

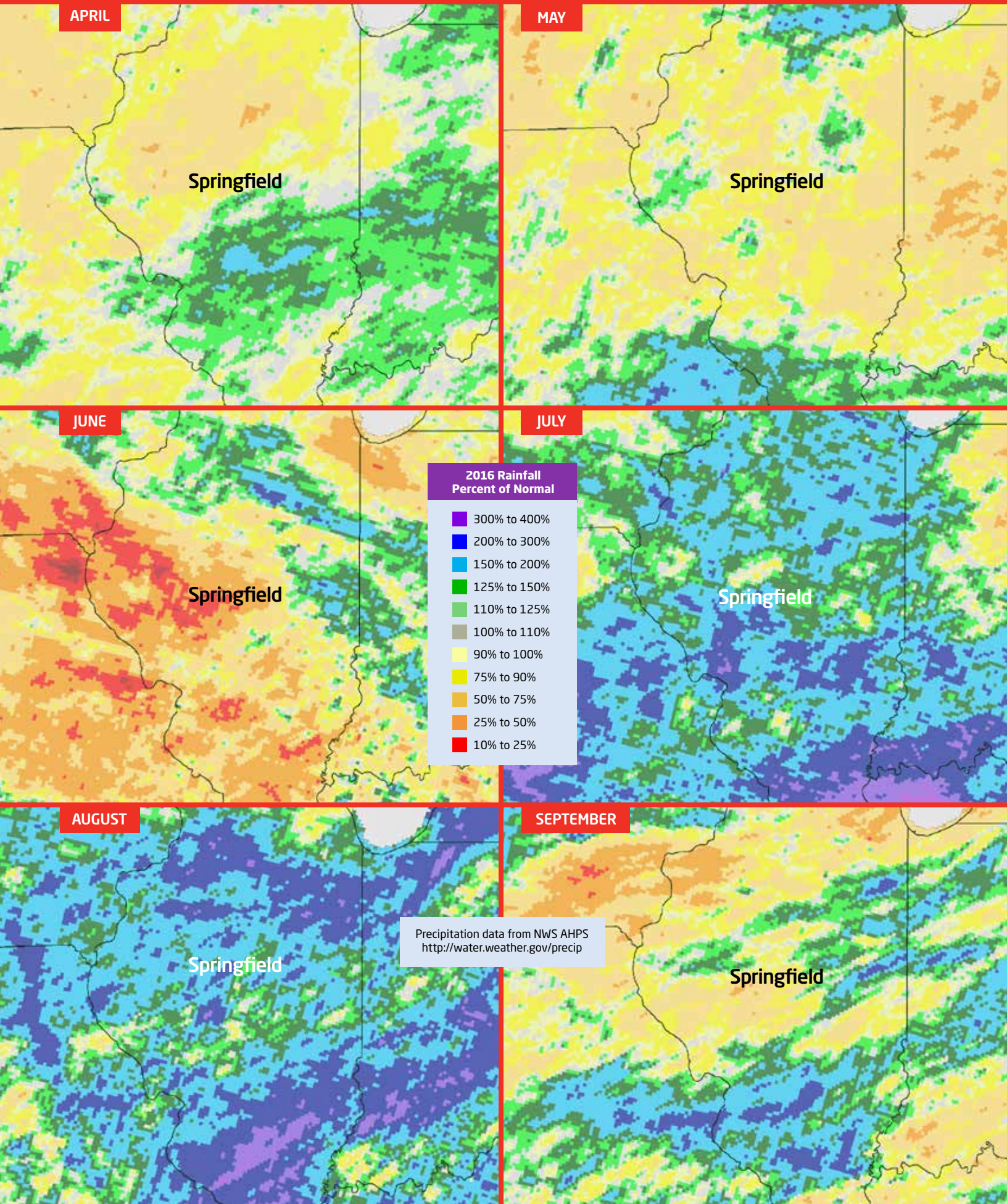
**2016 RESULTS**

# BRANDT<sup>®</sup> Research & Development Farms





# 2016 ILLINOIS PERCENT OF NORMAL RAIN





BRANDT Professional Agriculture is proud to present the 2016 trial results from Pleasant Plains, IL and Lexington, IL Research Farms.

Both locations focus on products and practices that can be implemented into everyday farming operations. Advances in agriculture move at a rapid pace and it is our job to test and understand these technologies to better your operations and ultimately your profitability. It is important to produce local data, under the same conditions our customers face, to assist in making informed decisions. We have two of the largest and most dynamic research farms in Illinois. Our goal is to stay ahead of agriculture trends so that you are never behind.

We continue to produce best agronomic practices while being mindful of environmental impact by implementing 4R Nutrient Stewardship Certification by our employees and locations (learn more at [www.keepit4rcrop.org](http://www.keepit4rcrop.org)). Also, our employees and facilities stay current with the latest best management practices with guidelines and certification process organized by ResponsibleAg (learn more at [www.responsibleag.com](http://www.responsibleag.com)).

Please enjoy our 2016 results and discuss with your BRANDT representative ways we can work together to improve yields and profitability on your farm.


*Ed Corrigan, Technical Agronomist*

*Dan Froelich, Technical Agronomist*

*Kyle McClelland, Technical Agronomist*

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 **WEATHER:** We experienced a little bit of everything throughout the market area, but for the most part the season climate factors were good to us. We saw periods of little rainfall early on, which led to some plant stress. Adequate moisture at pollination and grain fill helped to save this years crop. Fall conditions for harvest and fall nutrition and field work made for a successful fall.

Three consecutive years of above average yields have left the soils "tight" as some of you may have experienced during fall tillage or ammonia applications with tractors pulling hard. This could play a major role in 2017 depending on the freeze/thaw throughout the winter months.

# BRANDT RESEARCH FARMS

## PLEASANT PLAINS

200 TRIALS  
30" Corn  
Cover Crops  
Strip Till vs Conventional Till  
4 Hybrid Groups  
NH3 Fall/Spring, Broadcast 28%  
Sidedress, Starter Mixes  
42,000 Population  
10th and 12th Year Corn

1  
Plant Stimulant Trials

2  
20" vs 30"  
CROPLAN®  
Hybrid Performance  
Corn on Corn

3  
30"  
DEKALB® Hybrid  
Performance  
Trials

4  
N Rate  
Cover Crops  
Demo

10

11

12

1  
Tillage, Insecticide  
& High Yield Corn

Nitrogen Trials

2  
Hybrid Population,  
Row Width & Fungicide

Soybean Seed  
Treatments

Stress Mitigation,  
High Yield Soybeans

3  
Corn Pipeline

4  
Soybean Pipeline

## LEXINGTON





There were some definite highlights this year at the BRANDT Research Farms. As with any research, we get excited about outcomes that we expected to happen, but even more so at the unexpected and determining why. We take pride in producing local data under the same conditions as all of you. 2016 brought battles with weed resistance, insect and disease pressure as well as other environmental stresses.

We can't talk about a growing season without *Mother Nature*. In 2016, she threw a little bit of everything at us – from talks of drought to extended periods of heat, but overall she was pretty good to us. Conditions did favor outbreaks of pests in the forms of weeds, insects and fungi, but with proper management none were a significant detriment to yield.

We continue to fine tune production agriculture with the understanding of maximizing yield and ROI, increasing soil health and being stewards of the environment. Our employees and locations are taking a leadership role in ResponsibleAg and Nutrient Stewardship.

We are pleased to share with you the results from our Pleasant Plains, IL and Lexington, IL Research Farms. For economic analysis and return/acre we used the 2016 fall crop insurance price of **\$3.49** for corn and **\$9.75** for soybeans.

# BRANDT® TOTAL ACRE® CORN

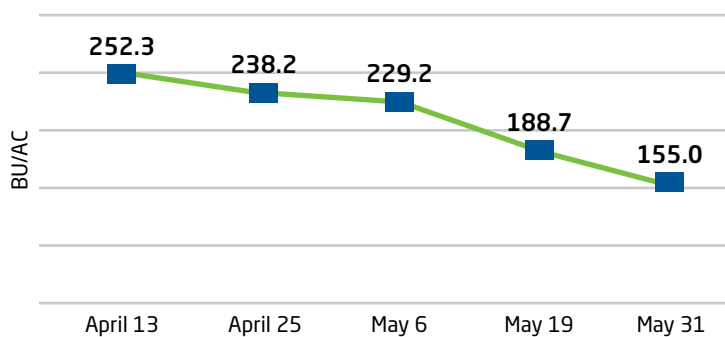
BRANDT Total Acre is an omission style trial system that is focused on exposing the differences between hybrid phenotypes. The “omission design” is based on providing all the treatments and then removing one to see what value each practice has on yield of that phenotype. This creates an environment where the yield responses are reflective of the total high management system rather than a limited response due to a lack of some or all the parts of the system.

## BRANDT Omission Design Standard Treatment

- 15-50-150 suspension fall with Brash® herbicide
- Fall NH3 - 150 units
- Band @ plant 25-0-0-9S (2x0)
- 2.5 gal/ac in furrow starter
- 42,000 population
- QuickRoots® seed treatment
- Conventional till in fall, salford in spring
- Plant on ammonia line
- Pre-emerge at plant with water
- 32 oz glyphosate, BRANDT Smart Trio®, BRANDT Smart B™
- Fungicide at VT plus BRANDT Smart B

## Corn Yield Planting Date Trial DKC 63-72

Pleasant Plains



It is well documented that early planting favors higher yields like we saw in 2016. This is the case more often than not, but there are factors that could change this outcome.

**Here are some things to remember:**

- It is important to monitor soil temperatures and long-term forecast
- Typically, yield potential declines significantly after May 1
- Avoid “mudding in” early, planting late is the better decision
- Mineralization was high in 2016





# BRANDT TOTAL ACRE CORN ON CORN TRIAL EVIDENCE

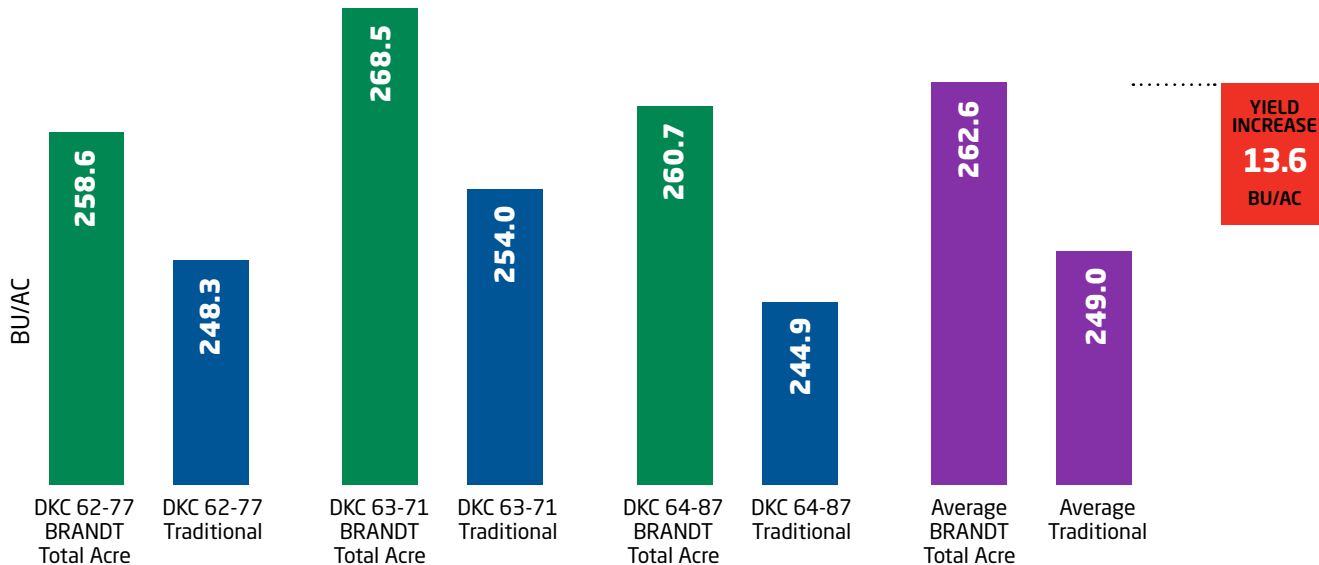
## PLEASANT PLAINS

ROI calculated using  
\$3.49 bu corn

TOTAL ACRE POLE POSITIONS	2011	2012	2013	2014	2015	2016	6 YR AVG	6 YR ROI
1. Planting Date	n/a	67.6	99.6	94.2	41.8	45.3	<b>69.7</b>	\$\$\$
2. Hybrid Variance	56.2	16.3	47.8	36.1	35.7	31.2	<b>37.2</b>	\$\$\$
3. Nitrogen Rate	18.3	39.3	18.1	11.5	47.1	12.4	<b>24.5</b>	\$\$\$
4. Strobilurin Response	14.1	51.7	13.4	14.3	21.2	27.2	<b>23.7</b>	2.7
5. Population Rate	13.9	3.7	32.5	27.3	40.4	12.3	<b>21.7</b>	1.7
6. BRANDT Smart Trio	15.9	22.0	22.1	34.1	17.5	15.8	<b>21.2</b>	18.5
7. Tillage System	n/a	n/a	n/a	19.7	15.0	19.5	<b>18.1</b>	3.5
8. P&K Rate	27.4	23.3	10.7	16.7	10.1	14.1	<b>17.1</b>	1.0
9. Nitrogen Timing	n/a	n/a	23.0	20.5	7.6	16.3	<b>16.9</b>	\$\$\$
10. Banding Nitrogen	n/a	n/a	13.0	15.4	22.9	11.9	<b>15.8</b>	\$\$\$
11. Soil Insecticide	20.6	12.3	8.1	11.5	n/a	n/a	<b>13.1</b>	2.2
12. Starter (28% Sulfur at Plant)	4.5	4.0	11.1	13.6	13.6	13.4	<b>10.0</b>	2.3
13. Zinc (1 qt/ac)	10.9	8.1	4.6	20.7	5.0	1.2	<b>8.4</b>	4.7
14. BRANDT Smart B at Tassel	7.0	4.0	n/a	9.3	5.9	6.8	<b>6.6</b>	5.8

## BRANDT Total Acre Management Vs Traditional Management

Lexington



The BRANDT Total Acre management system is designed to manage every variable within a field to maximize that field's potential. Matching genetics, nutrition and crop protection to soil type and management practices, such as tillage, will insure the highest possible yield is extracted from each field on your farm.

