MONSANTO LEARNING CENTER at Scott, Mississippi

2015 Demonstration Report

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2015 LARGE PLOT YIELD TRIAL RESULTS

Study Guidelines

- Large plot yield trials were designed to help determine which soybean, corn, and cotton products are best adapted for growing conditions at the Monsanto Learning Center at Scott, MS.
- Trials contained both new and locally established products.
- 0.25 acre non-replicated demonstration plots were managed according to local practices and harvested with commercial equipment.
- Data was adjusted for moisture and/or turnout as needed.

Results and Discussion

Soybean Product Trial

Asgrow® Brands	Average Yield (bu/acre)	Asgrow® Brands	Average Yield (bu/acre)
AG4632	92	AG5335	81
AG4531	87	AG4934	78
AG4534	87	AG5535	71
AG4835	86	AG3135	64
AG4831	85	AG4336	56
AG4730	84	AG4232	56

- Planted April 15, 2015; Harvested September 15, 2015.
- Planted on 7.5-inch x 38-inch twin rows at a seeding rate of 120,000 seeds/acre.
- Produced on highly productive Deer Creek Sand soil.
- All yields adjusted to 13.5% moisture.

Results and Discussion

Corn Product Trial

DEKALB® Brands	Average Yield (bu/acre)	DEKALB® Brands	Average Yield (bu/acre)
DKC65-19	269	DKC69-31	253
DKC67-14	268	DKC62-08	248
DKC68-26	266	DKC66-59	246
DKC66-87	265	DKC67-88	242
DKC64-69	265	DKC64-89	239
DKC67-72	264	DKC63-60	239
DKC67-58	262	DKC66-97	238

- Planted April 1, 2015; Harvested September 1, 2015.
- Planted on 38-inch row spacing at a seeding rate of 38,000 seeds/acre.
- Produced on highly productive Deer Creek Sand soil.
- 240 total units of nitrogen applied in a 50/50 split application.

2015 Large Plot Yield Trial Results - SLC

Results and Discussion

Deltapine® Varieties	Turnout	Average Lint Yield (lbs/acre)
DP 1518 B2XF	41.7	1858
DP 1522 B2XF	42.4	1765
DP 1555 B2RF	43.6	1753
DP 1133 B2RF	43.3	1681
DP 1321 B2RF	41.9	1676
DP 1028 B2RF	44.5	1527
DP 1311 B2RF	43.3	1495
DP 1219 B2RF	41.5	1450
DP 1137 B2RF	42.5	1395
DP 1048 B2RF	43.0	1379
DP 1538 B2XF	44.3	1359
DP 1549 B2XF	41.0	1359
DP1454NR B2RF	42.4	1323
DP 1553 B2XF	43.7	1273
DP 1558NR B2RF	41.0	979

2015 Large Plot Yield Trial Results - SLC

Cotton Product Trial

- Planted April 27, 2015; Harvested October 15, 2015.
- Planted on 38-inch row spacing at a seeding rate of 52,000 seeds/acre.
- Produced on highly productive Deer Creek Sand soil.
- 120 total units of nitrogen applied in a 50/50 split application.
- Regional (south Delta) turnouts used to calculate average lint yield.
- Aggressive PGR system: 48 oz. total application of mepiquat chloride.
  - 10 oz. May 20
  - 16 oz. June 15
  - 22 oz. July 2
- Regional (south Delta) turnouts used to calculate average lint yield.

Take Aways

- There are new soybean, corn, and cotton products that have a high yield potential and are well-adapted for the growing conditions at Scott, MS.
  - 7 of the tested soybean products produced average yields greater than 80 bu/acre, with the highest average yield being 92 bu/acre.
  - 7 of the tested corn products produced average yields greater than 260 bu/acre, with the highest average yield being 269 bu/acre.
  - 6 of the tested cotton products produced average yields greater than 1,500 lbs/acre, with the highest average yield being 1,858 lbs/acre.

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RESPONSE OF FOUR ASGROW® BRAND SOYBEAN PRODUCTS TO COMMON PLANTING ERRORS

Several different issues can lead to planting errors in soybean production. Sometimes, planting failures may not be realized until seedlings emerge. Growers are often concerned about what should be done once planting mistakes are realized. Should they fill in, replant, or leave the crop as is?

Past research has shown that soybean plants have the ability to adjust growth and development in order to compensate for reduced plant populations. Soybean plants can produce more branches and pods to make up for a reduced population. This study was designed to evaluate the yield response of soybean stands with planting errors of a missing row and either one or two missing twin rows. The results should help guide growers in making decisions about whether to fill in the missing parts of a stand or replant the field.

Data from this demonstration indicates that soybeans have an incredible ability to compensate for reduced populations, whether the population is spread across the field or caused by missing rows. In comparison to a full population check plot, there was no significant difference in yield observed across any of the reduced population treatments. This demonstration indicates that under resource-unlimited circumstances, it would not be necessary to fill in missing rows or replant areas of a field. However, it should be noted that under dryland conditions or a stressed planting system, there may be limitations in the ability of soybean plants to compensate. It is also important to consider that weed control must be a priority with missing rows as weeds may thrive with reduced canopy closure.

Background

- Growers often express concern about planting mistakes that they have made.
  - Mechanical failures may not be apparent until seedlings emerge.
- This study will aid decision making when considering replanting soybeans.

Background

- Soybean plants have the ability to adjust growth and development to compensate for different plant populations.
- Plants can produce more branches and pods per plant at reduced populations and fewer at higher populations.

Source: Pedersen, P. 2008. Optimum plant population in Iowa. Iowa State University Department of Agronomy. http://extension.agron.iastate.edu. Web source verified 10/12/2015.

Study Guidelines

- A soybean demonstration trial was conducted at the Monsanto Learning Center near Scott, MS to determine:
  - Yield response in soybean stands with missing rows and either one or two unplanted twins in an individual row
  - How well soybeans compensate for missing rows
  - When replanting or filling in a missing part of a stand should be considered

Study Guidelines

- 4 Asgrow® soybean products were used:
  - AG4232 Brand
  - AG4835 Brand
  - AG4934 Brand
  - AG5633 Brand
- Trial was planted April 29, 2015 and harvested October 1, 2015
- All field work was completed per local standard

Study Guidelines

- This demo was designed to simulate common planting errors that growers often face in day-to-day farming.
  - Specifically, entire missing rows and missing twin rows caused by mechanical failure that is not apparent until after planting.

Study Guidelines

- 4 treatments were included:
  - 4-row check plot planted at 145,000 plants/acre
  - 4-row plot with one row missing
    - Peas planted in the missing row and killed out after emergence
    - Planting population of 108,750 plants/acre
  - 4-row plot with one missing twin of the eight in a 4-row pass
    - Peas planted in the missing row and killed out after emergence
    - Planting population of 126,875 plants/acre
  - 4-row plot with two separated twins in the pass
    - Peas planted in the missing rows and killed out after emergence
    - Planting population of 108,750 plants/acre.

