FIELD RESEARCH BOOK

2018 Edition - Huxley Learning Center

Throughout the state in any given year, our products are put to the test in various research trials. These trials allow us to gain insights to help complete a year-long story of product performance, agronomic characteristics, and weather patterns.

We spend months planning out our research trials, but as you know, they are vulnerable to extreme weather patterns and unforeseen challenges. Across the state, we saw extreme drought in the south, heavy rain across the north, a new soybean insect in the west, and a corn disease creeping in from the east. With conditions like this, we often see research results that may not match data from prior years, but we can use these challenges as an opportunity to evaluate, learn, and provide better insights for the future.

For example, due to much of the available nitrogen being moved away from the ideal zone, we didn't see the yield response to planting populations that we typically see in high yield environments. On the flip side, we were able to evaluate how products handle nitrogen deficiency. This is just one scenario provided throughout our agronomic reports. I hope you enjoy all the information and find it insightful.

I'd also like to recognize my Bayer Crop Science colleagues who contributed to the research in this booklet:

Charles Boateng - Huxley
Matt Nelson - Atlantic
Craig Lamoureux - Storm Lake
Chuck Kolbet - Marble Rock
Doug Doty - Victor
Jarod Jackson, Eastern Iowa
Brett Schafer, Western Iowa
John Cantwell, Iowa

We appreciate your relationship in 2018 and look forward to working with you in 2019!

Brent Schwenneker

Huxley Learning Center

Table of Contents

How to Use This Book

The reports in this book are arranged by section: soybean, corn and agronomics. Each report is also tagged with one of these icons to quickly show you what it's about.

Management Practices for Optimizing Yield and Productivity in Soybean

Trial Objective

- Obtaining higher yields in soybean production involves the efficient and sustainable use of farm resources and management practices.
- There are several inputs and practices that growers use each year that ultimately impact yield and profitability. Therefore, the objective of this study was to evaluate the economic impact of these inputs and practices.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Huxley, IA	Clay loam	Corn	No tillage	5/10/2018	10/17/2018	60	140K

- A 2.0 maturity group soybean product was planted in 200-ft long strips.
- The trial was carried out in 30-inch row spacing, six rows per treatment, with two replications.
- Overall disease incidence and severity were low for this trial/location.
- The management practices tested were two seed treatments, a nitrogen side-dress application, and a fungicide application. These practices were compared in incremental stair-step treatments (Table 1).
- Acceleron® Seed Applied Solutions STANDARD is a fungicide and insecticide seed treatment.
- ILeVO® is a systemic soybean seed treatment for protection against early-season damage caused by pathogenic nematodes and *Fusarium virguliforme*, which causes Sudden Death Syndrome (SDS).
- Delaro® 325 SC fungicide was applied at R3 for the fungicide treatment.
- 32% urea and ammonium nitrate (UAN) was applied at the R3 growth stage to deliver 40 lb/acre of nitrogen.

Table 1. Treatments used in the trial with associated costs. Treatment cost does not include the price of seed.

Treatments	Input	Treatment Cost ($/acre)
UTC	**Untreated**	**$ -**
A	**Acceleron® Seed Applied Solutions STANDARD (A)**	**$7.00**
A+I	**ILeVO® seed treatment (I)**	**$19.00**
AI+F	**Foliar fungicide application at R3 (F)**	**$41.00**
AIF+N	**Side dress 32% UAN at R3 (N)**	**$50.20**

Understanding the Results

- All inputs improved yields over the untreated plot (UTC).
- The addition of ILeVO® seed treatment provided the largest yield response of all of the treatments.
- The addition of a fungicide application had a minimal effect on yield over the previous treatment and the addition of nitrogen did not provide a yield response over the previous treatment.

Management Practices for Optimizing Yield and Productivity in Soybean

Figure 1. Productivity of soybean under the different management systems. Soybean grain price was set at $7.50/bu.

- The yield gained by some of the systems (treatments A and AIFN) were not high enough to provide an economic incentive over the untreated plot (UTC).
- A system with just the two seed treatments provided the most economical input in this trial.

What Does This Mean For Your Farm?

- During the 2018 growing season, the research site experienced wet and rainy conditions in May and June followed by a dry July. Such conditions can result in poor plant health and may explain why the Acceleron® Seed Applied Solutions STANDARD with ILeVO® (AI) treatment was the most profitable.
- Growers should consider performing small-scale trials on their fields to understand how their management systems impact their operations economically.