The chart above illustrates yield in the same field/same genetics using two different management styles: BRANDT Total Acre management vs traditional management.

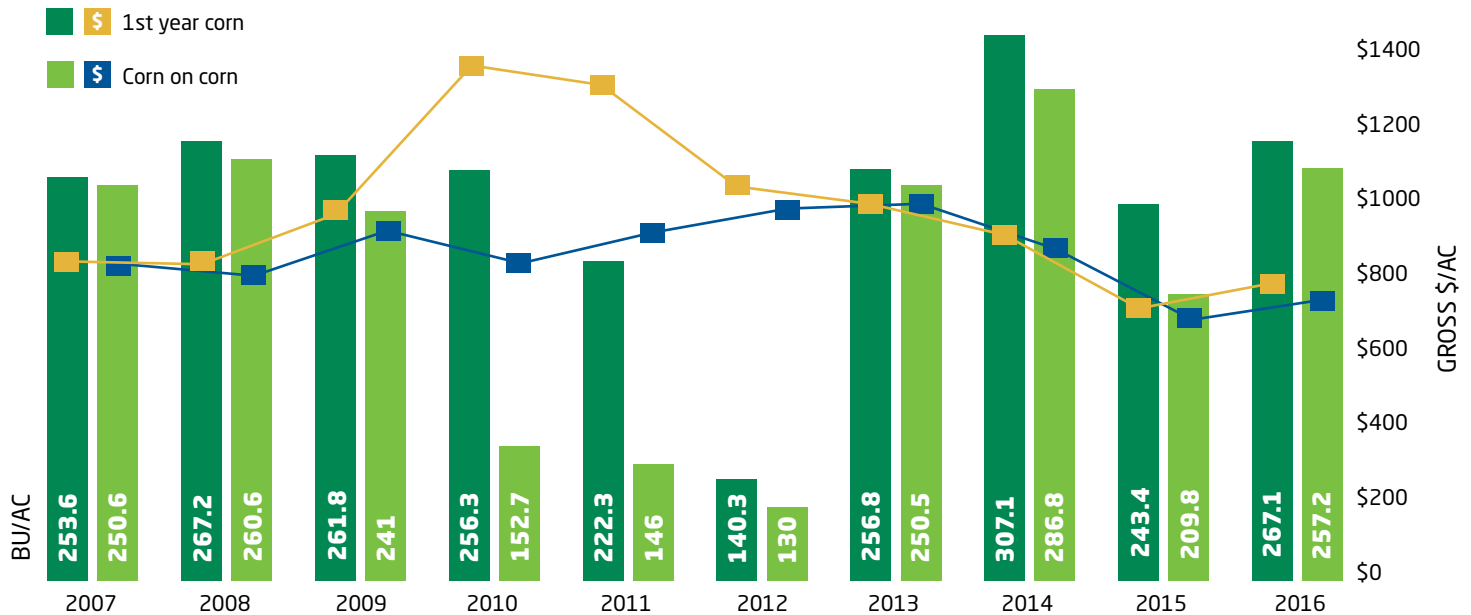
### Examples of BRANDT Total Acre Management:

- Matching nutrition to genetics and soil types
- Foliar fungicide/insecticide with BRANDT foliar nutritionals
- Use of sulfur and starter fertilizers
- Banding nutrition vs broadcast
- Balanced nutrition system

# CROP ROTATION TRIALS

There are several influencing factors to rotating crops: Specifically, break disease/pest cycles, market prices, increase soil health and increasing productivity. Current market conditions and surveys report that we'll likely have an increase in soybean acres throughout the cornbelt region. This market driven change may be as good economically as it is agronomically. Soils are currently "tight" making nutrient availability more difficult. Rotating to soybeans in 2017 could provide our soils some much needed relief while using our best practices to produce a successful ROI soybean crop.

## Crop Rotation - 10 Year Historical



### Pleasant Plains

We have 10 years of crop rotation data averages at our Pleasant Plains farm.

#### Important observations:

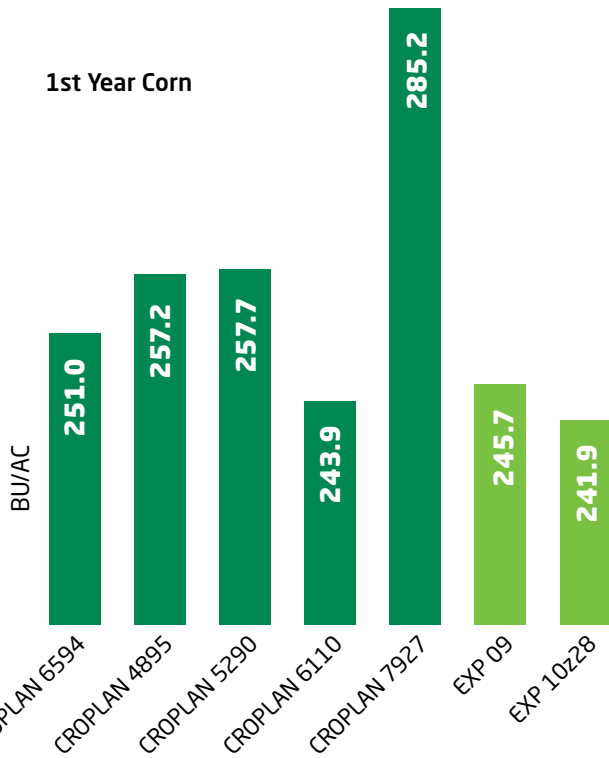
- 1st year corn out yields multi-year corn
- Increasing yield increases gross revenue
- 4 consecutive years of good to excellent yields will start to significantly impact soil/plant health if not managed properly
- 2012 drought has led to 4 years of loose soils and high mineralization



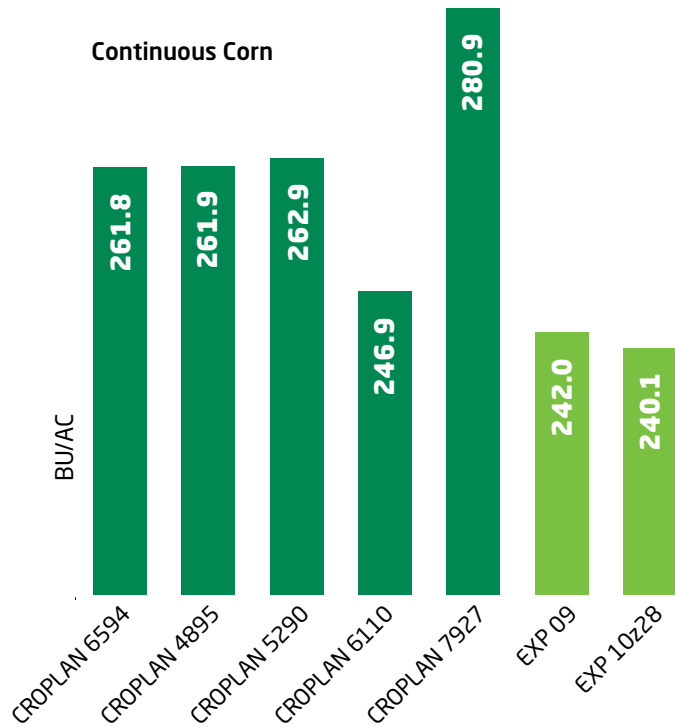


## CROPLAN® Hybrid and Crop Rotation

1st Year Corn



Continuous Corn



## QuickRoots® Trial

BU/AC

Without QuickRoots 244.7

With QuickRoots 254.0

63-72, 20 inch rows, corn on corn

Without QuickRoots 253.7

With QuickRoots 265.6

63-72, 20 inch rows, 1st year corn

### Pleasant Plains

- Improved nutrient uptake, including nitrogen, phosphate and potassium
- Enhanced nutrient capability which supports root and shoot growth
- The talc-based dry planter box formulation uniformly coats seeds
- A wettable powder formulation makes application more convenient

### Pleasant Plains

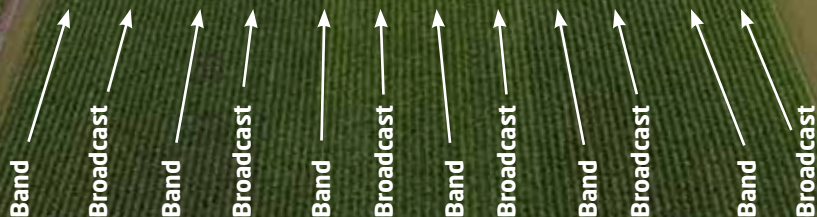
Overall, yields in 2016 were good. Some hybrids handled the stress better through the drought period of 2016 and those ended up being the highest yielding.

- Match hybrids to management
- Diversify hybrids across fields/farms
- Understand historical characteristics of your fields



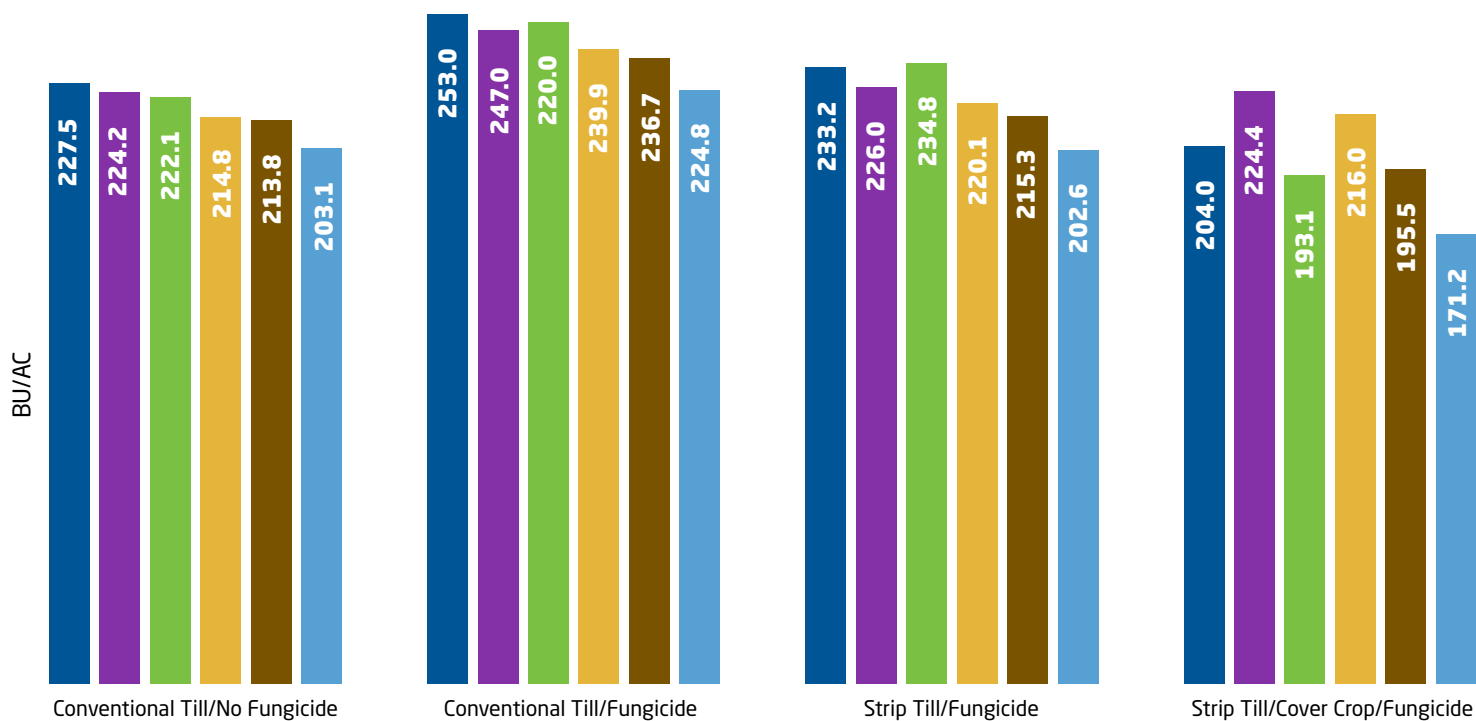
# NITROGEN STUDY

25-0-0-8S  
Band vs Broadcast at plant

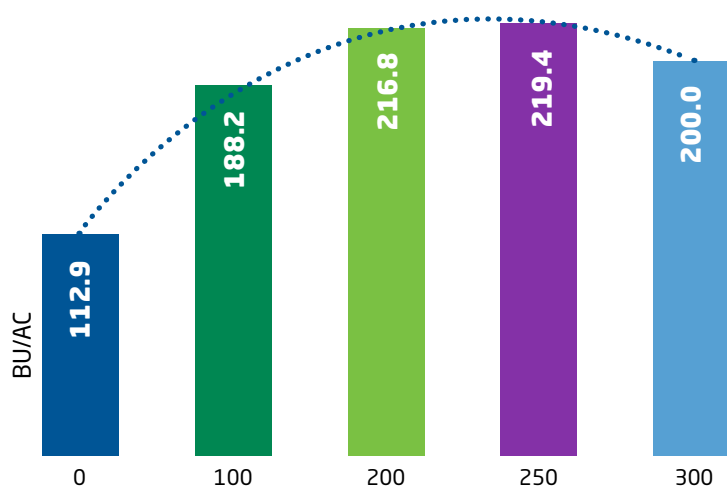


## Nitrogen Timing & Tillage Systems

- Fall NH3 with Banded Spring 28%
- Fall NH3 with Broadcast Spring 28%
- Banded Spring 28%
- Spring NH3 with Banded Spring 28%
- Spring NH3 with Broadcast Spring 28%
- Broadcast Spring 28%







## Nitrogen Rate Trial Block 4

### Pleasant Plains

Economics, the environment and yield are the important factors in N rate selection.