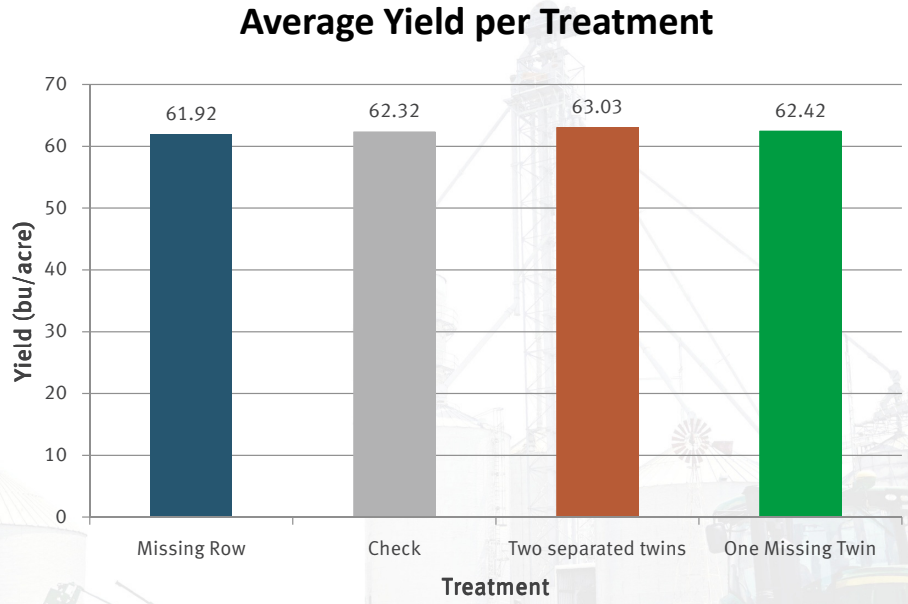
Results and Discussion

Figure 1. Treatment with missing pair of twin rows.

Results and Discussion

Figure 2. Treatment with one row missing.

Results and Discussion



Response of Four Asgrow® Brand Soybean Products to Common Planting Errors

Take Aways

- Planting errors often occur in soybean fields.
- Little guidance has been available in the past as to what should be done to these fields.
- Common questions include:
  - When should I replant?
  - Should I fill in missing rows?

Take Aways

- Demo data indicates that soybeans have a tremendous ability to compensate for reduced populations, whether the plant population is spread across the field or caused by actual missing rows.
- We observed no significant differences in yield across any of the treatments.
- By the end of the season, the only treatment left visibly identifiable was the missing row and it had almost shaded the skipped row.

Take Aways

- There were no confounding issues but a couple of points should be made:
  - This demo was planted in basically a resource unlimited environment.
    - In a dryland or weaker soil/system, some potential limitation in compensatory ability could be seen, but soybeans will likely always compensate on some level.
  - Weed control in unplanted areas would be important to consider.
    - Shading offers great benefits in weed management and the lack of it would likely cause a need for more aggressive residual weed management programs.

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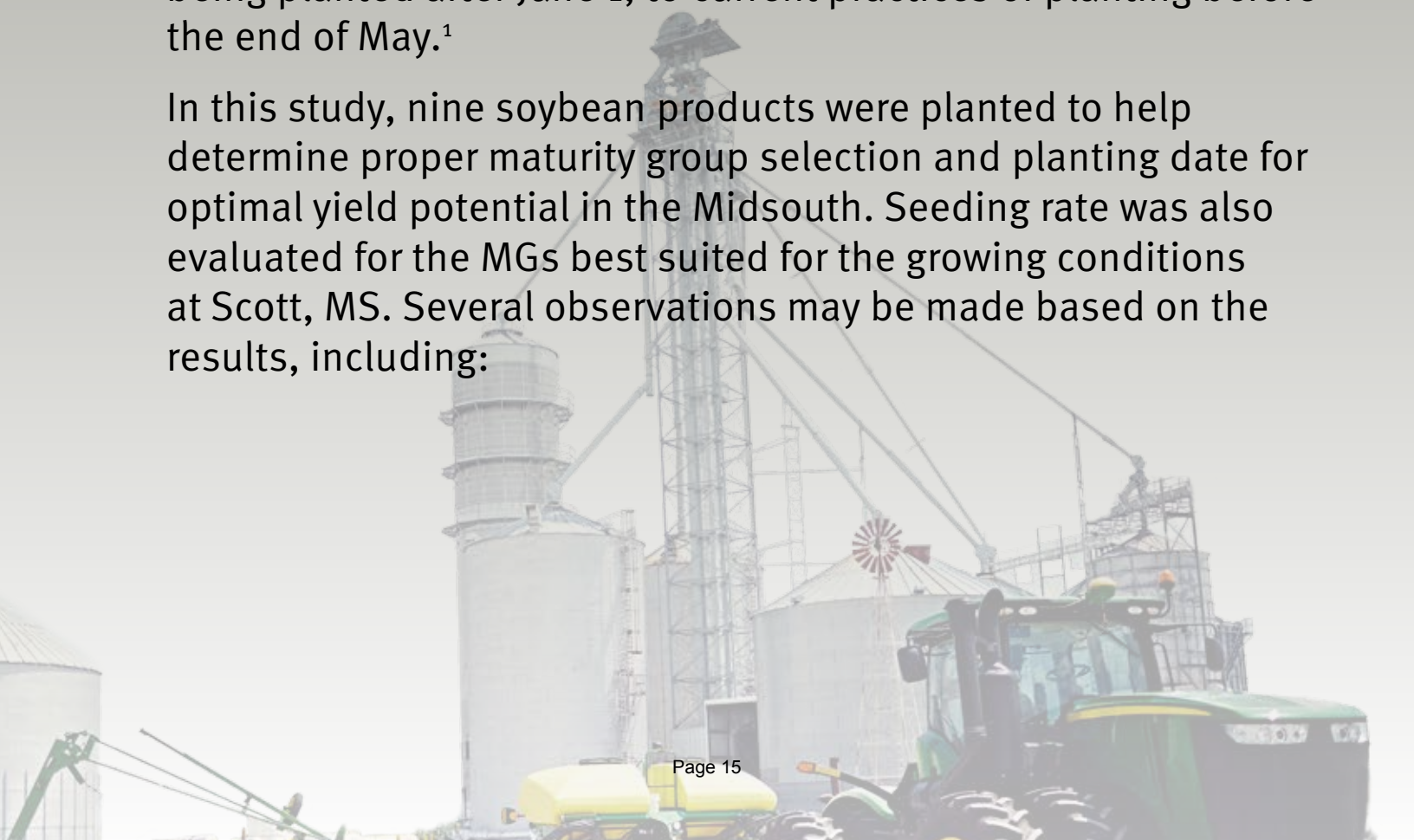
SOYBEAN PRODUCT AND MATURITY GROUP RESPONSE TO SEEDING RATE AND PLANTING DATE

Soybean product and maturity group selection is one of the most important decisions a soybean grower makes each season. Since the 1980s, maturity group (MG) selection and planting date have significantly changed in the Midsouth. Roughly 90% of soybeans planted in the 1980s were MG VI or VII. Today, the majority of soybean acres are planted with MG IV or V soybean products. Planting date has also shifted from one third of soybean acres being planted after June 1, to current practices of planting before the end of May.[1]

In this study, nine soybean products were planted to help determine proper maturity group selection and planting date for optimal yield potential in the Midsouth. Seeding rate was also evaluated for the MGs best suited for the growing conditions at Scott, MS. Several observations may be made based on the results, including:



SOYBEAN PRODUCT AND MATURITY GROUP RESPONSE TO SEEDING RATE AND PLANTING DATE

- Early planting of MG IV and V soybean products provided the highest and most consistent yield potential. This observation has also been made in previous studies.
- Late MG III soybean products can also achieve high yield potential in the Midsouth.
- Planting too early rather than too late can reduce potential yield loss.
- Increased seeding rate did not greatly impact yield potential. Seeding rates of between 130,000 and 170,000 seeds/acre optimized yield potential.