Legal Statements

Soybean Yield Response to Seeding Rate

Trial Objective

- A critical agronomic decision is the choice of soybean products and their associated optimum seeding rate. Though soybeans compensate well at different plant populations, soybean products respond differently and the search for the optimum seeding rate continues.
- The objective of this study was to determine the yield potential of Asgrow® brand soybean products at different seeding rates.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seed/acre)
Huxley, IA	Clay loam	Corn	No tillage	05/09/2016	10/17/2016	60	100K, 140K, 180K

- Fifteen Asgrow® brand soybean products ranging from 1.8 to 3.6 maturity group (MG) were planted at 100,000, 140,000, and 180,000 seeds/acre.
- The trial was planted in 30-inch spacing, 4 rows per product per seeding rate, and 200-ft long plots.
- Weed management consisted of a rye burndown with Roundup PowerMAX® herbicide and a post-emergence application of XtendiMax® herbicide with VaporGrip® Technology, Warrant® herbicide, and Roundup PowerMAX®.

Understanding the Results

- The decrease in plant population across the trial between the V4 and R8 growth stages was partly due to wet and rainy conditions at the research site in May and June, followed by a dry July. Such conditions result in poor seedling health and reduced crop stands.
- Seeding rate did not have an impact on lodging in most of the products tested, especially in the late MG products (Table 1 and 2). In the products in which there was an association (particularly in the early MG), lodging increased with increasing seeding rate.
- In both the early and late MGs, yield increased as seeding rate increased in most of the products. In the other products, the 140,000 seeds/acre seeding rate produced the highest yields (Figure 1 and 2).
- In both MGs, the biggest yield increase was from the 100,000 to 140,000 seeds/acre rate increase (Figure 1 and 2).

Soybean Yield Response to Seeding Rate

Table 1. Performance of early MG Asgrow® brand soybean products at different seeding rates. Early stand count was taken at the V4 growth stage. Harvest population and lodging score were taken after the R8 growth stage. Lodging score was based on a 1-9 scale with 1 = 100% erect and 9 = 100% flat.

Asgrow® Brand	Seeding Rate (1000 seeds/acre)	Early Stand Count (1000 seeds/acre)	Harvest Population (1000 seeds/acre)	Lodging Score	Grain Moisture (%)	Average Yield (bu/acre)	Average Yield Ranking
AG18X9	100	81.5	84.5	1	11.1	62.2	7
	140	105	101.5	1	11.5		
	180	149	123.5	1	11.2		
AG20X9	100	90.5	85.5	1.5	12.7	68.0	3
	140	123.5	108	3	13.0		
	180	149.5	129	5	13.3		
AG21X9	100	88	78	2	12.6	70.1	2
	140	124.5	107	3.5	13.0		
	180	155	132	5.5	13.0		
AG22X9	100	83	77.5	2	12.2	70.6	1
	140	113.5	107	3	12.5		
	180	142.5	124	5.5	12.6		
AG23X9	100	86.5	86	1.5	11.3	63.8	6
	140	120.5	114	2.5	11.5		
	180	145	132.5	5	11.5		
AG24X9	100	75.5	82	1	11.7	64.2	5
	140	109.5	99	1	11.7		
	180	133	119.5	2	11.6		
AG25X9	100	68.5	73.5	1	11.4	66.7	4
	140	100.5	95.5	2	11.5		
	180	128.5	115.5	2	11.6		