#### Considerations for determining proper N rate:

- Only apply as much as the crop needs – Maximum Return to Nitrogen (MRTN)
- Utilize multiple timings to achieve most efficient N
- Use data collection to keep historical records
- Consider variable rate technology (VRT)

## Fall Applied NH<sub>3</sub> - 4 Row Trials





## 4R Nitrogen Management

### Lexington

Results from our 2016 nitrogen 4R management trails were very similar to 2015. This is the likely outcome for several reasons:

- Fall NH3 had the time and conditions to convert to usable N
- Providing nutrition at the proper placement where the plant can easily get it
- Cover crops are a good source to uptake remaining post-season nutrition and hold it for upcoming season

4R nutrient management has been key to achieving high yields while lessening the environmental impact in our watersheds, lakes and rivers.



BU/AC

**266.7**

100% NH3 @ V5

**260.3**

100% Y Drop® 28% @ V5

**262.9**

100% Y Drop® 28% @ V10

**265.1**

100% NH3 @ V5

**249.3**

100% Y Drop 28% @ V5

**265.5**

25% Spring NH3 75% Sidedress NH3

**252.2**

75% Spring NH3 25% Sidedress NH3

**260.8**

50% Fall NH3, 25% Spring NH3, 25% Sidedress NH3

**265.5**

50% Fall NH3, 50% Sidedress NH3

**273.9**

50% Fall NH3, 50% Spring NH3

**273.7**

100% Sidedress 28% @ V5

**269.3**

100% Sidedress NH3 @ V5

**274.6**

100% Spring Broadcast 28%

**248.9**

100% Spring NH3

**278.6**

100% Fall NH3



# COVER CROPS

**Allelopathy** refers to the beneficial or harmful effects of one plant on another plant, both crop and weed species, from the release of biochemicals, known as allelochemicals, from plant parts by leaching, root exudation, volatilization, residue decomposition, and other processes in both natural and agricultural systems.

Cover crops are one of the practices recommended by the Illinois Nutrient Loss Reduction Strategy to improve water quality at home and downstream by reducing nitrogen and phosphorus levels in our lakes, streams, and rivers. Many different types of plants fall under the cover crop umbrella such as ryegrass, brassicas, legumes, sudan, winter peas, etc.

When it came time to pick a winter cover crop for our trial system at Pleasant Plains, we turned to the most widely used cover crop in our area - cereal rye. Cereal rye can be seeded later in fall than other cover crops and still provide considerable dry matter, an extensive soil-holding root system, significant reduction of nitrate leaching and exceptional weed suppression. A good stand is critical for a successful cover crop, making cereal rye an easy choice for local producers.

## Recommendations for Corn Going to Soybeans:

In 2016, we saw a positive yield response in trials where cereal rye was used as the cover crop prior to soybean planting. Cereal rye is a

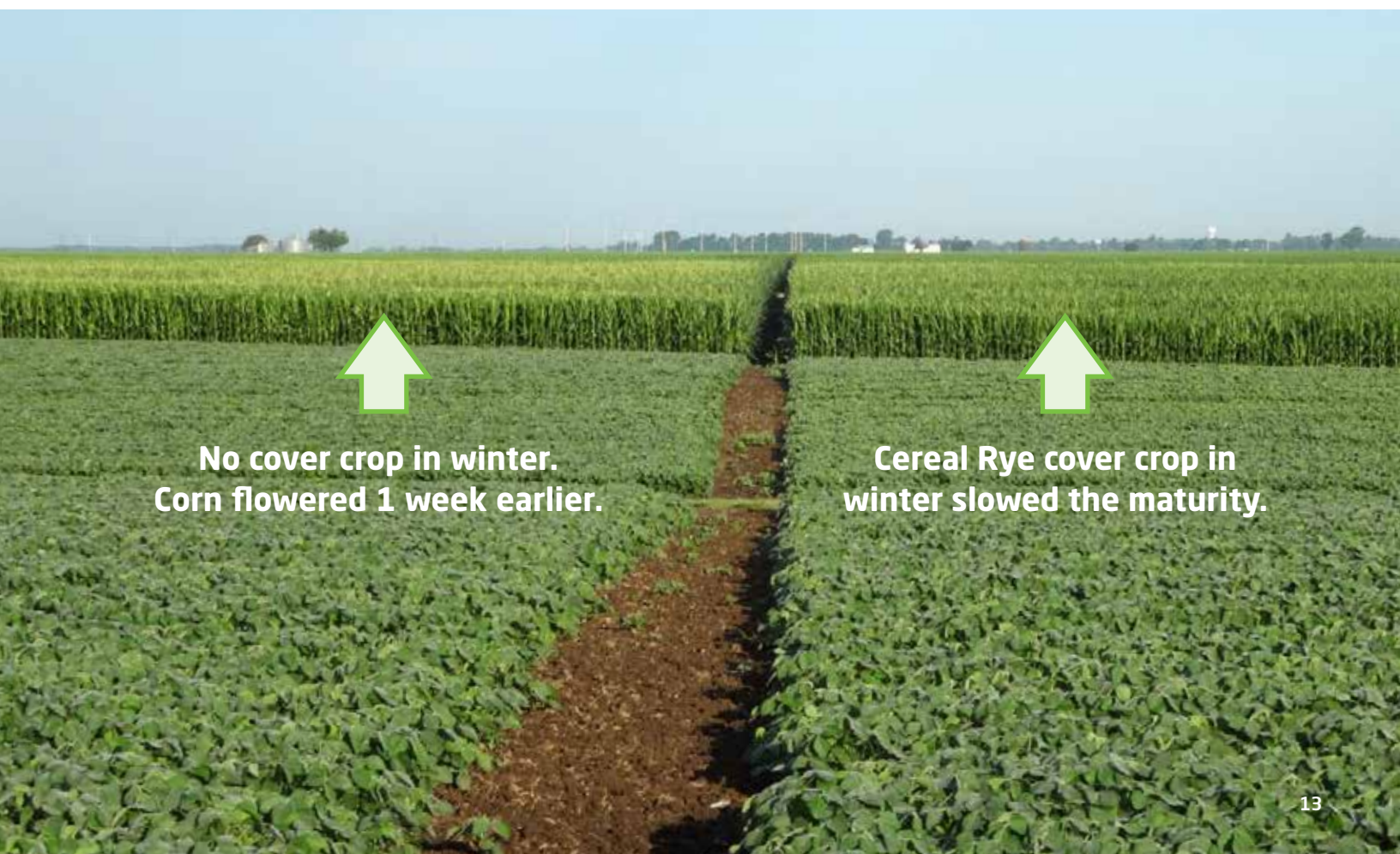
cool season annual grass that is very flexible to work with and has a strong winter-hardiness. Excellent germination and early vigor allows for later fall planting if necessary.

## Recommendations for Soybeans Going to Corn or Corn on Corn:

2016 trials at the BRANDT Research Farm showed that corn planted into cereal rye cover crop had a negative response due to the allelopathic effect produced by the cereal rye. However, oats may be the better choice of cover crop ahead of corn with some reported yield increases. Oats are a low water use crop that do a great job at capturing unused nutrients and holding soil.

## Response to Tillage and Cover Crops on Corn

		BU/AC
Conventional Till		236.9
Strip Till		222.0
No Till	200.7	Cover Crop



**No cover crop in winter.  
Corn flowered 1 week earlier.**

**Cereal Rye cover crop in  
winter slowed the maturity.**

# STARTER PERFORMANCE TRIALS

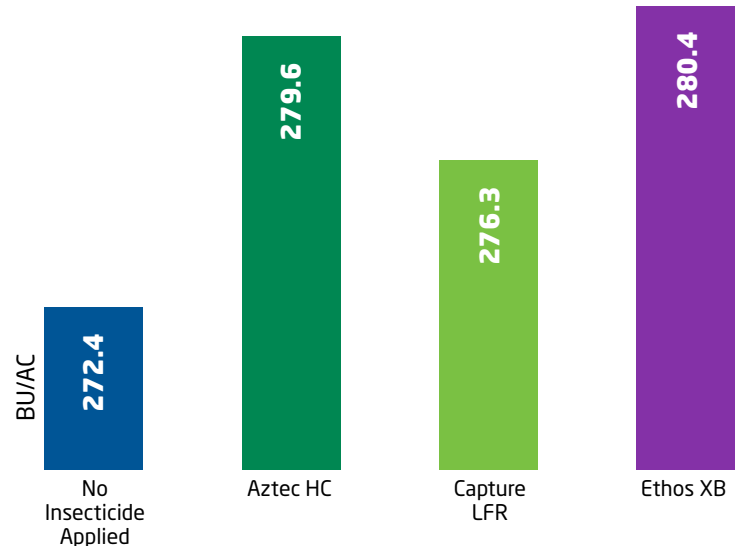
Part of achieving maximum yield is to lessen or not allow the plant to undergo periods of stress. Outside of weather, there are many variables we can control. In this section we are going to look at early stage insecticides and nutrition applied as a starter fertilizer.

## Insecticide Trial

### Lexington

Soil applied insecticide in corn production mainly focuses on corn rootworm control, but also allows for control of many harmful secondary insects.

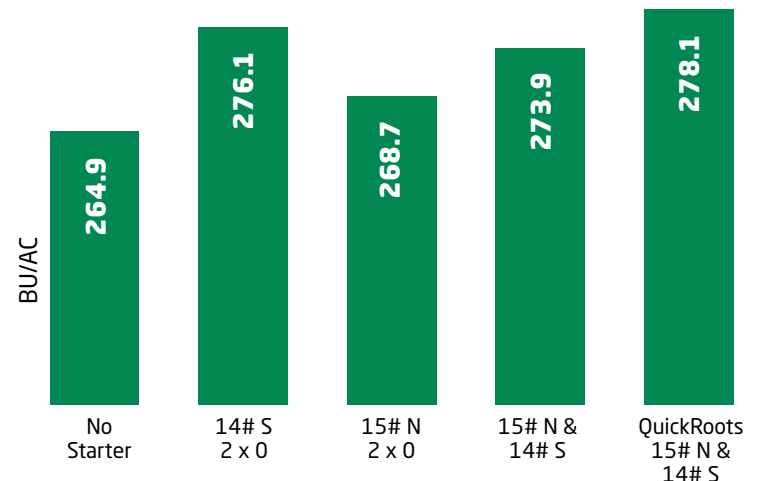
- A good tool for fields planted continuous corn
- Soil insecticides target the larvae stage of corn rootworm
- Weather can play a role in effectiveness
- In high pressure/high rootworm populations, additional action may be necessary
- Dekalb 64-87 SS/RIB planted



## Starter Fertilizer Trial

### Lexington

- The combination of N and S showed the largest return in 2015 compared to S alone as the leader in 2016
- Applied 2 x 0
- ATS was the source of S and 28% the source of N
- N is often readily available at this stage, but this is where we are seeing more and more S deficiency – that is why we see a larger response to the S applications.





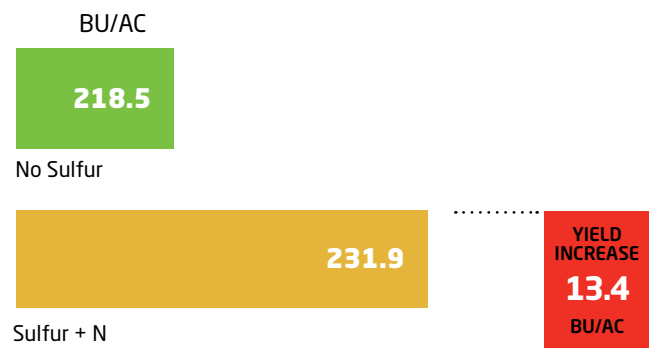


## Sulfur vs No Sulfur at Plant

### Lexington

Sulfur has become one of the most beneficial applications in terms of crop response and ROI. Sulfur is mobile in the soil and therefore can be easily lost, so timing of application is important. Applying S at-planting or as a starter is important for early season growth.

- Atmospheric sulfur is decreasing, contributing to S deficiencies in crop production
- Apply sulfur when the crop can use it
- High rates may be necessary to correct deficiencies
- A good ROI application

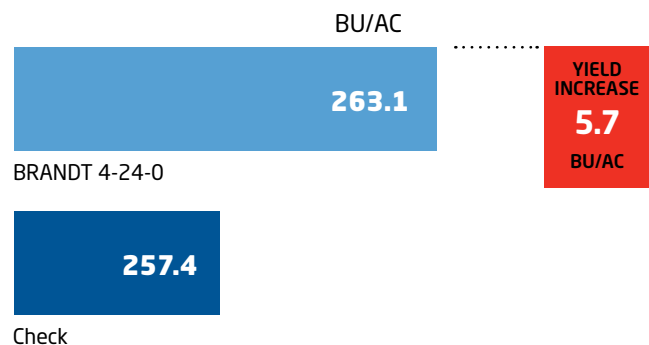


## BRANDT® 4-24-0 as Starter

### Pleasant Plains Pipeline

BRANDT has been working with a new starter fertilizer that has shown promising results the last two seasons.