It is beneficial to spread risk by selecting varying MGs instead of spreading out planting dates. Late plantings can accelerate maturity, limiting growth and yield potential. Planting most or all of a soybean crop prior to cotton planting can help prevent late soybean planting and maintain yield potential.1

Source:

1 Soybean production in Mississippi. 2015. Mississippi State University Extension Service. http://msucares.com/crops/soybeans/. Web source verified 10/29/15.

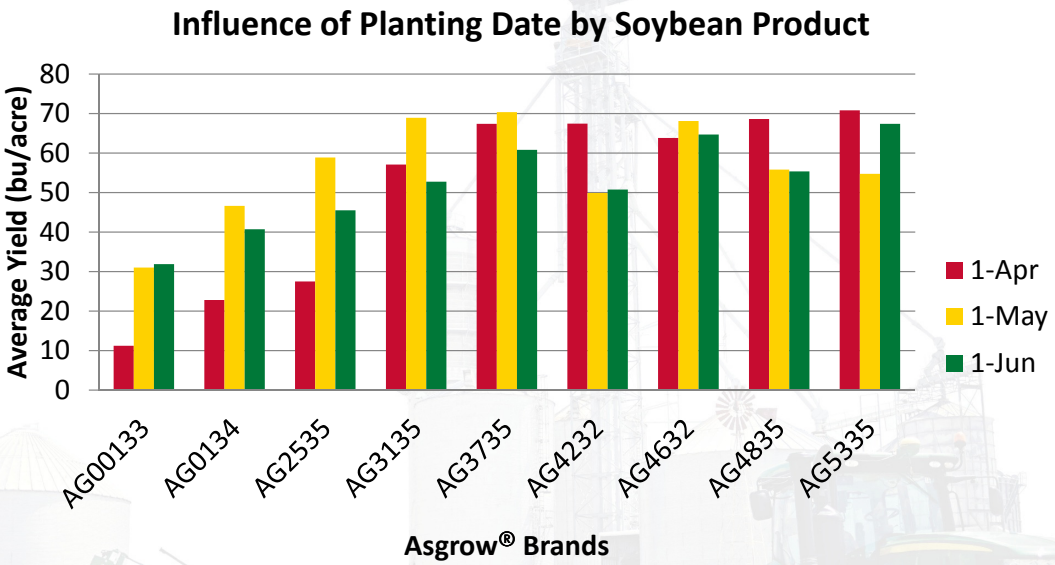
Study Guidelines

- This study was designed to demonstrate the impact of maturity group (MG) selection on the yield potential of a soybean crop. Specifically to:
  - Determine the impact MG has on soybeans at different planting dates.
  - Evaluate the yield response of soybean products to different planting dates.
  - Understand the interaction of seeding rate on MG selection and planting date.

Study Guidelines

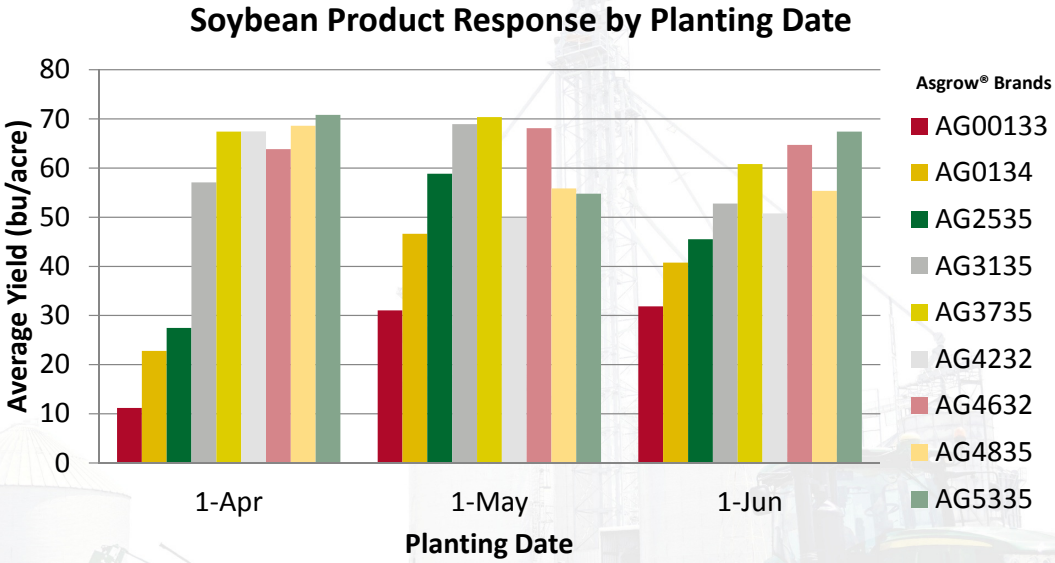
- A total of 9 soybean products ranging from MG 00 to V were planted one month apart at three planting dates: 1 April (early), 1 May, and 1 June (late) at the Monsanto Learning Center at Scott, MS using standard local agronomic practices.
- Soybean products within MG III–IV were also planted at 3 different seeding rates: 130,000, 170,000, and 210,000 seeds per acre.

Results and Discussion



Soybean Product and Maturity Group Response to Seeding Rate and Planting Date

Results and Discussion



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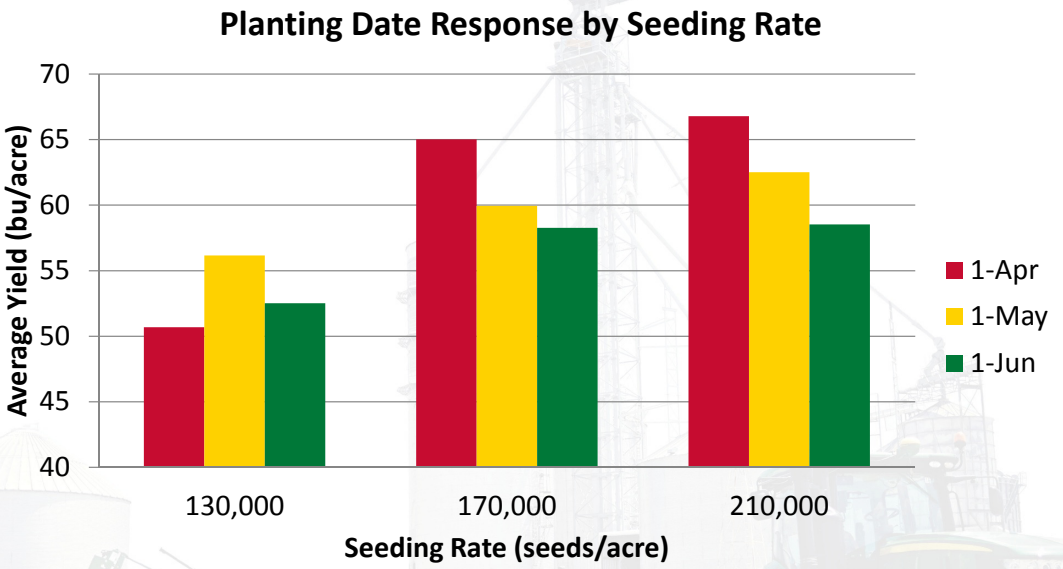