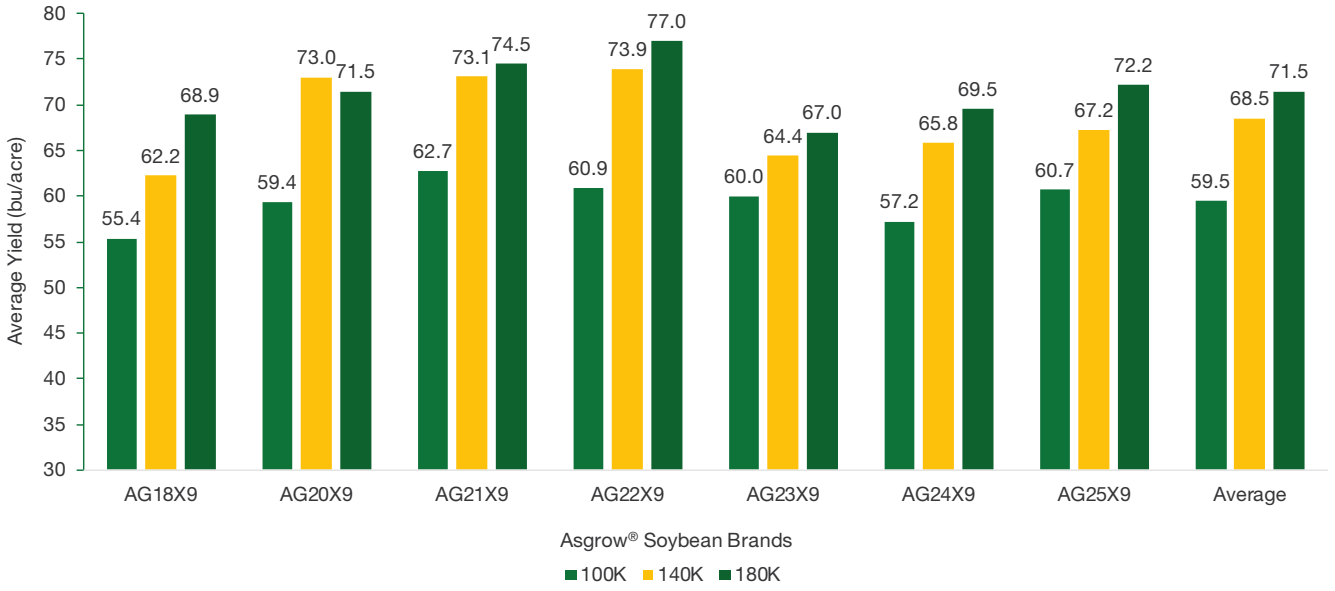

Figure 1. Average yields of early MG Asgrow® brand soybean products at three different seeding rates.

Soybean Yield Response to Seeding Rate

Table 2. Performance of late MG Asgrow® brand soybean products at different seeding rates. The early stand count was taken at the V4 growth stage. Harvest population and lodging score were taken after the R8 growth stage. Lodging score was based on a 1-9 scale with 1 = 100% erect and 9 = 100% flat.

Asgrow® Brand	Seeding Rate (1000 seeds/acre)	Early Stand Count (1000 seeds/acre)	Harvest Population (1000 seeds/acre)	Lodging Score	Grain Moisture (%)	Average Yield (bu/acre)	Average Yield Raning
AG26X8	100	84.5	82	1	11.4	62.3	5
	140	115.5	102.5	1	11.3		
	180	143.5	124	1	11.5		
AG27X9	100	88	83.5	1	11.5	57.2	6
	140	121.5	122	1.5	11.4		
	180	152.5	126.5	2.5	11.4		
AG28X9	100	81	81	1	12.0	66.1	3
	140	116	108.5	1	11.8		
	180	139.5	121	1	11.8		
AG29X9	100	86.5	88	1	12.6	74.1	1
	140	115	112.5	1	12.5		
	180	155	142.5	1.5	12.5		
AG30X9	100	90	87	1	12.9	64.6	4
	140	123.5	112	1	13.0		
	180	149.5	141.5	1	12.9		
AG31X9	100	73.5	77	1	13.5	56.8	7
	140	92.5	95	1	12.4		
	180	115.5	106	1	13.1		
AG33X8	100	83	80.5	1	13.9	56.3	8
	140	115.5	112.5	1	13.9		
	180	156	143.5	1	14.1		
AG36X6	100	80	83	1	12.9	71.7	2
	140	115	104	1	12.8		
	180	153	134.5	2	12.5		