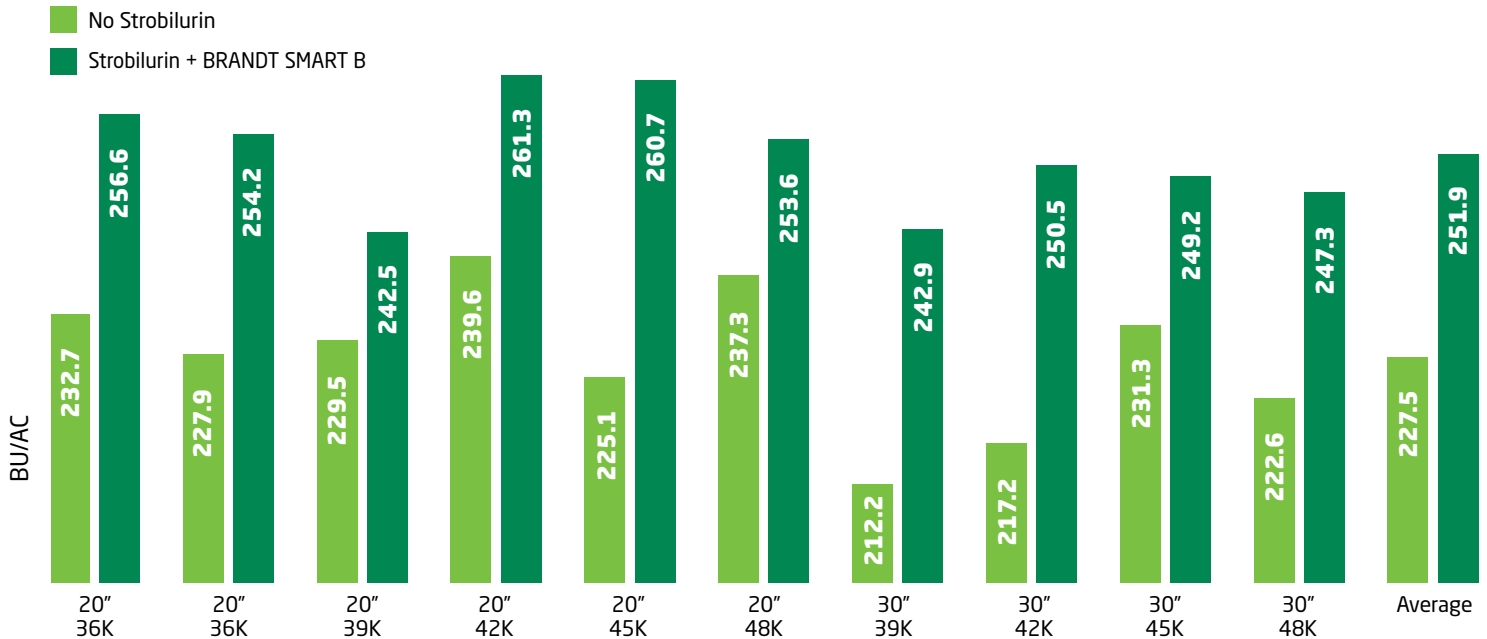
- BRANDT 4-24-0 proprietary formulation
- Valuable source of P at early growth stages
- Compatible with sulfur products
- Low salt
- Stable at low temperatures
- 100% Orthophosphate



# STROBILURIN FUNGICIDE ON CORN

Strobilurins, one of the most important classes of agricultural fungicides, are used for protection from disease and must be applied before the disease has spread heavily through the crop. These fungicides are responsible for reducing stress by decreasing ethylene gas in the plant (sometimes referred to as plant health). The reduction of ethylene slows the maturity of the plant allowing for increased nutrient efficiency in the plant. When plants are heavily stressed from weather, disease, etc., the amount of ethylene in the plant rises and speeds up maturity, reducing yields.

## BRANDT® Smart B™ Yield Response at Tassel



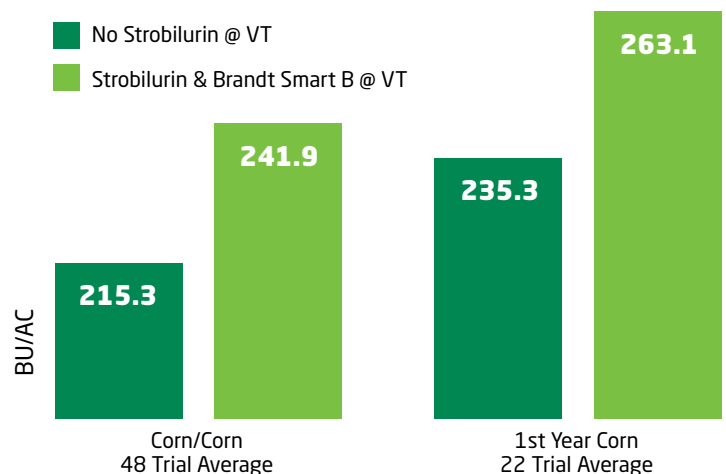
### Pleasant Plains

- Apply at VT to lessen any period of stress that may reduce yield. Don't wait for disease to be present.
- Always use a BRANDT boron product as a companion. Boron is essential at R stages and is often deficient.
- Higher yield response is typically seen in seasons with periods of weather related stress.
- Must contain a strobilurin derived fungicide.

## Strobilurin and BRANDT Smart B at VT vs No Fungicide

### Pleasant Plains

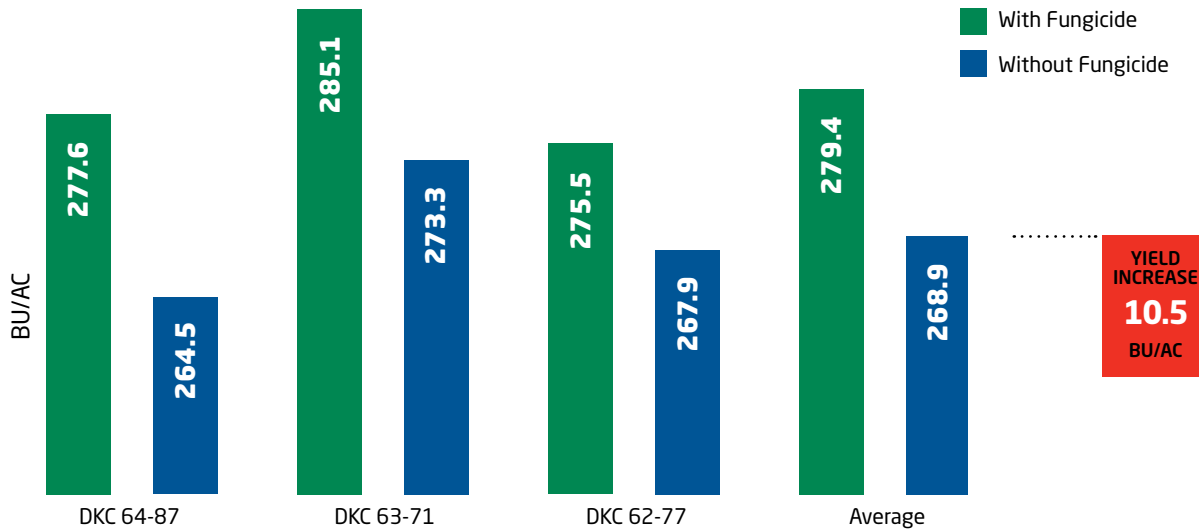
Strobilurin fungicide was applied over multiple corn-on-corn and first year corn trials. All resulted in yield and ROI increase with the averages graphed below.





## Strobilurin Fungicide on Corn vs No Fungicide

Lexington



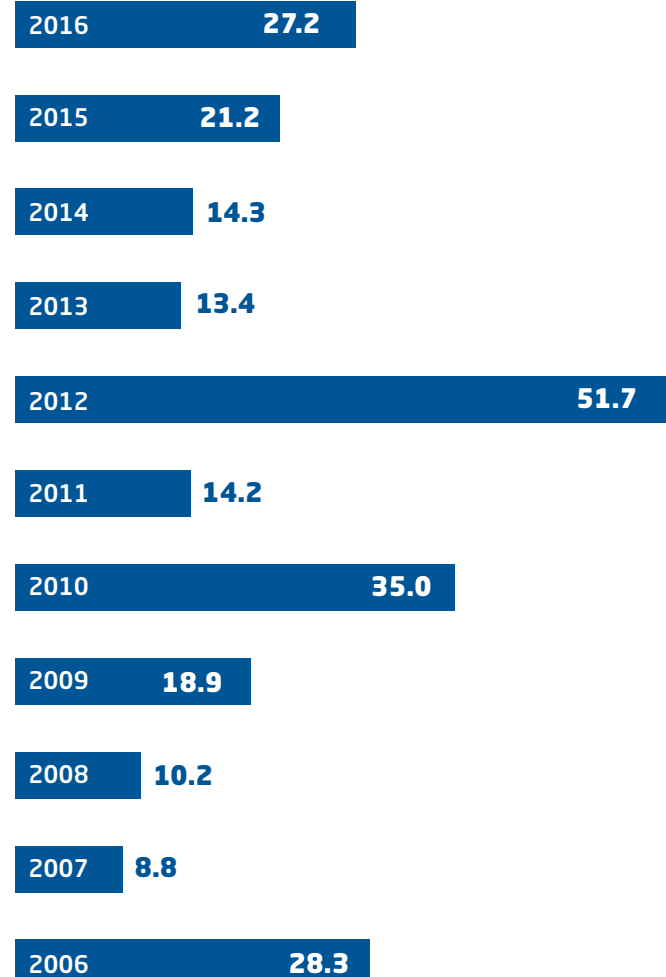
## 11 Year Strobilurin and BRANDT Smart B at Tassel

Pleasant Plains

Over many years the benefits of the strobilurin fungicide plus BRANDT Smart B or in early years, N-Boron®, has been a consistent yield response and a good ROI. As we look at the 2016 season, the stress drought period early in the season and late season wet conditions proved to be a great indicator that the response would be significant.

BU/AC YIELD INCREASE

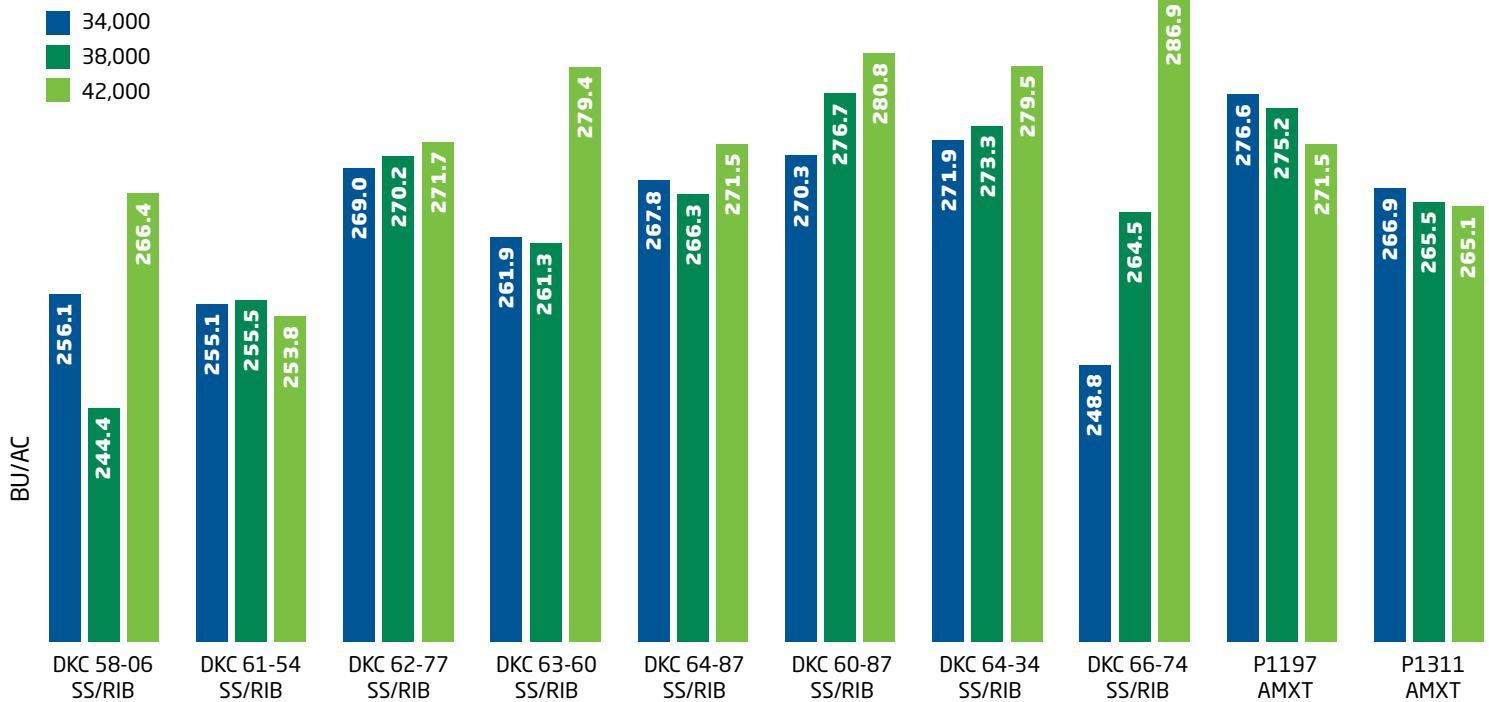
22.1 11 year average



# POPULATION STUDIES

Increasing ears per acre has always been the major driver of increased bushels/acre. The ability of individual hybrids to handle the intense stress caused by population has been, and will continue to be, researched heavily. BRANDT is testing for hybrids that can handle higher population stress and turn extra ears/acre into extra bushels/acre. BRANDT recognizes certain genetics and certain phenotypes can achieve this while some cannot. The objective of this data is providing local research that helps refine population response under top management.