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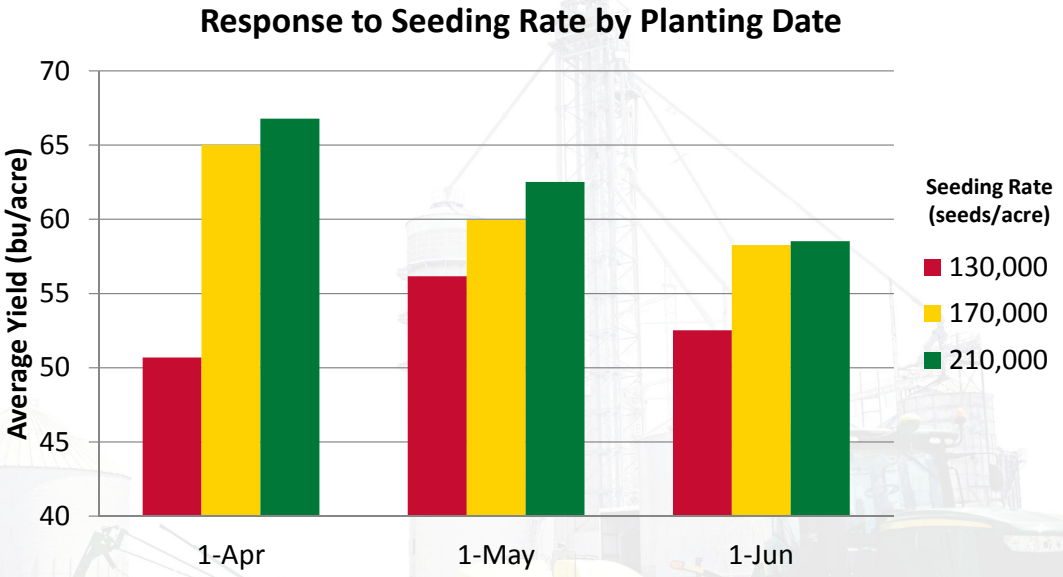
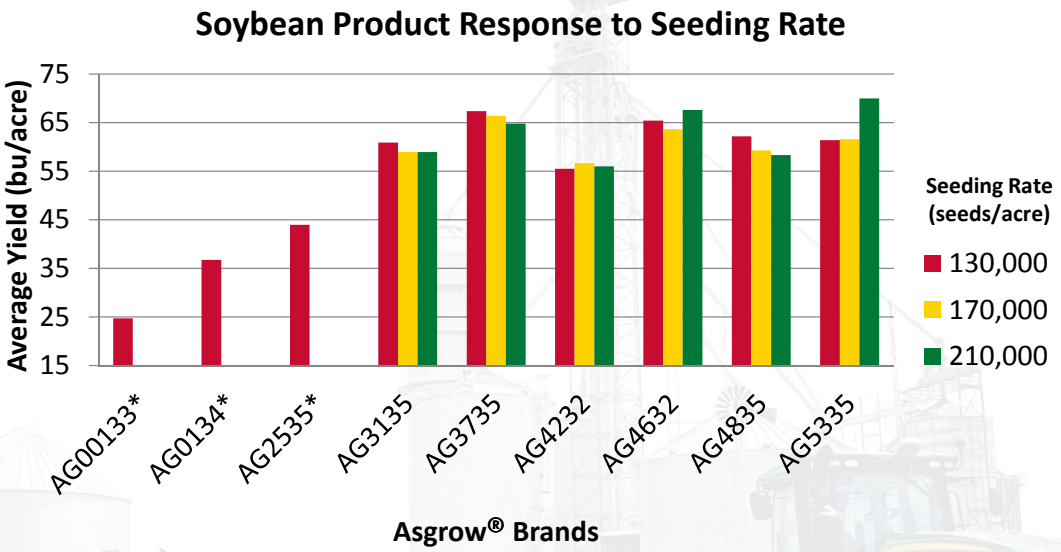


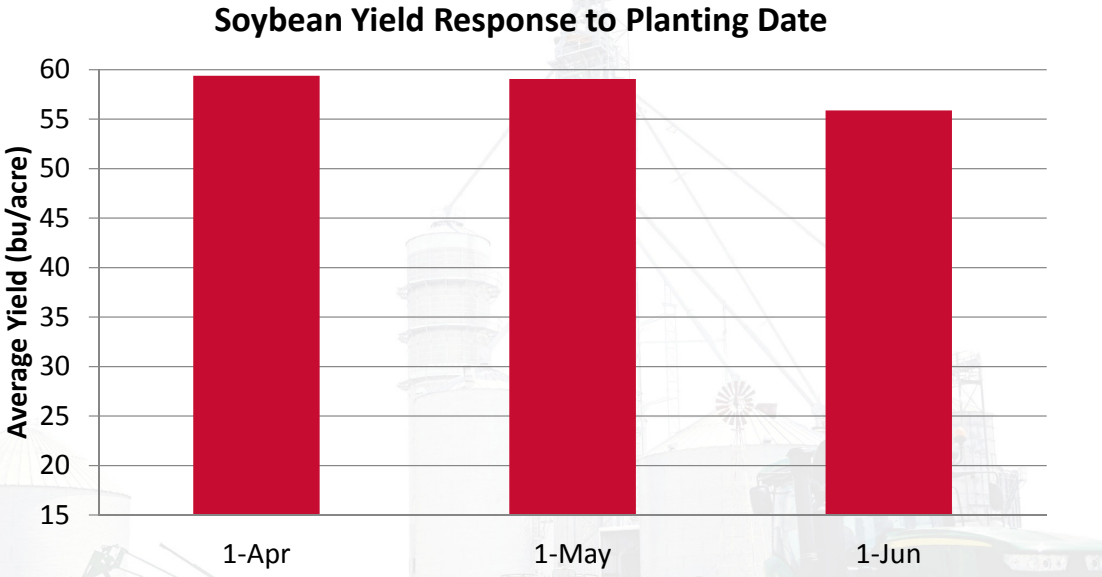
Results and Discussion



* These soybean products were not planted at 170,000 and 210,000 seeds/acre seeding rates.

Soybean Product and Maturity Group Response to Seeding Rate and Planting Date

Results and Discussion



Soybean Product and Maturity Group Response to Seeding Rate and Planting Date

Take Aways

Selecting early MG soybean products in the Midsouth:

- The late MG III soybean product was the earliest product that may have a high enough yield potential for planting consideration at Scott, MS.
- MG 00, I, and II soybean products had a substantial loss in yield potential across planting dates when compared to later maturing soybean products.
- Early MGs (00–II) are not well-adapted for the Midsouth, as they are bred for growing seasons in Northern climates with longer day length and cooler temperatures. This limitation could not be overcome by increasing seeding rate.

