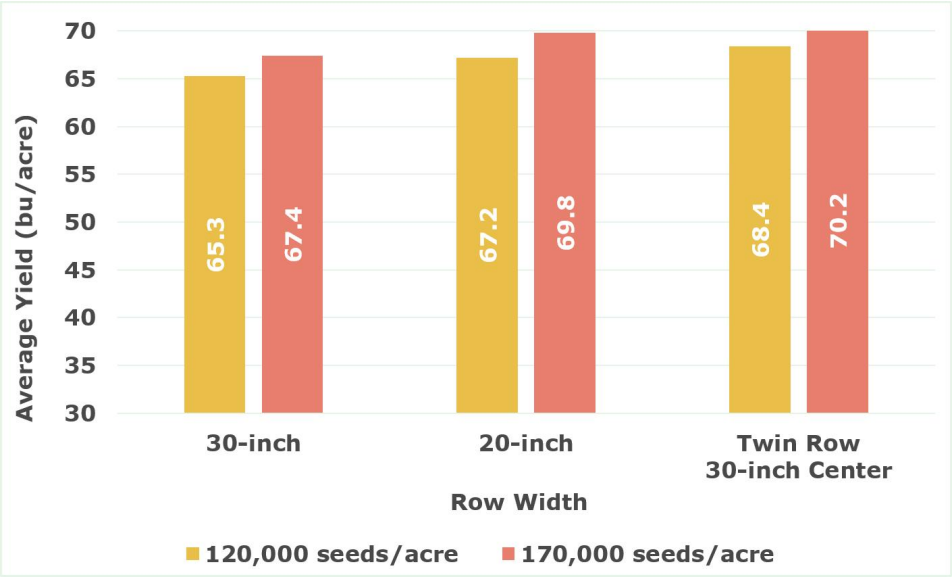


Figure 2. Average Yield Response of Two Soybean Products Using Three Row Widths and Two Seeding Rates, Monsanto Learning Center at Monmouth, IL (2017).

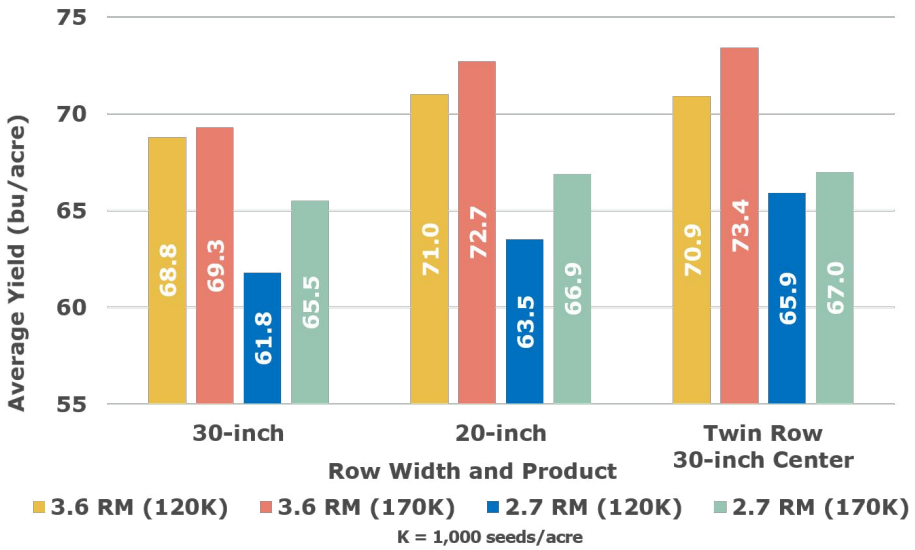


Figure 3. Soybean Yield Response to Row Width and Seeding Rate at the Monsanto Learning Center at Monmouth, IL (2017).

- Narrow rows (20-inch and twin) produced higher yields than wider, 30-inch rows (Figure 2). This is consistent with results from multiple row spacing trials over the past several years at the Monsanto Learning Center at Monmouth, IL.[2]
- The yield advantage in narrow rows and twin rows may be attributed to better weed control because of earlier canopy closure and increased sunlight interception.
- The 3.6 RM product @ 170,000 seeds/acre was the highest yielding regardless of row spacing (Figure 3).
- Although 170,000 seeds/acre was the optimum rate in this trial (Figure 3), previous work at the Monsanto Learning Center at Monmouth, IL has shown soybean response to planting population to be inconsistent year over year.
  - Soybean Populations by Stress Mitigation. 2013 Demonstration Report.[1]
  - Soybean Row Spacing by Population. 2014 Demonstration Report.[2]

WHAT DOES THIS MEAN FOR YOUR FARM?

- Multiple years of data from the Monsanto Learning Center at Monmouth, IL have shown high soybean yields at a range of seeding rates.
- The Monsanto Learning Center plans to continue conducting trials to help determine the optimum combination of soybean seeding rates and row spacing.
- Multiple years of data from the Monsanto Learning Center have supported an advantage of 20-inch and Twin 30-inch center rows over 30-inch rows.[2]

SOURCES
1 Soybean Populations by Stress Mitigation. 2013 Demonstration Report. https://monsanto.com/app/uploads/2017/05/mlc-lc-soybean-population-by-stress-mitigation.pdf.
2 Soybean Row Spacing by Population. 2014 Demonstration Report. https://monsanto.com/app/uploads/2017/05/mlc-lc-soybean-row-spacing-by-population.pdf. Sources verified 11/6/17. 171102110840

Notes

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