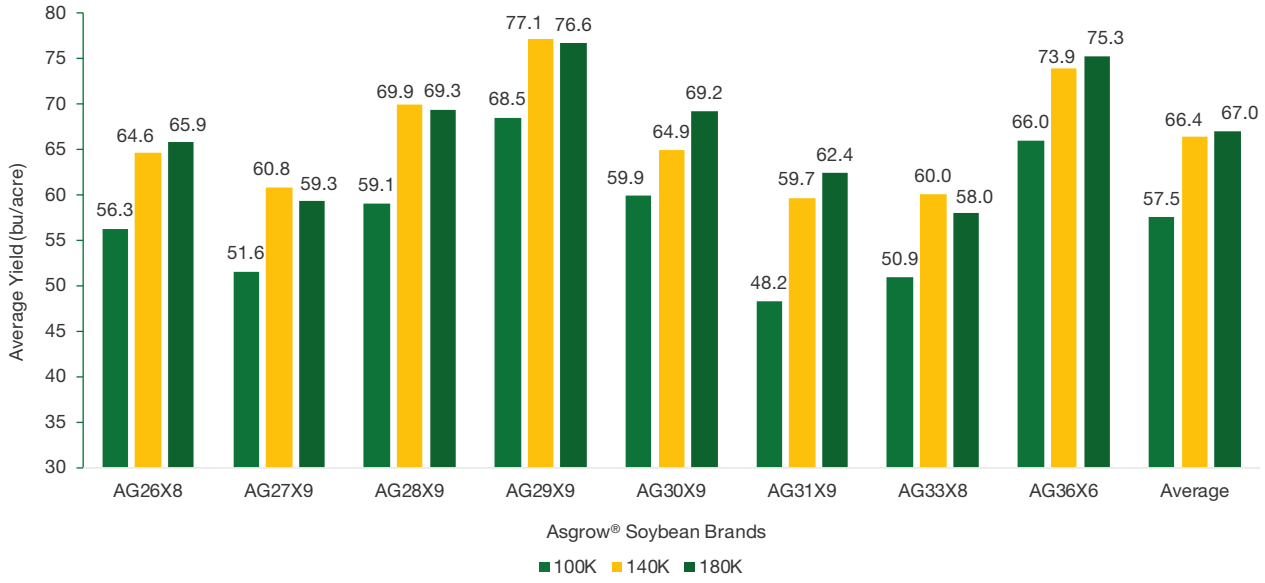

Figure 2. Average yields of late MG Asgrow® brand soybean products at three different seeding rates.

Soybean Yield Response to Seeding Rate

What Does This Mean for Your Farm?

- With the current soybean seed cost at $62/bag and assuming the soybean grain was sold at $7.50/bu, a minimum of a 2.4 bu/acre yield increase is needed to justify a 40,000 seeds/acre seeding rate increase.
- Thus, for all products in the early MG (except for AG20X9 and AG21X9), 180,000 seeds/acre was the highest yielding and most profitable seeding rate (Figure 1).
- For the late MG, the median seeding rate of 140,000 seeds/acre was the most profitable, except for AG30X9, in which the 180,000 seeds/acre rate was both the highest yielding and most profitable (Figure 2).
- This is our fourth year of research into germplasm response to seeding rate. Results from the 2015-2017 trials were product-specific and did not provide a consistent trend in response to seeding rate.[1] The 2018 results are consistent across almost all products tested, providing a good benchmark for future decision making.
- Growers should consult their trusted agronomists and dealers in choosing the best products for their operation.

Source

[1]Monsanto Learning Center at Huxley, Iowa Demonstration Reports, 2015-017.

Legal Statements

Management of Early-season Stressors in Soybean Production

Trial Objective

- To optimize yield potential, soybean growers often plant as early as possible within the recommended planting window. Such early planting predisposes seeds and young seedlings to early-season stressors, such as insects, diseases, and cool, wet soils, which can significantly affect stand establishment and overall plant and field health.
- To help alleviate some of the early planting challenges, the use of seed treatments has become an important tool in fields prone to early-season stressors. Insecticides, fungicides, and nematicides are the common components of most seed treatments, and the choice depends on the anticipated pest to be controlled.
- The objective of this study was to determine soybean product performance as influenced by two seed treatment options.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Huxley, IA	Clay loam	Corn	No tillage	05/09/2018	10/17/2018	60	140K

- Twenty-seven soybean products ranging from 1.8 to 3.7 maturity group (MG) were planted at an average of 140,000 seeds/acre.
- Each product received two types of seed treatments:
  - Base seed treatment (fungicide and insecticide)
  - Base + ILeVO® seed treatment
  - ILeVO® is a systemic soybean seed treatment for protection against early-season damage caused by pathogenic nematodes and *Fusarium virguliforme,* which causes Sudden Death Syndrome (SDS).
- The trial was planted in 30-inch row spacing, two rows per product per treatment, 200-ft long plots, and three replications.
- There was a low level of SDS incidence at the research site.
- No symptoms of soybean cyst nematode (SCN) were observed at the research site. Soil samples in 2017 showed low SCN levels.
- Weed management consisted of a rye burndown with Roundup PowerMAX® herbicide and a post-emergence application of XtendiMax® herbicide with VaporGrip® Technology, Warrant® Herbicide, and Roundup PowerMAX® herbicide.