Take Aways

Soybean Product and MG Response to Seeding Rate:

- Seeding rates between 130,000 and 170,000 seeds per acre helped optimize yield potential across planting dates.
- Few, if any, soybean products showed significant response to increasing seeding rate.
- Soil type and potential for lodging should be carefully considered when determining proper seeding rate.

Take Aways

Soybean Product and MG Response to Planting Date:

- This study found that yield potential can start to decrease when soybeans are planted late. However, in situations where late planting cannot be avoided, selecting later-maturing soybean products may help increase yield potential.
- This response to planting date was as expected and has been observed in previous years with similar soybean planting date studies.

Soybean Product and Maturity Group Response to Seeding Rate and Planting Date

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SOYBEAN PRODUCT RESPONSE TO DIFFERENT DURATIONS OF FLOOD IRRIGATION

Soybean farmers in the Delta typically irrigate with a system similar to the flood system used in rice production. This region of the country also receives significant rainfall during the growing season. This combination can result in excess water on fields; sometimes for extended periods.

This study was designed to evaluate the response of six Asgrow® soybean products to different durations of flood irrigation. Farmers may also use data from this study to determine which soybean products may be more suitable for planting in fields prone to water logging.

This leads to the following preliminary conclusions:

- All soybean products suffered some yield loss from the flood irrigation.
- AG4534 brand suffered the most from the 60-hour treatment and should not be planted in systems with excessive water.
- AG5535 brand had the lowest level of loss and is likely adapted well for wet situations.
- The other soybean products were similar in their response to the two levels of flood irrigation.
- Growers should carefully consider flood tolerance, along with disease tolerance, yield potential, and adaptation when selecting soybean products to plant in any system.

Background

- Many farmers in the Delta irrigate soybeans with a system similar to the flood system used in rice production.
- This system involves plowing up large earthen levees and installing flood gates to control irrigation water.
- A series of bays or paddocks are established in each field.

Background

- One bay is filled with water.
- The water is released to flow down soybean rows and is collected in the next bay and the process is repeated until the entire field is irrigated.
- Time required to irrigate a field is 6 to 7 days.
- The impact of this long period of flooding on soybean yield potential varies among soybean products.

Background

- This trial was developed to investigate and quantify the impact of various durations of long-term flood irrigation on Asgrow® brand soybean products.
- A second goal was to determine if some soybean products perform better than others in flood-irrigated fields or in wet fields where water logging is common.

Study Guidelines

- Six Asgrow® brand soybean products were planted in 30-inch rows on May 4, 2015 at a population of 150,000 seeds/acre.
- Each 250 foot long plot was replicated two times.
- Flood-irrigation water was held on each soybean product for 24 hours and 60 hours.

Study Guidelines

- Soybeans were harvested on October 8, 2015.
- Yield differences were calculated between soybean products receiving 24 hours of flood irrigation and the same products receiving 60 hours of flood irrigation.

Results and Discussion

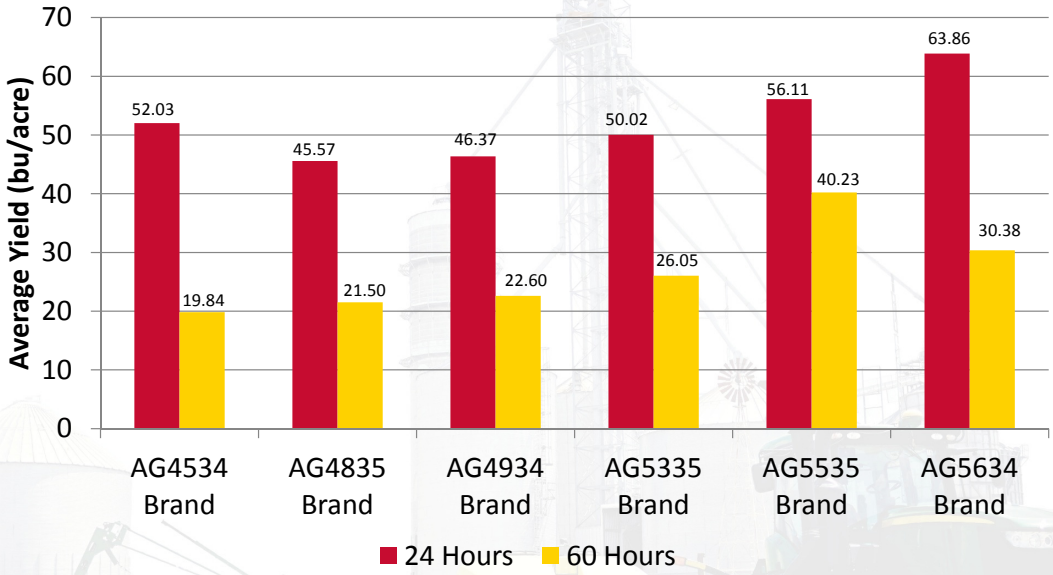
- All soybean products suffered some yield loss from the flood irrigation.
- AG4534 brand suffered the most from the 60-hour treatment and should not be planted in systems with excessive water.
- AG5535 brand had the lowest level of loss and is likely adapted well for wet situations.

Results and Discussion

- The other soybean products were similar in their response to the two levels of flood irrigation.
- Growers should carefully consider flood tolerance, along with disease tolerance, yield potential, and adaptation when selecting soybean products to plant in any system.

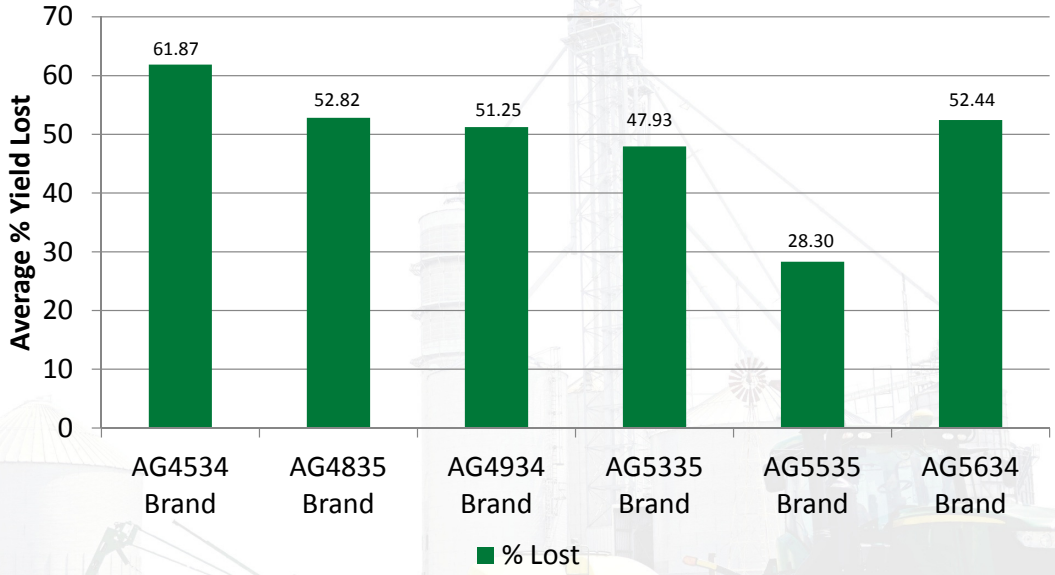
Results and Discussion

Figure 1. Average yields of six Asgrow® brand soybean products under two irrigation durations.