## Corn Population Trials



### Pleasant Plains

- Match population to genetics, soil type and fertility program
- Determine best population to achieve ROI
- Higher population does not always mean higher yield
- Keep a good history of how hybrids react on your farm and management practices





# BRANDT FOLIAR NUTRIENTS



## BRANDT SMART TRIO® 9 Year Results

### Pleasant Plains

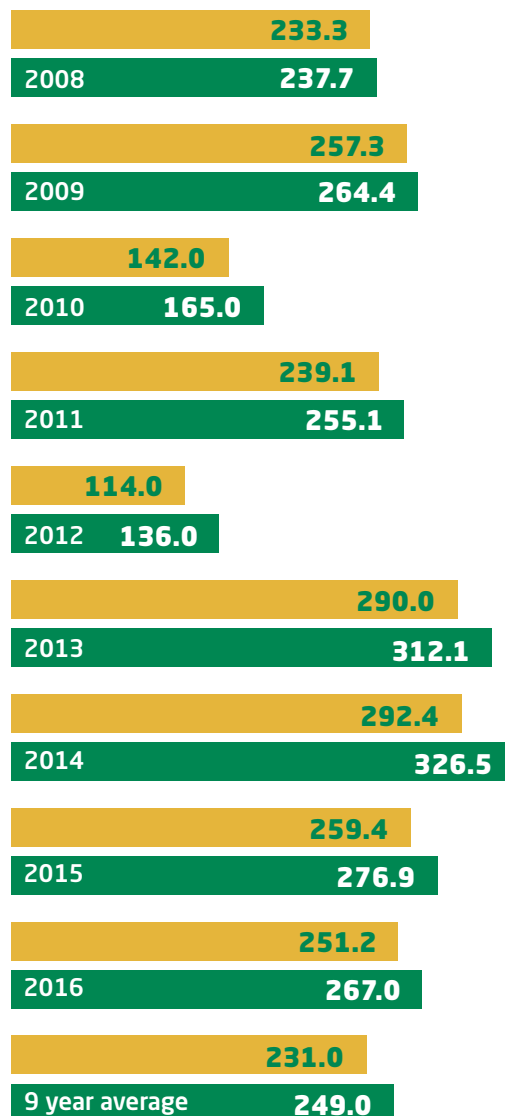
BRANDT Smart Trio has been rigorously tested since it was first formulated and marketed in 2008. Today, it is still our flagship foliar nutrient package providing a significant yield response and return on investment. It is also the cornerstone for newer foliar formulations such as BRANDT Smart B and BRANDT Smart Quatro.®

We are continuing work with this product to determine if earlier applications will prove more beneficial.



■ Glyphosate at 32 oz/ac  
■ Glyphosate plus 32 oz/ac BRANDT Smart Trio

BU/AC



# EVOLUTION OF BEST MANAGEMENT PRACTICES

When we look back, we see patterns or trends in practices that have brought us to the production levels we see today. Environmental factors are always a key element in the outcome of a successful harvest, but unpredictable.

The established trials combined with environmental pressures result in practices we identify as noteworthy, allowing us to implement new practices in the next growing season. Below is a timeline of how our best management practices have evolved over the last 8 growing seasons.

	2009	2010	2011	2012
ENVIRONMENT	A repeat of 2008 - cool/damp spring that evolved into a wet summer and fall. Delayed planting in no till. Minimized nutrient mineralization and tightened soils. Insects at silking caused Diplodia. Too wet for fall tillage.	Collapsed soils from the wet winter immobilized nitrogen into the residue. Soil mineralization was shut down. The summer nights were hot and humid. Drying trend for harvest. Tillage used to reduce residue/soil density layers.	Light rains during April and May combined with a warming trend into summer. Timely rains with a hot summer produced high heat unit numbers and sped up crop progress. Drying trend for fall harvest.	Record warm temperatures and dry spring creating perfect soil conditions. Light frost April 9. The warm and dry spring led into a very dry and hot summer. An early dry harvest!
IDENTIFIED PRACTICES	<p>Residue begins to create plant health issues.</p> <p>Maturity vs fungicide and insecticide response.</p> <p>Yield response to micronutrients vs nitrogen rate.</p> <p>Ear worm and Japanese beetles attacking silks and husk cause Diplodia.</p> <p>Potash applications responsible for standability at harvest.</p>	<p>Sulfur, zinc, manganese, boron deficiencies.</p> <p>Nitrogen immobilized by residue</p> <p>Higher P&amp;K rates needed to maximize higher populations.</p> <p>Hybrid rooting response to damp/tight soils.</p> <p>Soybeans respond to total management system.</p>	<p>Planting date affected corn yields in corn on corn.</p> <p>Split timing of nitrogen and banding near planting.</p> <p>Foliar insects attack soybeans at flowering.</p> <p>Narrow rows compliment shorter hybrids and lower N rates.</p> <p>Applying 210 units of nitrogen/acre maximized yields.</p>	<p>Early planting maximized yields except for scattered frosted fields.</p> <p>Corn tasseling followed potash applications.</p> <p>Fungicides applied at VT slowed plant metabolism and drought stress</p> <p>Sulfur applications with zinc maximized yields.</p> <p>Foliar insecticides improved yields and reduced "green stem syndrome"</p>
ADVANCING PRACTICES	<p>BRANDT SMART TRIO</p> <p>RR2Y Trait</p> <p>Strobilurin at tassel</p> <p>Residue management</p> <p>Phenotype vs nutrient interactions</p> <p>Narrower rows to maximize rooting</p>	<p>Nitrogen immobilization</p> <p>Soybean fungicides</p> <p>Split nitrogen applications</p> <p>Narrow rows</p> <p>Soybean seed treatments</p> <p>Plant soybeans early</p> <p>Late nitrogen applications worked</p>	<p>Zinc at planting</p> <p>Soybean maturity</p> <p>Potash applications</p> <p>Omission plots</p> <p>Short hybrids with narrow rows</p>	<p>Apply sulfur</p> <p>Fungicides reduce stress</p> <p>Potash reduces stress</p> <p>Early flowering</p> <p>Lower pH of foliar insecticides</p> <p>Narrow row shading improves yields</p> <p>Strobilurins stopped frost damage</p> <p>Cover crops absorb unused nutrition</p>





2013	2014	2015	2016
A moderately cool and moist winter led to a cool and wet spring. Light rains in April and late May with cloudy conditions. A cloudy summer was warm with ample moisture slowing crop maturity. Warm and dry harvest conditions through the fall.	A cold winter led to an early spring with warm temperatures and dry soils. A rainy May and June turned into a moderate temperature summer and ample moisture. The fall began dry and quickly moved into a cold and rainy late harvest.	A moderately cool/moist winter led to a cool/dry spring. Light rains fell in April and May making good planting conditions with slow corn emergence due to the cold. June was unusually wet with more than 20" for the month. July and August were dry and cooler than normal.	A normal/average winter led into spring with good workable soil conditions with adequate warmth and moisture for early planting. Drought conditions were experienced from mid-May through June. Rains came steadily around the 4th of July and continued through the rest of the growing season.
<p>Fall applied nitrogen moved deeper into the second foot of soils.</p> <p>Crops suffered from transient nutrient deficiencies until June.</p> <p>At plant applications of nitrogen, sulfur, and zinc were valuable.</p> <p>Early growth stage applications of nutrients and stimulants added yield.</p> <p>Late applied side dress nitrogen had no effect on yield.</p>	<p>Banding beats broadcast nitrogen applications at plant.</p> <p>Late side dress nitrogen applications did not perform well.</p> <p>Higher plant densities and narrow rows maximized the nutrition.</p> <p>Sulfur is needed on corn and soybeans.</p> <p>Hormone applications need adequate nutrition to perform.</p>	<p>Even emergence fields were critical for top yields.</p> <p>Banded nitrogen at planting time improved nitrogen efficiency.</p> <p>Hybrids with early plant vigor maximized yields.</p> <p>Insect damage was minimal in 2015 due to the wet June.</p> <p>Cover crops improved soybean yields.</p>	<p>Early planting date promoting even emergence</p> <p>Starter application of 4-24-0 with S</p> <p>Spraying crop protection early before stress</p> <p>BRANDT foliar products, specifically B with fungicide</p> <p>Fall ammonia with supplemental N banded in season</p>
<p>Hormones assist plants</p> <p>Apply sulfur</p> <p>Split apply nitrogen</p> <p>Higher populations</p> <p>Apply sidedress nitrogen early</p> <p>Long maturity soybeans</p> <p>Seed treatments</p> <p>Foliar applications mitigate transient nutrient deficiencies</p>	<p>Banding at plant</p> <p>Early foliar applications</p> <p>PONCHO®/VOTIVO® treated seed</p> <p>High populations</p> <p>Strip till provided better plant health</p> <p>Sulfur "at plant" on soybeans</p> <p>Crown rot controlled with potash</p>	<p>Even corn emergence</p> <p>Band nitrogen at plant</p> <p>Cover crop allelopathy did not effect soybeans</p> <p>Allelopathy in corn was stopped by strip tillage</p> <p>Amplified boron deficiency</p> <p>Zinc at plant continues to improve yields.</p> <p>Plant soybeans by the end of April to maximize yields</p>	<p>20" rows yielded higher than 30" rows under 2016 growing conditions</p> <p>Nutrition placement, i.e. banding or foliar, increased yield over broadcast methods</p> <p>Early kill of cereal rye cover crop had less impact on yield</p> <p>Soils are "tightening" due to 4 years of high yield in our area</p>

# BRANDT® TOTAL ACRE® SOYBEANS

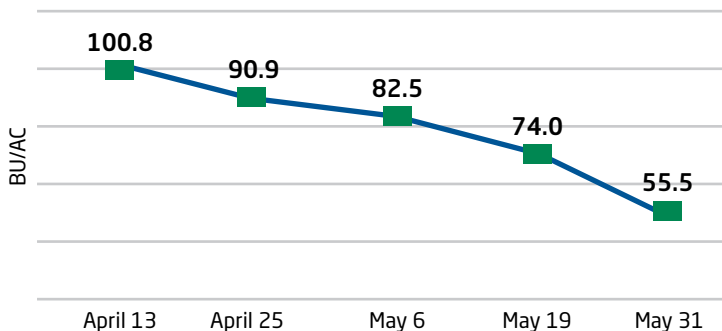
BRANDT Total Acre is an omission style trial system that is focused on exposing the difference between varieties. The “omission design” is based on providing all the treatments and then removing one to see what value each practice has on yield of that variety. This creates an environment where yield responses are reflective of the total high management system rather than a limited response due to a lack of some or all the parts of the system.

## BRANDT Omission Design Standard Treatment

- 15-50-150 suspension fall with Brash herbicide
- 120,000 population
- 3 gal ATS at plant 2x0
- PONCHO/VOTiVO seed treatment
- QuickRoots seed treatment
- Cover Crop- cereal rye
- Glyphosate burn down prior to plant
- Post applied herbicide tank mixes plus BRANDT Smart Trio plus BRANDT Smart B @ 1st trifoliolate
- Foliar insecticide @ R1 plus 1 qt BRANDT Smart Trio plus 1 pt BRANDT Smart B
- Strobilurin @ R2/insecticide plus 1qt BRANDT Smart Trio plus 1 pt BRANDT Smart B

## Soybean Planting Date Trial - AG 4135

### Pleasant Plains



Conditions in early spring are typically more favorable for germination. As we saw in corn, the earlier planting date yielded the highest. This is a result of early moisture, soil temperature and available nutrition.