Management of Early-season Stressors in Soybean Production

Understanding the Results

- In general, ILeVO® seed treatment did not substantially affect grain moisture content and stem lodging, but did have a remarkable affect on plant density in some products (Table 1).
- Of the 27 products tested, eight (approx. 30%) did not have a positive yield response to ILeVO® seed treatment. Of the remaining 70% that responded positively, the yield advantage ranged between 0.5 to 10.8 bu/acre (Figure 1).
- The average yield response to ILeVO® seed treatment for all products was 2.53 bu/acre; however, when looking only at the products that showed a positive yield response with ILeVO® seed treatment, the average yield response was 4.8 bu/acre (Figure 1).
- In general, products with an SDS score of 3 had the lowest yield response to ILeVO® seed treatment (Figure 2).

Table 1. Agronomic response of soybean products to seed treatments. The data represent the difference between the Base + IleVO® treatment minus the Base treatment. Early stand count was taken at the V4 growth stage. Harvest population and lodging score were taken after the R8 growth stage. Lodging score was based on a 1-9 scale with 1 = 100% erect and 9 = 100% flat. SDS scores are the official scores from product seed guides and are based on a 1-9 scale with 1 = no disease and 9 = ≥ 80% incidence with severe symptoms.

Maturity Group	Early Stand Count (1000 seeds/acre)	Harvest Population (1000 seeds/acre)	Lodging Score	SDS Score	Grain Moisture (%)
1.8	1.0	3.7	0.0	4.0	0.2
1.8	7.7	20.3	0.7	4.0	-0.4
1.8	5.0	-4.7	0.3	4.0	0.5
2.0	1.0	-0.3	-1.0	5.0	0.4
2.0	4.7	16.7	0.3	4.0	-0.3
2.1	4.3	3.3	0.0	4.0	0.4
2.2	3.3	-1.0	-0.3	4.0	0.5
2.2	4.0	13.3	0.0	5.0	0.0
2.2	3.0	-7.0	0.0	5.0	-0.1
2.3	14.0	4.3	2.0	4.0	0.5
2.4	-5.3	-1.0	0.0	3.0	0.1
2.4	5.0	15.3	0.3	4.0	0.0
2.6	7.0	6.3	0.0	5.0	-0.3
2.6	9.0	1.3	-1.3	3.0	0.0
2.7	-0.7	4.0	0.7	5.0	0.1
2.8	-3.0	1.0	0.0	4.0	0.1
2.8	-14.3	-13.0	0.0	3.0	-0.1
2.9	2.3	-4.0	-0.3	4.0	-0.1
2.9	5.3	-5.0	0.0	4.0	0.0
3.0	3.3	0.3	0.0	5.0	-0.1
3.1	1.0	-6.0	0.0	5.0	0.4
3.1	-14.0	-5.0	0.0	4.0	0.0
3.3	1.7	-2.3	0.0	3.0	-0.3
3.3	6.7	5.0	0.0	5.0	0.1
3.3	-4.0	-7.0	-0.3	3.0	-0.2
3.5	-1.7	-0.3	0.0	6.0	0.2
3.7	3.0	-0.7	0.0	5.0	-0.3
AVG	1.8	1.4	0.0	-	0.0