Results and Discussion

Figure 2. Percent of yield potential lost to 60 hours of flooding compared to 24 hours of flooding.



Soybean Product Response to Different Durations of Flood Irrigation

Results and Discussion

Figure 3. Levee gate allowing water to move from one bay to the next.

Results and Discussion

Figure 4. Irrigation water was held on soybean trials for 24 or 60 hours.

Soybean Product Response to Different Durations of Flood Irrigation

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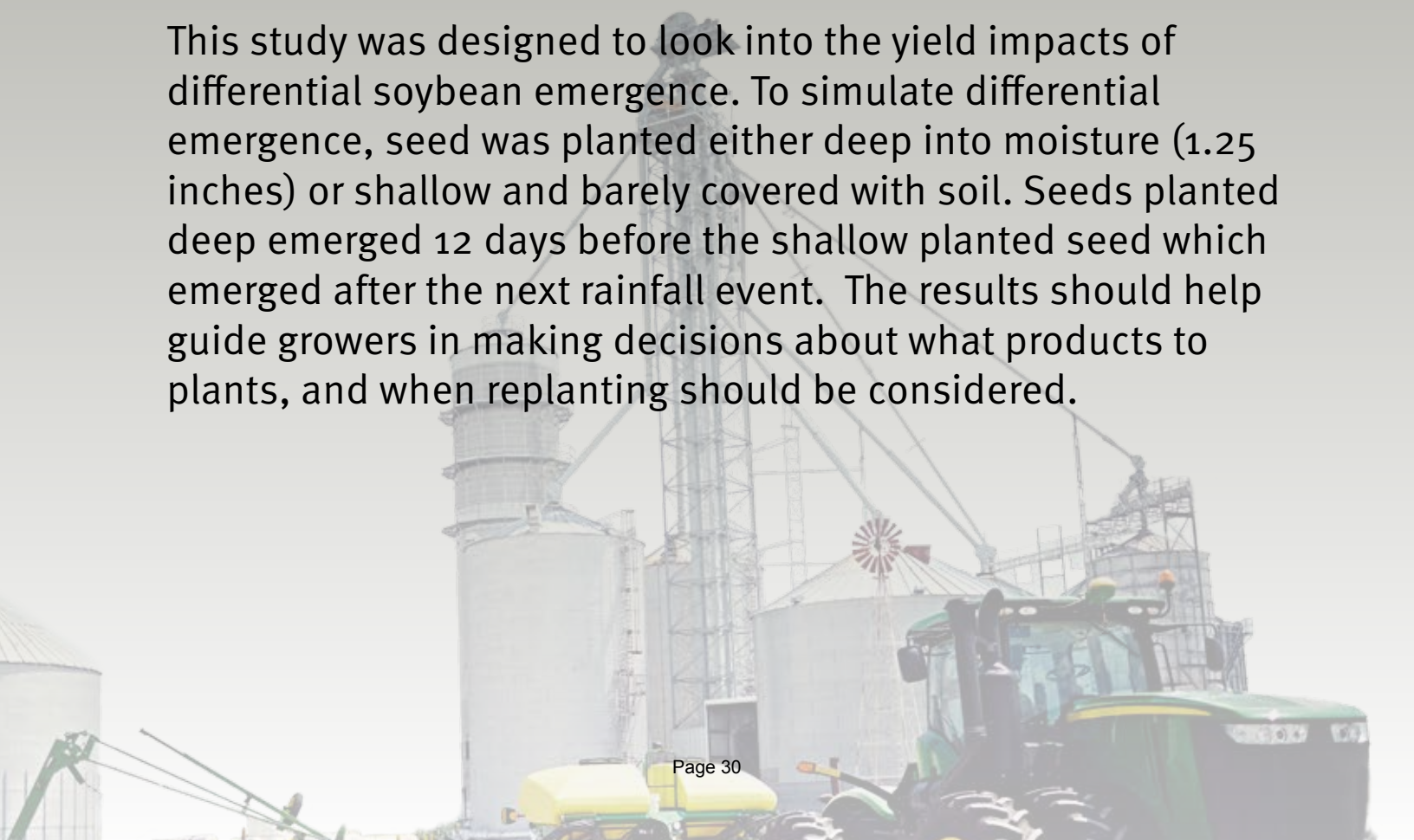
THE RESPONSE OF ASGROW® SOYBEAN BRANDS TO DIFFERENTIAL EMERGENCE

Problems with emergence can occur in soybean production. For example, in 2015, the Midsouth region experienced early season drought followed by heavy rainfall which disrupted planting for 3 to 4 weeks. Poor weather conditions caused the soybean crops to emerge differentially across the area. Growers are often concerned about what should be done when emergence issues occur. Should they fill in, replant, or leave the crop as is? Also, growers may wonder if different products vary in response to differential emergence.

This study was designed to look into the yield impacts of differential soybean emergence. To simulate differential emergence, seed was planted either deep into moisture (1.25 inches) or shallow and barely covered with soil. Seeds planted deep emerged 12 days before the shallow planted seed which emerged after the next rainfall event. The results should help guide growers in making decisions about what products to plants, and when replanting should be considered.



THE RESPONSE OF ASGROW® SOYBEAN BRANDS TO DIFFERENTIAL EMERGENCE

Data from this demonstration indicates that soybean products respond differently to problems with emergence. The earliest maturing soybean product selected for the demonstration (Asgrow AG4232 brand, 4.2 RM) reported increased yield potential with increasing simulated differential emergence. In comparison, the latest maturing soybean product selected for the demonstration (Asgrow AG5335 brand, 5.3 RM) reported a decrease in yield potential from increasing differential emergence. The two soybean products with relative maturities between the early and late maturing products reported a slight decrease in yield potential with increasing simulated differential emergence. This demonstration indicates that earlier season soybean products were able to compensate for emergence problems better than products with a later relative maturity.

Growers should carefully consider product response to differential emergence for replanting situations.

The cost of replanting my not be justified when calculating potential yield reductions. Patience is essential during harvest when differential emergence occurs as later emerging rows may have looked good all year, but matured somewhat later than the earlier emerging rows. Later emerging soybeans may require harvest preparation in the form of a desiccant or need modification in use under these circumstances.

Background

- In 2015, the Midsouth experienced drought prior to planting followed by heavy rainfall, which disrupted planting for 3 to 4 weeks.
- The planting delay caused the soybean crops to emerge differentially across the area.
- This demonstration was designed to look into the yield impacts of differential soybean emergence.
  - The initial intent was to simulate a situation where a grower planted soybeans into marginal moisture, waiting on rainfall and eventually resulting in differential emergence over time.