- Use a variety with high RM when planting early
- Monitor long-term forecast for best planting conditions
- May need to increase population if planting at a later date
- There is potential for a larger ROI in soybeans in 2017 if the soybean remains strong
- Population: 120,000
- Be ready to protect early planted beans from insects
- Seed treatments are a “must” for early planting success





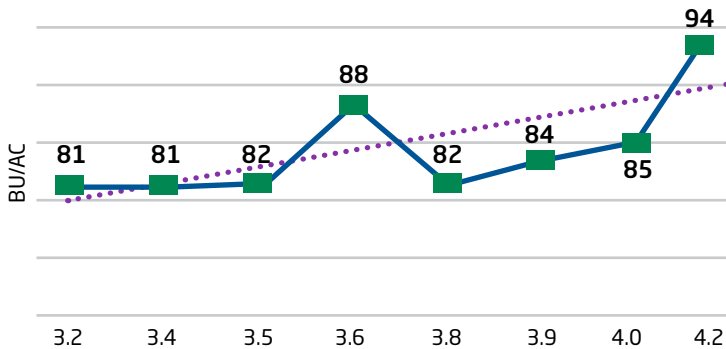
## PLEASANT PLAINS

ROI calculated using  
\$9.75 bu soybeans

TOTAL ACRE POLE POSITIONS	2011	2012	2013	2014	2015	2016	6 YR AVG	6 YR ROI
1. Planting date	n/a	6.8	8.3	13.6	11.0	45.3	<b>17.0</b>	\$\$\$
2. Variety	25.6	14.6	19.3	17.5	7.0	12.4	<b>16.1</b>	\$\$\$
3. Maturity	17.0	10.2	13.0	8.5	0	12.4	<b>10.2</b>	\$\$\$
4. Seed Treatment	6.1	11.9	7.4	5.5	8.5	12.9	<b>8.7</b>	5.5
5. Sulfur (ATS at plant)	n/a	n/a	3.8	4.8	4.8	8.8	<b>5.6</b>	11.3
6. Strobilurin	n/a	4.0	3.1	6.5	3.2	9.1	<b>5.2</b>	3.4
7. Cover Crop	n/a	n/a	n/a	n/a	9.5	0	<b>4.8</b>	2.9
8. Foliar Insecticide	3.5	5.7	4.9	3.4	n/a	2.9	<b>4.1</b>	8.0
9. P&K Rate	1.6	3.5	4.0	5.2	n/a	n/a	<b>3.6</b>	0.7
10. Manni-Plex® B Mo at R2-R4	n/a	n/a	1.0	7.4	n/a	2.0	<b>3.5</b>	6.8
11. BRANDT Smart Trio	3.2	3.9	3.4	3.3	n/a	n/a	<b>3.5</b>	8.4
12. Population	2.5	2.8	3.6	0	n/a	n/a	<b>2.2</b>	2.2

## Soybean Variety Maturity Yield Response

Pleasant Plains



A higher RM soybean will perform the best in most cases. If the ability to plant early is there, consider moving to a 3.9 RM soybean or higher. As the planting window closes, a shorter maturing variety will be necessary.

- Pick the right RM for your planting date and management style
- In the above chart, Asgrow 36X6 was a strong variety among the 3.9 RM or lower

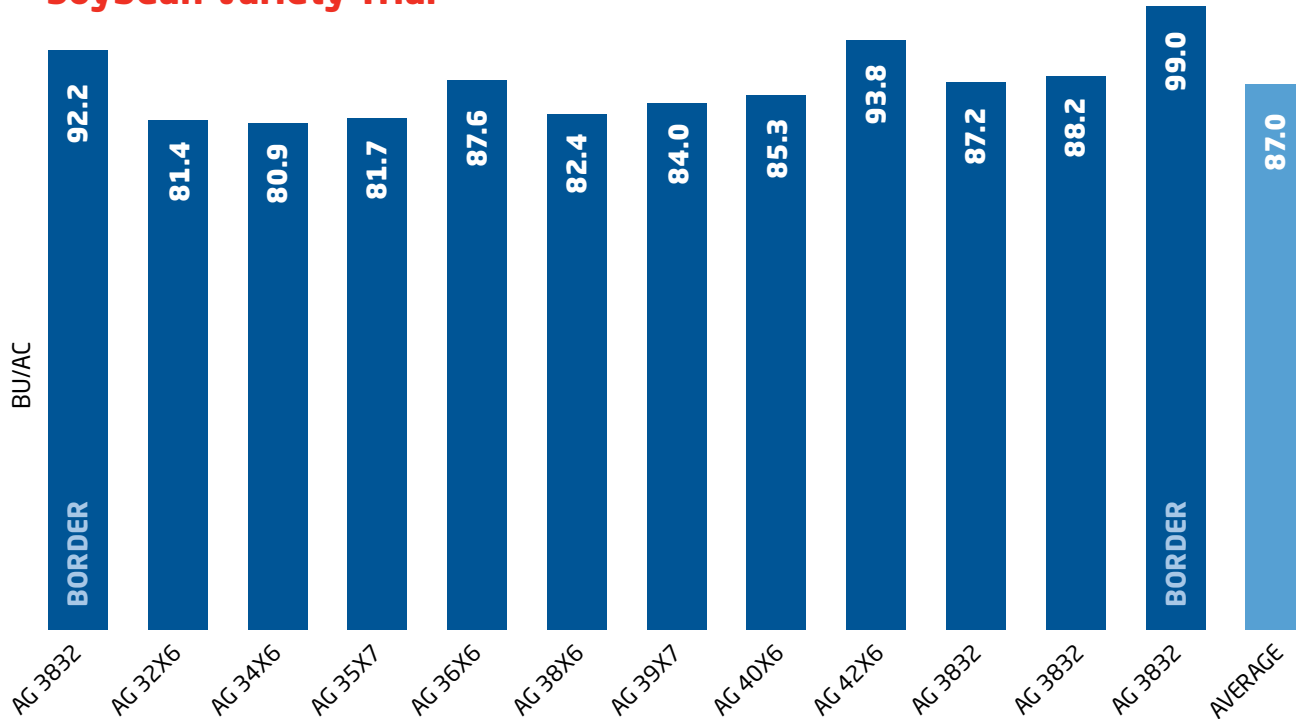


# VARIETY PERFORMANCE

BRANDT recognizes the future of soybean breeding will be in the Roundup Ready 2 XTEND® soybean germplasm base. We heavily tested those varieties in 2016 on the BRANDT Research Farm as well as in BRANDT Community Trials around our trade area. Dicamba will be a new tool in fighting herbicide resistant weeds in unison with our layered residual approach to fight resistance and prevent future resistance.

For more yield data on Roundup Ready 2 XTEND soybeans, go to [www.brandt.co/harvest](http://www.brandt.co/harvest)

## Asgrow® Roundup Ready 2 XTend® Soybean Variety Trial

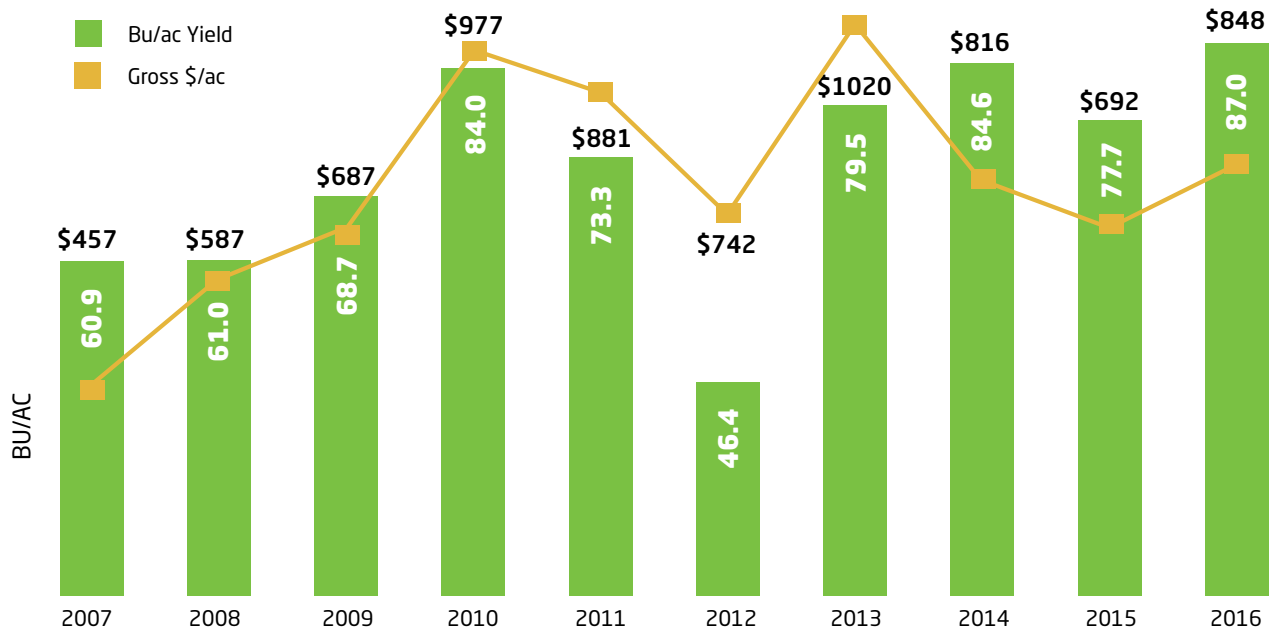






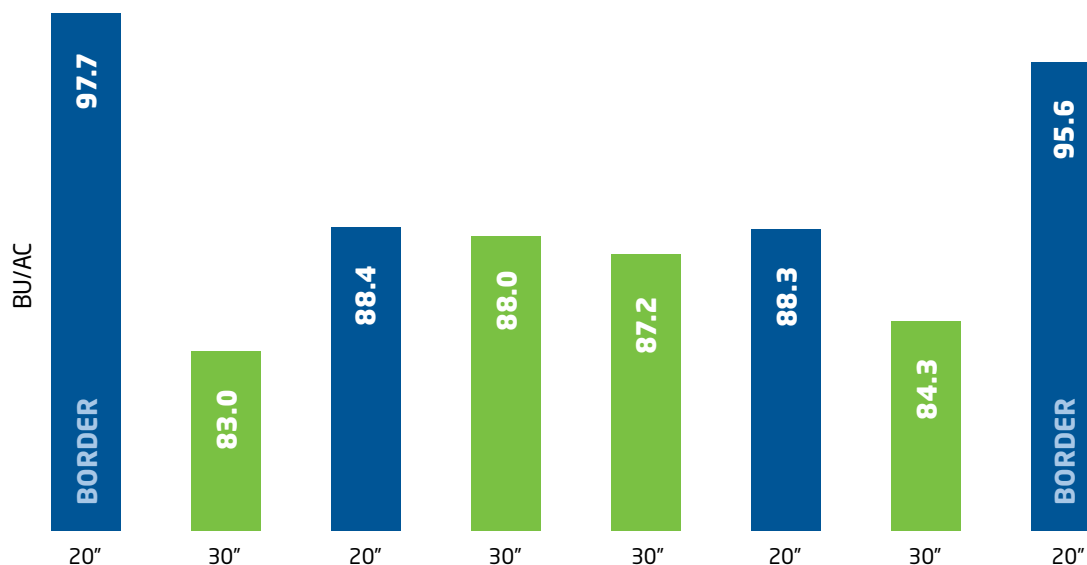
## 10 Year Average All Soybean Plots

Pleasant Plains, \$9.75 bu crop insurance price



## 20" vs 30" Row Soybean Trial

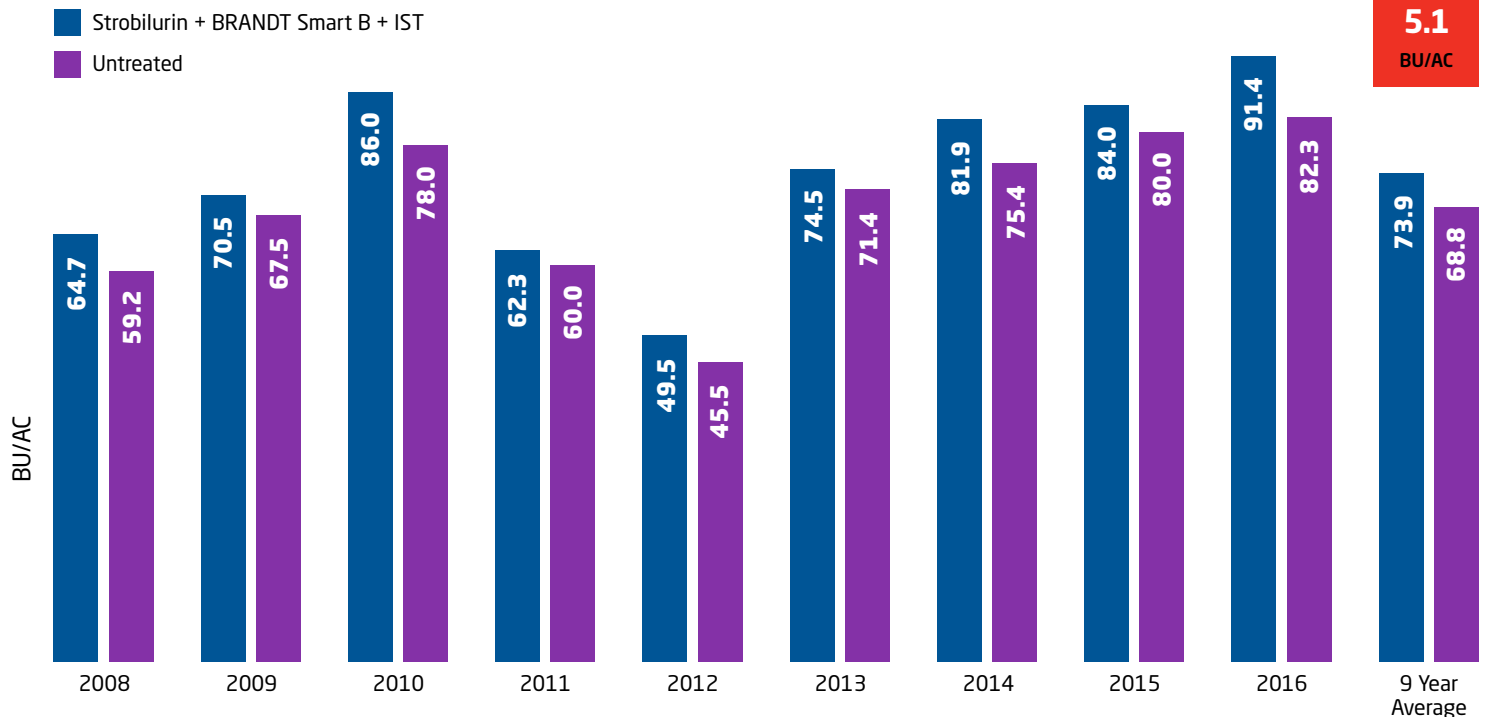
Pleasant Plains



# STROBILURIN FUNGICIDE ON SOYBEANS

Strobilurins, one of the most important classes of agricultural fungicides, are used for protection from disease and must be applied before the disease has spread heavily through the crop. These fungicides are responsible for reducing stress by increasing photosynthesis and decreasing ethylene gas in the plant. The reduction of ethylene slows the maturity of the plant allowing for increased nutrient efficiency in the plant. When plants are heavily stressed from weather, disease, etc., the amount of ethylene in the plant rises and speeds up maturity, reducing yields.