Management of Early-season Stressors in Soybean Production

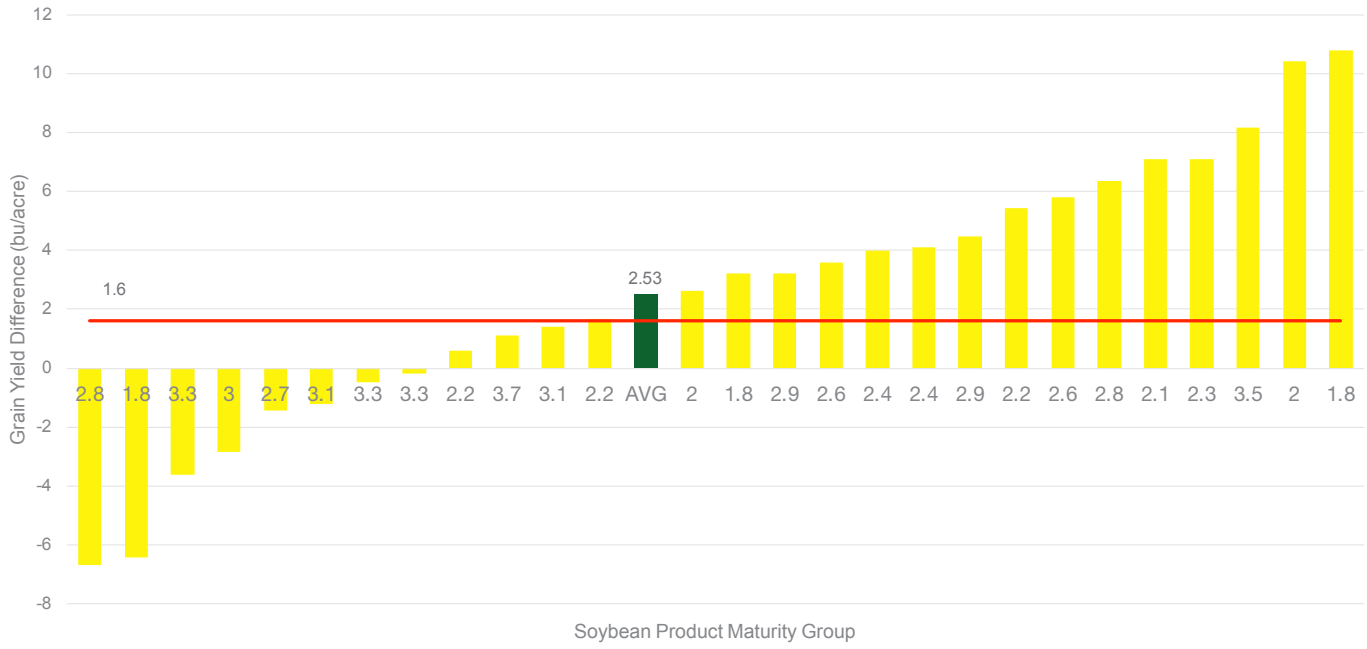

Figure 1. Yield advantage of ILeVO® seed treatment (base seed treatment of fungicide and insecticide components + ILeVO® seed treatment over a base seed treatment alone). The red line indicates a 1.6 bu/acre economic break-even yield for ILeVO® seed treatment.