Background

- What impact does differential emergence have on a soybean crop?
- Does differential emergence effect vary from product to product?
- When should replanting be considered in crops that emerge differently?

Study Guidelines

- Four Asgrow® brand soybean products – AG4232, AG4632, AG4835, and AG5335 brands
- Planting Date – June 4
  - Emergence for deep planted seeds – June 7
  - Emergence for shallow planted seeds – June 19
- This demonstration was set up via novel use of planting equipment. The following parameters were established.
  - Planted with a twin row Monesum™ planter on 7.5-inch twin rows on 38-inch beds.
  - 8 row plots, treatments were established by planting depth of the row.

Study Guidelines

- To inflict the differential emergence, treatments were established by adjusting planting depth.
- Treatments differed by the number of rows planted deep or shallow. Each plot had 8 rows total.
- Differential planting depth –
  - 8-inch depth into moisture = Deep planting
  - Shallow = Barely covered

Treatment (TRT)	# of Rows Planted Deep (8" into moisture)	# of Rows Planted Shallow
TRT 1	8	0
TRT 2	7	1
TRT 3	6	2
TRT 4	5	3
TRT 5	4	4
TRT 6	3	5
TRT 7	2	6
TRT 8	1	7
TRT 9	0	8

- Differential depths allowed the deeper planting to emerge more timely.
- Shallow plantings emerged two weeks later, after a rainfall.
- Plots emerged differentially in 12.5% increments.

Study Guidelines

Figure 1. Treatment 1, all eight rows planted deep (8-inch planting depth).

Figure 2. Treatment 9, all eight rows planted shallow.

Figure 3. Treatment 4, four emerged rows were planted deep and four missing rows were planted shallow.

Figure 4. Treatment 8, one emerged row planted deep and seven missing rows were planted shallow.

Results and Discussion

- Soybean products responded differently to emergence problems.
  - Soybean response would likely be different in environments where conditions are less and less favorable (i.e. poor drainage, dryland, etc.).
  - Asgrow® AG4232 brand responded positively to the treatments.
    - Increase of .083 bu/1% of population that emerged two weeks later than the deep planting.
    - So if 10% emerged later, the grower would gain 0.83 bu/acre.
      - Likely due to slow growth conditions early followed by better conditions later.
      - Early-season conditions resulted in reduced growth that AG4232 brand could not compensate for in the end.

Results and Discussion

- Soybean products responded differently to emergence problems.
  - Asgrow® AG4632 and AG4835 brands responded similarly to the differential emergence
    - Decrease of .063 bu/1% of population that emerged two weeks later than the deep planting.
    - So if 10% emerged later, the grower loses .63 bu/acre for these two soybean products.

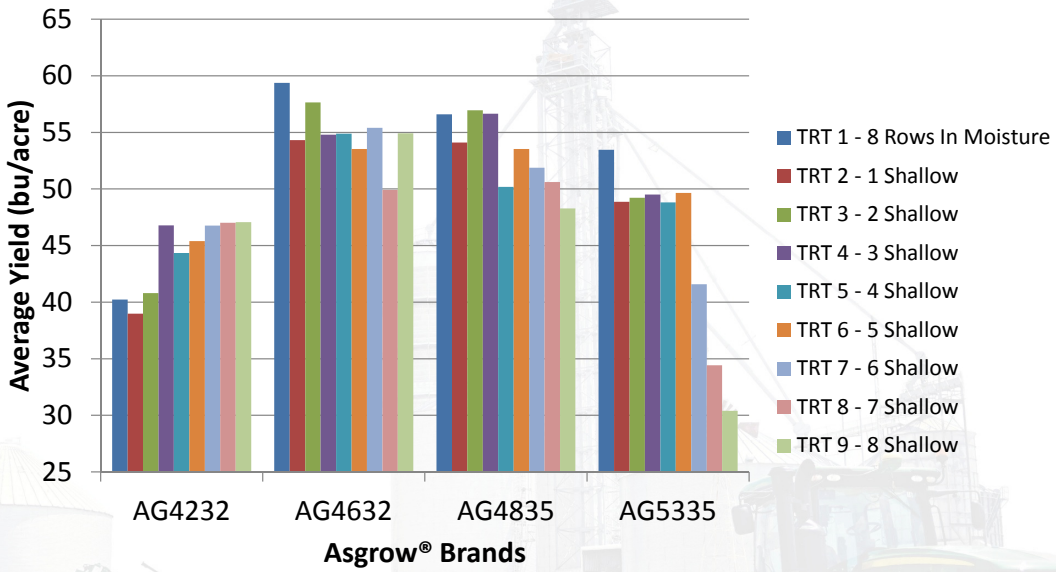
Results and Discussion

- Soybean products responded differently to emergence problems.
  - Asgrow® AG5335 brand had the largest reduction for the differential emergence.
    - Decrease of .2 bu/1% of population that emerged two weeks later than the deep planting.
    - So if 10% emerged later, the grower loses 2 bu/acre.
    - Likely due to the soybean product having reduced yield potential relating to season length and/or plant physiology.

Results and Discussion

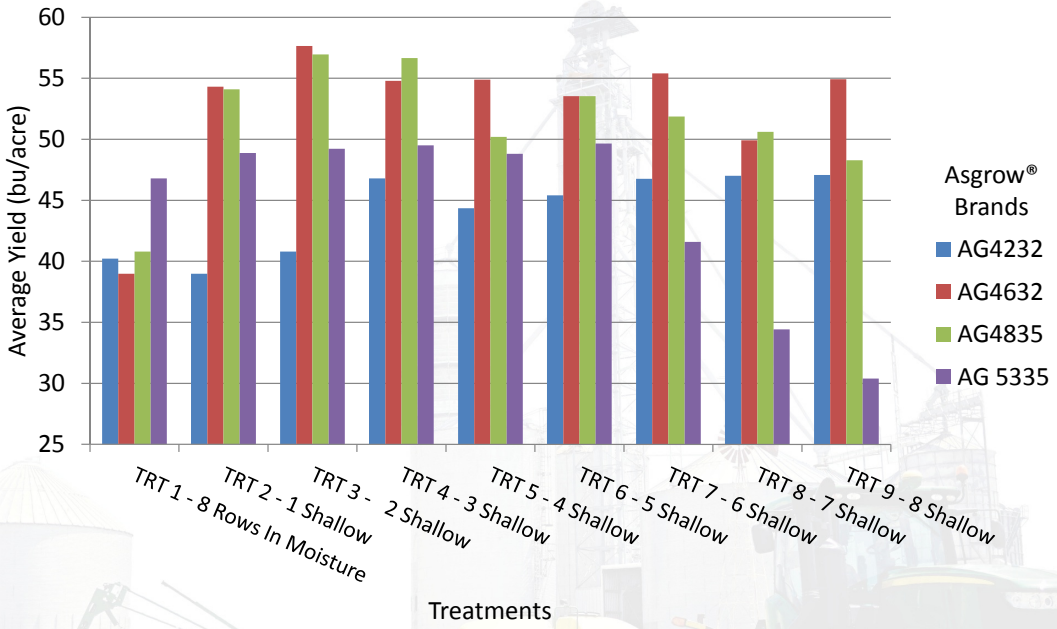
- Growers should carefully consider product response to differential emergence for replanting situations.
  - Items to consider:
    - What is the cost of replanting?
    - Do I have measurable effects of the differential emergence in the field?
    - What is my potential yield loss from later planting when replanting?
- Patience is essential during harvest when differential emergence was an early-season problem.
  - Later emerging rows (shallow planting) looked good all year, but matured somewhat later than the earlier maturing rows (deep planting).
  - Later emerging soybeans may require harvest preparation in the form of a dessicant or need modification in use under these circumstances.