## Fungicide with BRANDT® Smart B™ Response on Soybeans - 9 Year Study



### Pleasant Plains

There was a significant response to strobilurin fungicide with BRANDT Smart B applications both at the research farm and throughout our market area.

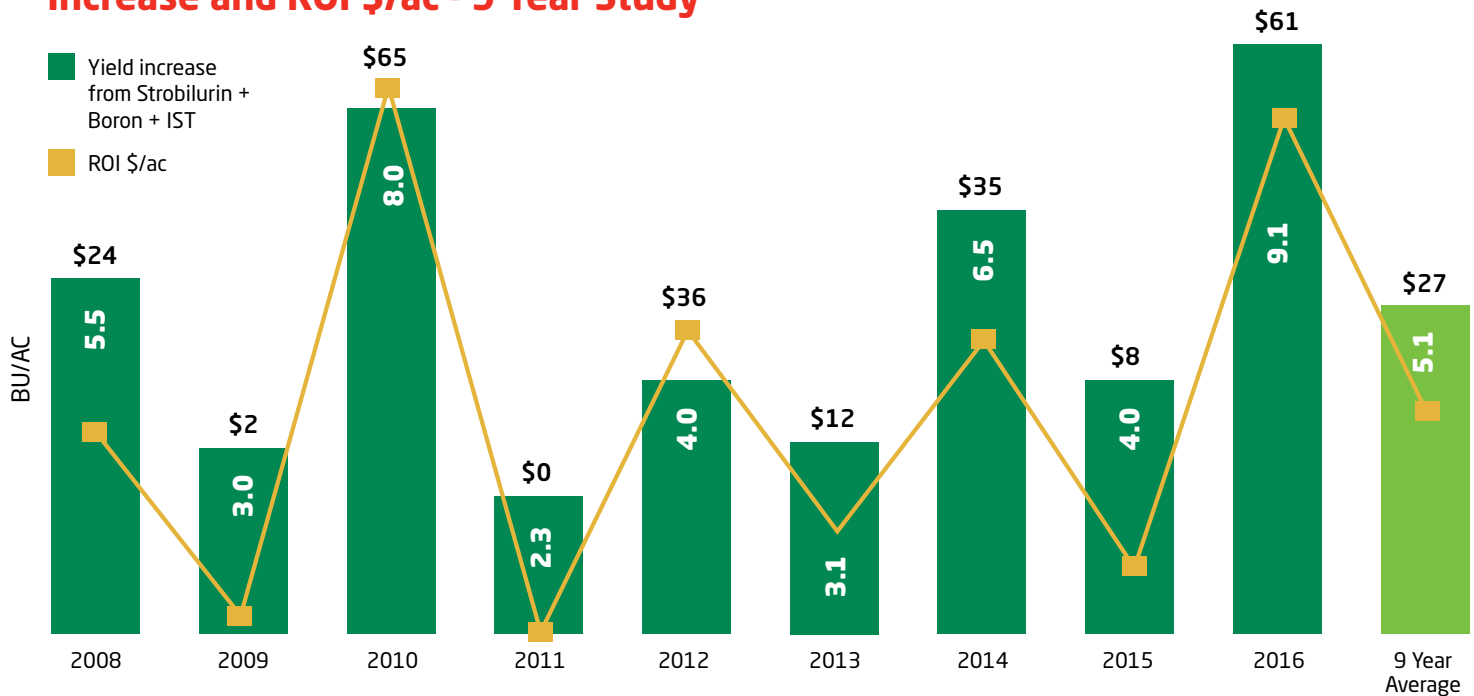
- Apply at early stage (R1-R3) before disease pressure is high
- Addition of BRANDT Smart B provides needed nutrition during reproductive stage
- Effective across all populations and row widths
- High management practices equals higher yield increase







## Fungicide with BRANDT Smart B Yield Increase and ROI \$/ac - 9 Year Study



### Pleasant Plains

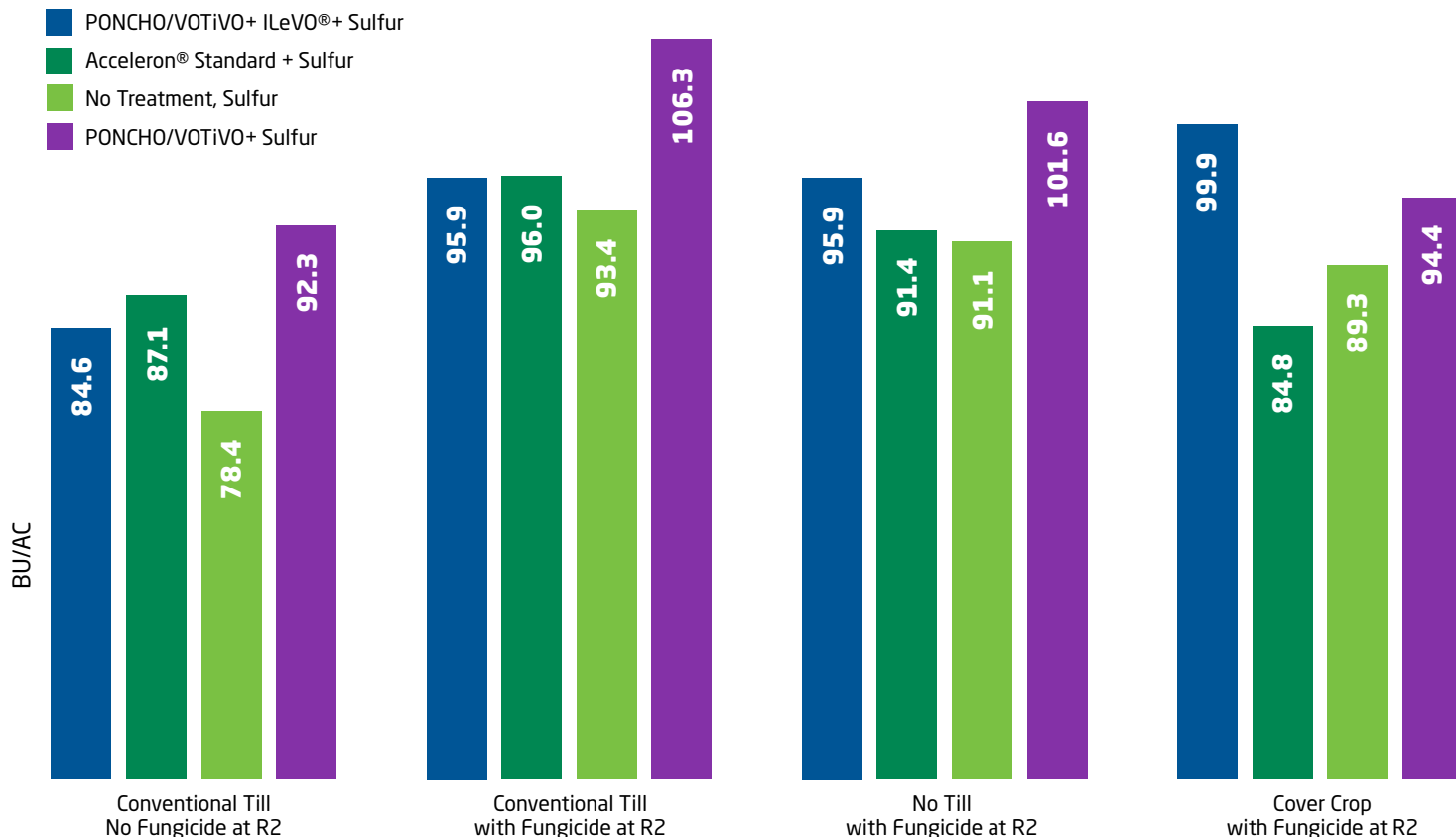
During periods of low commodity prices, it is logical to look at ways to cut costs. Strobilurin fungicide applications are often looked at as a place to cut. Historical data would suggest otherwise.

- Strobilurin fungicide will produce a positive ROI
- Periods of stress, such as drought, wet or other external pressures will typically see a higher yield increase than normal years
- Plan for it and budget for it early . . . don't wait for disease to be present
- Look at addition of foliar insecticide during the time of application

# SOYBEAN SEED TREATMENT

Seed treatments have become an effective way to control pests (disease and insects) and also start off the growing season with a more vigorous crop. In today's high yielding environments containing large amounts of surface residue, it's very important to keep up with the latest information on what's available and how seed treatments are performing.

## Soybean Seed Treatments with Sulfur Across Tillages



### Pleasant Plains

Soybean seed treatments is an area of advancing technologies. It's normal to have two or three, sometimes four different technologies on the seed. Acceleron Standard and PONCHO/VOTiVO have been clear winners in past years, but the addition of ILeVO for SDS has added another layer of protection to limit the amount of stress on the plant.

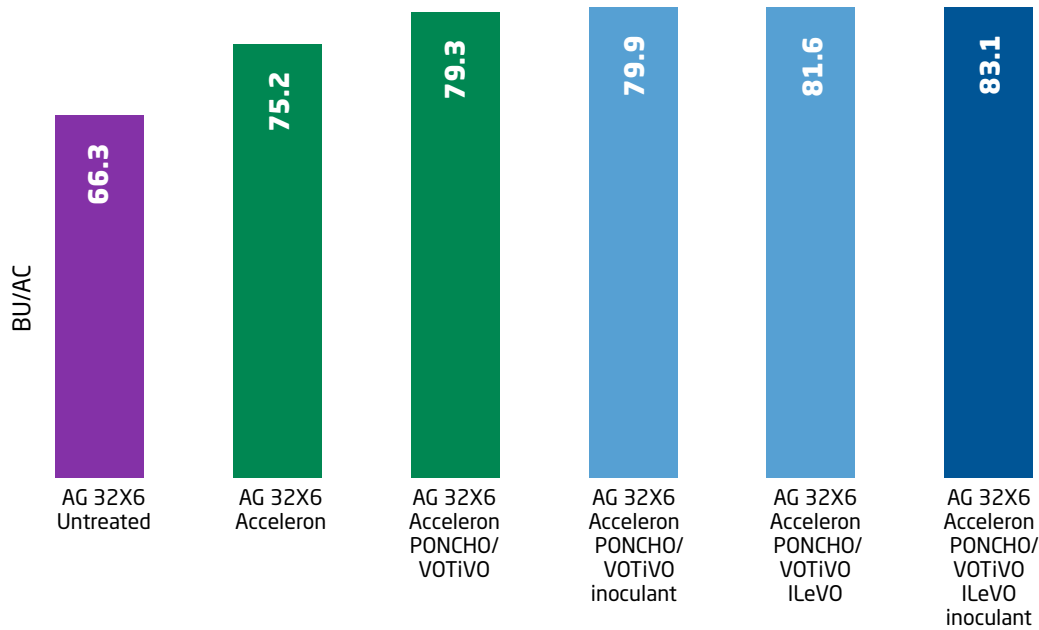
- You must use soybean seed treatments to achieve desired yield
- Consider multiple modes of action to alleviate stress throughout the season
- The combination of Acceleron, PONCHO/VOTiVO and ILeVO out yielded the untreated by 16.8 bushels. That's a +\$163.80 at \$9.75/bu.