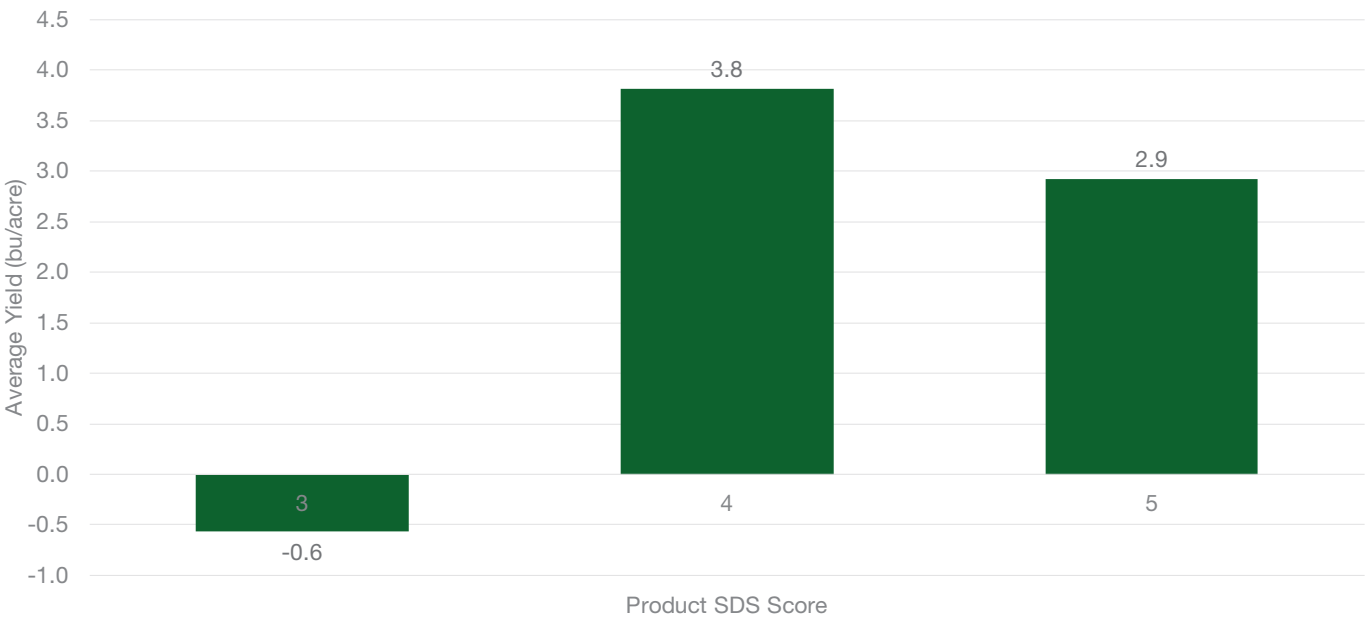

Figure 2. Impact of a soybean product's SDS score on the yield response to ILeVO® seed treatment. SDS scores are the official scores from product seed guides and are based on a 1-9 scale with 1 = no disease and 9 = ≥ 80% incidence with severe symptoms.

Management of Early-season Stressors in Soybean Production

What Does This Mean for Your Farm?

- Several seed treatment options are available to growers and a decision should be based on the challenges of the operation and the expected economic value (ROI).
- Fungicides and insecticides should be the platform upon which other seed treatment options are based, where needed.
- Not all SDS infections produce foliar symptoms. Thus, the disease could be robbing yields without growers knowing. ILeVO® seed treatment is mainly recommended for SDS control and could be an important addition to the seed treatment platform of the operation.
- With the current soybean grain price at $7.50/bu, a minimum of a 1.6 bu/acre yield increase was needed in this trial to offset the cost of ILeVO® seed treatment (approx. $12/acre) (Figure 1).
- In this trial, product tolerance (an SDS score of 3) provided good control of the disease, thus ILeVO® was not warranted. Where product tolerance is lacking, ILeVO® could provide more than a 2 bu/acre economic gain for the operation (Figure 2).
- As always, growers are encouraged to conduct small-scale trials on their fields to evaluate the value of new practices to their operations. They should also consult their trusted agronomists and dealers when choosing the best seed products for their operations.

Legal Statements

Yield Observations When Shifting to Earlier Maturity Group Soybeans

Trial Objective

- We continue to see a trend of growers planting earlier maturity group (MG) soybeans in Iowa and managing them at a higher level with seed treatments and foliar applications of fungicide and insecticide.
- This trend, dubbed “MG shift”, is becoming increasingly important in some locations.
- There are many benefits of planting early MG soybeans including, but not limited to, earlier harvest timing, earlier cover crop seeding, and risk management benefits.
- The objective of this trial was to determine the yield impact of early MG soybean product selection against the normal MG products for the location.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Fonda, IA	Silty clay loam	Corn	No tillage	5/25/18	10/19/18	65	140K
Storm Lake, IA	Silty clay loam	Corn	Conventional	5/25/18	10/20/18	65	140K
Marble Rock, IA – North	Loam	Corn	Strip tillage	5/22/18	10/18/18	55	140K
Marble Rock, IA - South	Loam	Corn	Strip tillage	5/22/18	10/18/18	55	140K
Huxley, IA	Clay loam	Corn	No tillage	5/19/18	10/17/18	60	140K
Atlantic, IA	Silty clay loam	Corn	Conventional	5/29/18	10/16/18	65	140K
Shenandoah, IA	Silty clay loam	Corn	No tillage	5/31/18	10/15/18	60	140K
Victor, IA	Silty clay loam	Corn	Conventional	5/18/18	9/24/18	60	140K

- This trial was broken into two sets, North and South Iowa, with a total of eight locations – four locations in the north set and four locations in the south set:
  - North Set – Fonda, Storm Lake, Marble Rock North, and Marble Rock South
  - South Set – Huxley, Atlantic, Shenandoah, and Victor
- Each set consisted of 18 unique soybean products:
  - Nine products are considered early MG
    - North Set – 1.1 MG to 1.8 MG
    - South Set – 2.0 MG to 2.4 MG
  - Nine products are considered normal MG
    - North Set – 2.0 MG to 2.4 MG
    - South Set – 2.9 MG to 3.5 MG
  - The nine 2.0 to 2.4 MG products were the same products for both the north and south sets.
- The plots consisted of four, 15-ft-long rows in 30-in row spacing with three replications.
- The Shenandoah site exhibited above average levels of frogeye leaf spot and insect feeding.
- Above average levels of sudden death syndrome were observed at the Victor site.
- The Marble Rock North site was impacted with hail on August 28.