## Soybean Seed Treatment Results

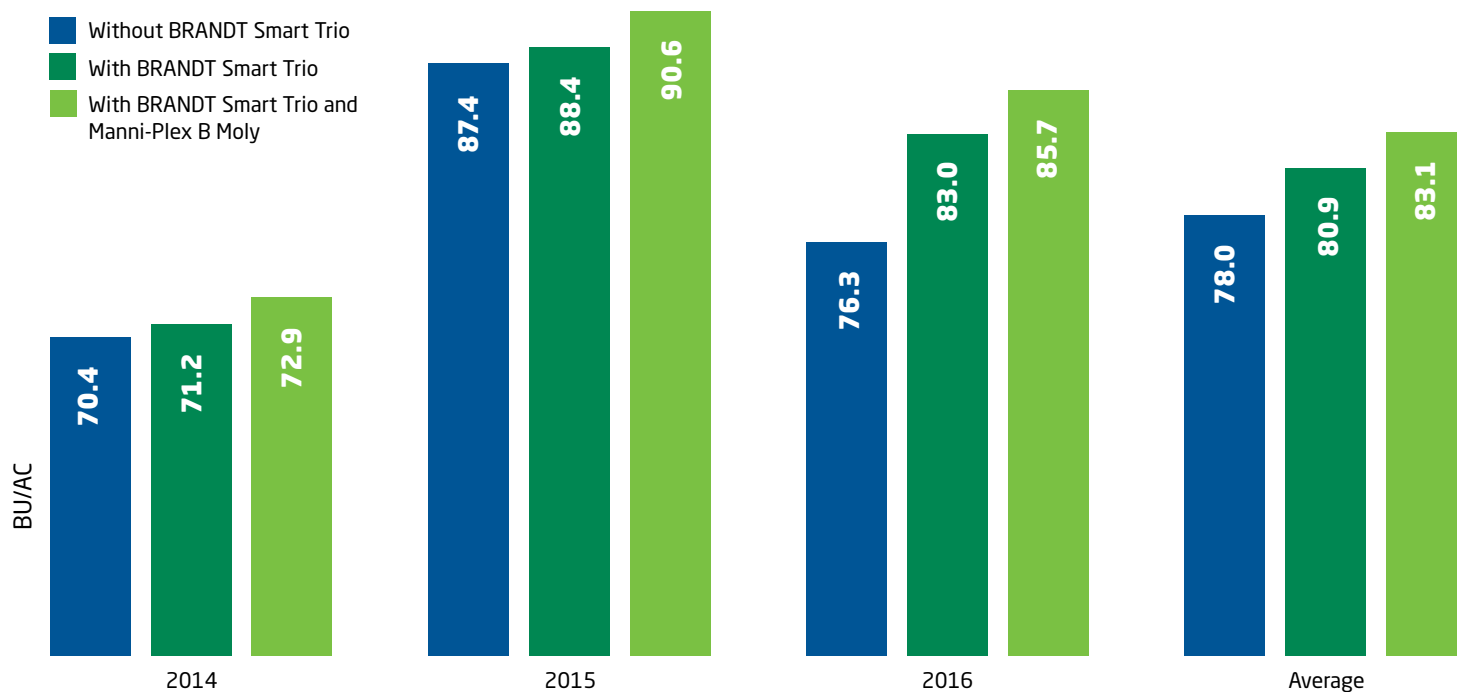
Lexington



# FOLIAR APPLICATIONS

Weather, insects, disease and herbicides create short term stress sometimes referred to as transient stress. Emerging university trial results demonstrate the role micronutrients play to assist plants through transient stress periods. BRANDT Smart Trio provides sulfur, zinc, manganese and boron to stimulate plant growth and increase metabolism of post applied herbicides. BRANDT Smart System technology protects the nutrition and herbicide efficacy, allowing for improved plant utilization.

## Foliar Micronutrients with Herbicide Application



### Lexington

- Long history of yield increase and ROI
- Additional B and Mo from Manni-Plex B-Moly adds additional yield above BRANDT Smart Trio alone
- Nutrients help mitigate herbicide stress and increase plant health







## Foliar Insecticide on Soybeans @ R1

BU/AC

87.2

Insecticide

84.3

No Insecticide

### Pleasant Plains

At the research farm in 2016, insect pressure met the threshold where a foliar insecticide became necessary. Spidermites had the largest impact on plant health among other feeding insects present.

- Scout and spray early before yield is impacted
- Determine insects present and threshold before spraying – good IPM practice
- Choose appropriate chemistry
- Use as an opportunity to tank mix fungicide and foliar nutrients
- Add BRANDT® Smart System® products to reduce PH of solution and increase insect control



# TRIAL PARAMETERS

In any research farm there are applications that are standards and variables. Through this year's book, we brought attention to the products or practices that were being trialed in the specific blocks. The information highlighted in the graphs points directly to the information we were seeking. In addition to the variables tested were "grower standard" applications to grow a successful crop, but also give a real-life picture of how the different variables effect the overall outcome. Below and on the next page are detailed charts outlining the variables and grower standards throughout the BRANDT Research Farms. Our farms are so extensive that it's difficult to describe each trial in great detail, so please consult your BRANDT representative for further details or clarification.

## Pleasant Plains

TRIAL		NITROGEN STUDY	BRANDT TOTAL ACRE	STROBILURIN FUNGICIDE	STRESS MIT. STIMULANTS	CROP ROTATION & VARIETY		VARIETY & MATURITY	STRESS MITIGATION
2015 Crop	CORN	CORN	CORN	CORN & BEANS	CORN & BEANS	CORN & BEANS	SOYBEANS	CORN	CORN
Tillage		STRIP TILL	CONVENTIONAL STRIP TILL NO TILL	CONVENTIONAL STRIP TILL	CONVENTIONAL STRIP TILL	CONVENTIONAL		CONVENTIONAL	CONVENTIONAL NO TILL COVER CROP
Fall 2015 NH3		150 UNITS NH3 WITH N-SERVE®	150 UNITS NH3 WITH N-SERVE®	150 UNITS NH3 WITH N-SERVE®	150 UNITS NH3 WITH N-SERVE®	150 UNITS NH3 WITH N-SERVE®		NONE	NONE
Fall 2015 other NPK		NONE	VARIOUS	150-50-150	150-50-150	150-50-150		150-50-150	150-50-150
Spring 2016 NH3		NONE	150 UNITS NH3 WITH N-SERVE	NONE	NONE	NONE		NONE	NONE
Total Nutrition		TRIALED	190-50-150-85	190-50-150-85	190-50-150-85	190-50-150-85		15-50-150	15-50-150
Planting Date		4/14/16	4/14/16	4/14/16	4/14/16	4/14/16		4/21/16	4/21/16
Planting Population		42,000	42,000	42,000	42,000	34/38/42,000		120,000	120,000
Harvest Date		9/7/16	9/14/16	9/14/16	9/14/16	9/14/16		9/26/16	9/26/16
Herbicide/Nutrition Applications		PREEMERGENT: BRASH® & ACURON® POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™	PREEMERGENT: BRASH® & ACURON® POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™	PREEMERGENT: BRASH® & ACURON® POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™	VARIOUS TRIALS	PREEMERGENT: BRASH® & ACURON® POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™		PREEMERGENT: BRASH® & ANTHEM POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™	PREEMERGENT: BRASH® & ANTHEM POST APPLIED: GLYPHOSATE BRANDT SMART TRIO® BRANDT SMART B™
Fungicide/Insecticide/ Nutrition Application		TRIVAPRO® HERO® BRANDT SMART B™	TRIVAPRO® HERO® BRANDT SMART B™	TRIVAPRO® HERO® BRANDT SMART B™	TRIVAPRO® HERO® BRANDT SMART B™	TRIVAPRO® HERO® BRANDT SMART B™		QUADRIIS TOP® HERO® BRANDT SMART B™	QUADRIIS TOP® HERO® BRANDT SMART B™







## Lexington

APPLICATION	TILLAGE, INSECTICIDE & HIGH YIELD	NITROGEN TRIALS	HYBRID POP, ROW WIDTH & FUNGICIDE	PIPELINE	SEED TREATMENT	STRESS MITIGATION HIGH YIELD	PIPELINE
<b>2015 CROP</b>	SOYBEANS	SOYBEANS	CORN	SOYBEANS	CORN	CORN	CORN
<b>Planting Date</b>	5/6/16	5/6/16	4/20/16	4/25/16	5/6/16	5/6/16	5/10/16
<b>Herbicide Program</b>	2.5 QT ACURON® FB 3.6 QT HALEX® GT	2.5 QT ACURON® FB 3.6 QT HALEX® GT	2.5 QT ACURON® FB 3.6 QT HALEX® GT	2.5 QT ACURON® FB 3.6 QT HALEX® GT	2 PT BOUNDARY® FB 2.5 PT PREFIX® & 22 OZ GLYPHOSATE 0.6 OZ CADET® W/ INSECTICIDE	2 PT BOUNDARY® FB 2.5 PT PREFIX® & 22 OZ GLYPHOSATE 0.6 OZ CADET® W/ INSECTICIDE	2 PT BOUNDARY® FB 2.5 PT PREFIX® & 22 OZ GLYPHOSATE 0.6 OZ CADET® W/ INSECTICIDE
<b>Fungicide Program</b>	QUILT® XCEL, BRANDT SMART B-MO™ & INSECTICIDE	QUILT® XCEL, BRANDT SMART B-MO™ & INSECTICIDE	QUILT® XCEL, BRANDT SMART B-MO™ & INSECTICIDE	QUILT® XCEL, BRANDT SMART B-MO™ & INSECTICIDE	QUADRIS® TOP SB, BRANDT SMART B-MO™ & INSECTICIDE	QUADRIS® TOP SB, BRANDT SMART B-MO™ & INSECTICIDE	QUADRIS® TOP SB, BRANDT SMART B-MO™ & INSECTICIDE
<b>Total Acre Fertility</b>	VARIABLE RATE APPLIED DAP 160 LB POTASH 200 LB	VARIABLE RATE APPLIED DAP 160 LB POTASH 200 LB	VARIABLE RATE APPLIED DAP 160 LB POTASH 200 LB	VARIABLE RATE APPLIED DAP 160 LB POTASH 200 LB	NONE	NONE	NONE
<b>Total Nitrogen Fertility (Total Acre Treatment)</b>	120 LB FALL 2015 W/ N-SERVE® 45 LB PRE PLANT 15 LB AS STARTER 60 LB SIDE DRESS	120 LB FALL 2015 W/ N-SERVE® 45 LB PRE PLANT 15 LB AS STARTER 60 LB SIDE DRESS	120 LB FALL 2015 W/ N-SERVE® 45 LB PRE PLANT 15 LB AS STARTER 60 LB SIDE DRESS	120 LB FALL 2015 W/ N-SERVE® 45 LB PRE PLANT 15 LB AS STARTER 60 LB SIDE DRESS	NONE	NONE	NONE
<b>Traditional Fertility</b>	DAP FLAT RATE 150 LB POTASH FLAT RATE 200 LB	DAP FLAT RATE 150 LB POTASH FLAT RATE 200 LB	DAP FLAT RATE 150 LB POTASH FLAT RATE 200 LB	DAP FLAT RATE 150 LB POTASH FLAT RATE 200 LB	NONE	NONE	NONE
<b>Total Nitrogen Fertility (Traditional Treatment)</b>	180 LB FALL 2015 W/ N-SERVE® 60 LB PRE PLANT	180 LB FALL 2015 W/ N-SERVE® 60 LB PRE PLANT	180 LB FALL 2015 W/ N-SERVE® 60 LB PRE PLANT	180 LB FALL 2015 W/ N-SERVE® 60 LB PRE PLANT	NONE	NONE	NONE

# GROWER OBSERVATIONS



## 2016 Corn Grower Observations to Increasing Yields

- Plant early according to climate conditions
- Apply crop protection products early before stress is achieved
- Supplemental nutrition - sidedress N and S, BRANDT foliar nutrients with herbicide and fungicide
- Don't penny pinch your way to profitability, yield is the number 1 determinant of ROI
- Plan early and implement a well rounded strategy

## 2016 Soybean Grower Observations to Increasing Yields

- Plant early with an associated RM variety
- Develop a good herbicide strategy to match field conditions
- Foliar strobilurin fungicide with insecticide early minimized periods of stress
- BRANDT foliar nutritionals and seed treatments are an easy ROI
- High management equals high yields

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# Summary

*On behalf of BRANDT, we want to thank you, our customers, for your business. We hope you have enjoyed and benefited from this 2016 BRANDT Research Farm results book.*

*This is the 12th year for the Pleasant Plains Farm! At both Pleasant Plains and Lexington we continue to build on a solid database of multiyear results that you can count on.*

*During the summer we held educational Agronomy Days at each farm. Eric Snodgrass, Director of the Department of Atmospheric Sciences at the U of I talked to us about “forecasting the forecast” for impact on market conditions. At Lexington, Jason Barickman, Illinois State Senator, 53rd District, discussed the impact of Illinois politics on agriculture. Be sure to join us in 2017 for Agronomy Days!*

*This book is packed with valuable data and insights. You need to dig deep to uncover them all. Some insights are subtle. For example, in the corn and soybean omission trials, planting date takes the first position. We all know planting date is very important, but an insight is in the value of fall fieldwork and nutrient applications to make sure we are “ready” for the ideal planting date in the spring.*

*Many growers are aware of the value that fungicide applications provided on both corn and soybeans in 2016, often in the absence of disease symptoms. Looking at the 11 year average data, you can see the value every year. Fungicide applications should be in your crop plan for 2017.*

*BRANDT is blessed with a great team to organize and implement the farms and the publication of this book. Ed Corrigan is the Manager of the Pleasant Plains Farm and Dan Froelich leads the Lexington group. They are joined by many BRANDT employees to produce this fine work. Thanks to all.*

*As you read the book, you noticed some new names for Brandt products such as BRANDT Smart B and BRANDT Smart Quatro. BRANDT is a world leader in the development and distribution of foliar nutritional products. Most of the development and production happens right here in central Illinois. These are new products that you will have the opportunity to use in 2017.*

*Crop budgets are tighter this year. Good choices become more important and the economics of each choice has to work. That is why BRANDT invests in these farms: To give our customers insights and data to make good business decisions.*

*Our BRANDT locations stand ready to serve you and help you with choices and implementation in 2017. Here's to farming for success and profit in 2017.*

**Tim McArdle**  
General Manager

#### BRANDT RETAIL LOCATIONS

Ashland	217 476 3438
Auburn	217 438 6158
Cooksville	309 725 3710
Cropsey	309 377 3121
Curran	217 483 4512
Fairbury	815 692 2612
Fisher	217 897 6920
Franklin	217 675 2302
Galesville	217 489 2141
Greenvew	217 968 5589
Gridley	309 747 2233
Lexington	309 365 7201
Lincoln	217 735 2571
Mt. Auburn	217 676 3231
New Berlin	217 488 3125
Niantic	217 668 2228
Oakford	217 635 5765
Pleasant Plains	217 626 1127
Raymond	217 229 3442
Towanda	309 728 2294
Virginia	217 452 3545
Waverly	217 391 9705
Williamsville	217 566 2113

**BRANDT Consolidated, Inc.**  
2935 South Koke Mill Road  
Springfield, Illinois 62711 USA  
[www.brandt.co](http://www.brandt.co)  
217 547 5800

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