Yield Observations When Shifting to Earlier Maturity Group Soybeans

Understanding the Results

- The effect of maturity group on soybean yield was variable and highly dependent on the location. For example, Victor saw an 8 bu/acre yield advantage with early MG products, whereas Huxley realized a 7 bu/acre advantage with normal MG products.
- In general, Atlantic, Victor and Storm Lake saw some level of yield advantage with early MG soybean products versus the other locations where normal MG products gained some yield advantage. However, average site performance across all locations was nearly similar at 58 bu/acre.

What does this mean for your farm?

- In general, early MG soybean products yield close to late MG products, especially when conditions are favorable.
- This trial experienced unfavorable growing conditions in the locations where the normal MGs succeeded, including:
  - Excessive rain, wind, and hail in season followed by weather-delayed harvest
  - Lower management (no R3 growth stage fungicide/insecticide application)

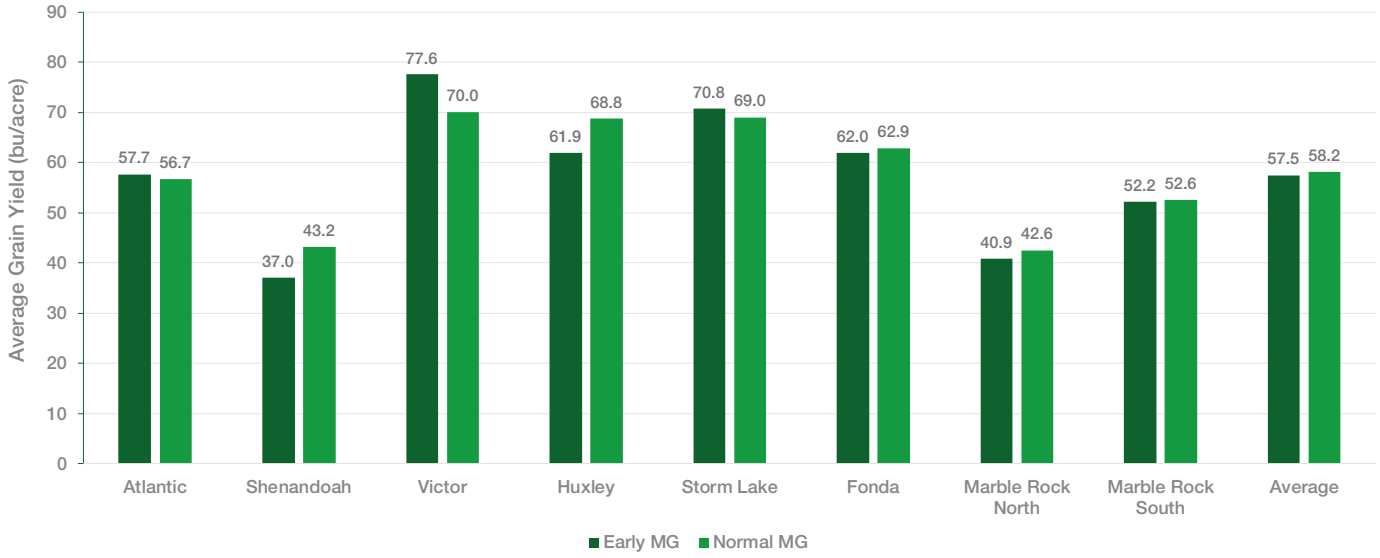

Figure 1. Average yields of the nine products in each MG range at each location. There was severe insect and frogeye leaf spot damage at Shenandoah and hail damage at Marble Rock North.

- Finding the proper genetic package for a maturity group is still critical when considering planting early soybeans.
- More research is needed in the genetic pipeline to better understand which soybean products are better suited for the south.
- It should be noted that a MG shift may not be right for every operation and that its benefits could be defined in terms other than yield.

Legal Statements