Results and Discussion



The Response of Asgrow® Soybean Brands to Differential Emergence

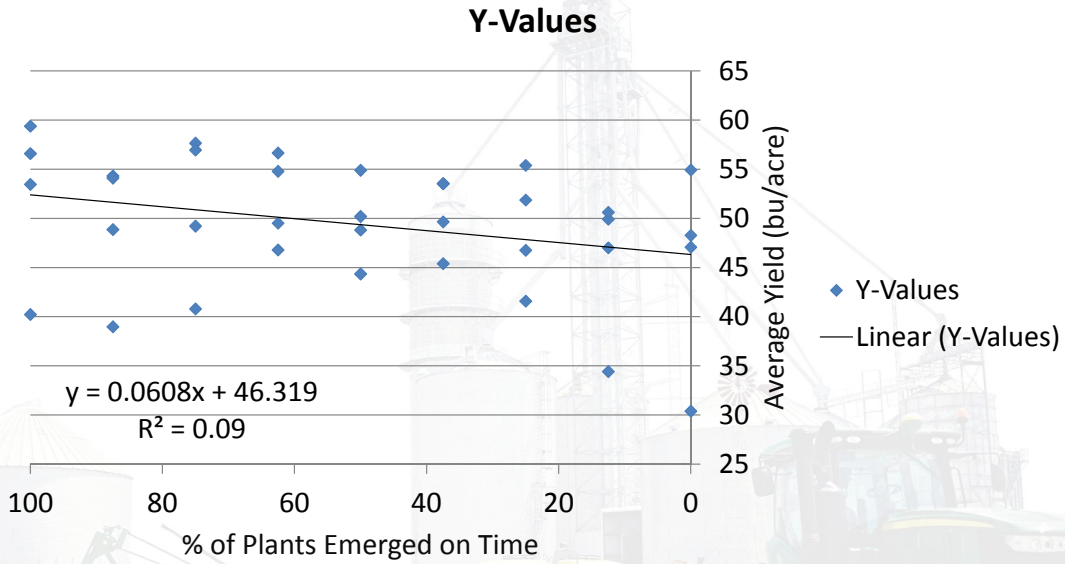
Results and Discussion



The Response of Asgrow® Soybean Brands to Differential Emergence

Results and Discussion

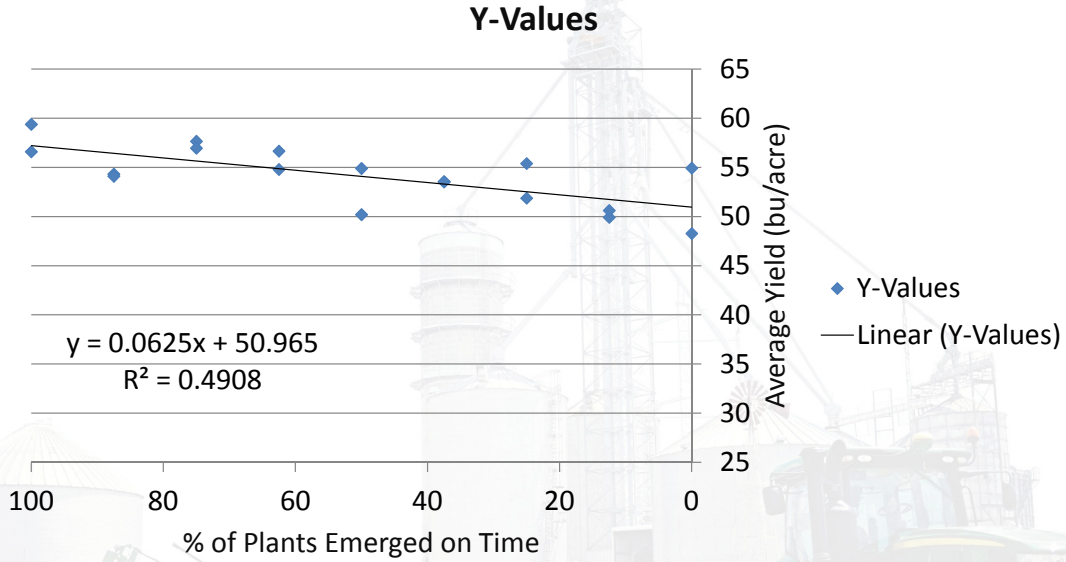
Response of All Soybean Products



The Response of Asgrow® Soybean Brands to Differential Emergence

Results and Discussion

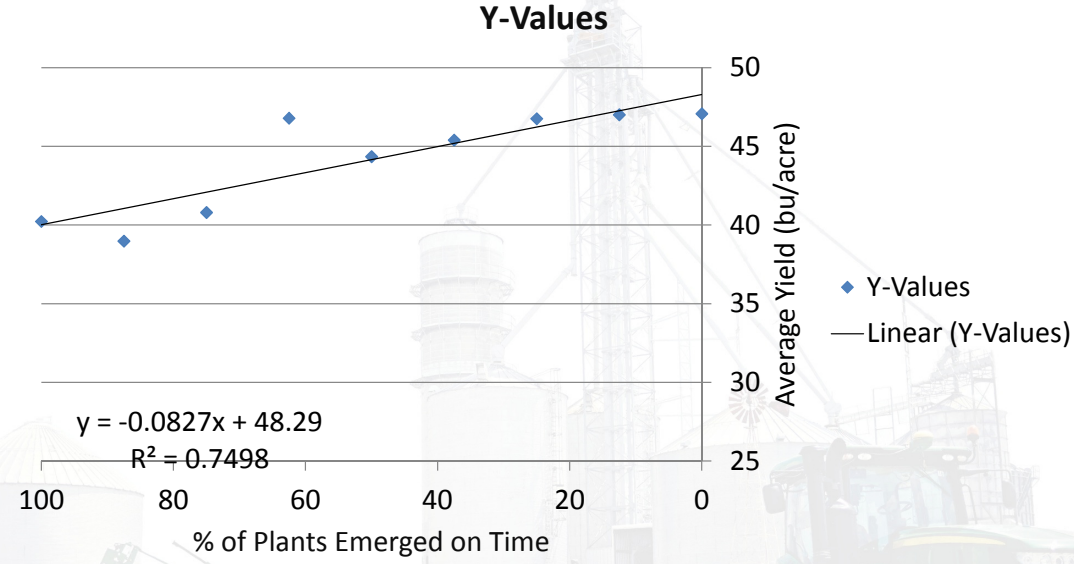
Response of Asgrow® AG4632 Brand and AG4835 Brand



The Response of Asgrow® Soybean Brands to Differential Emergence

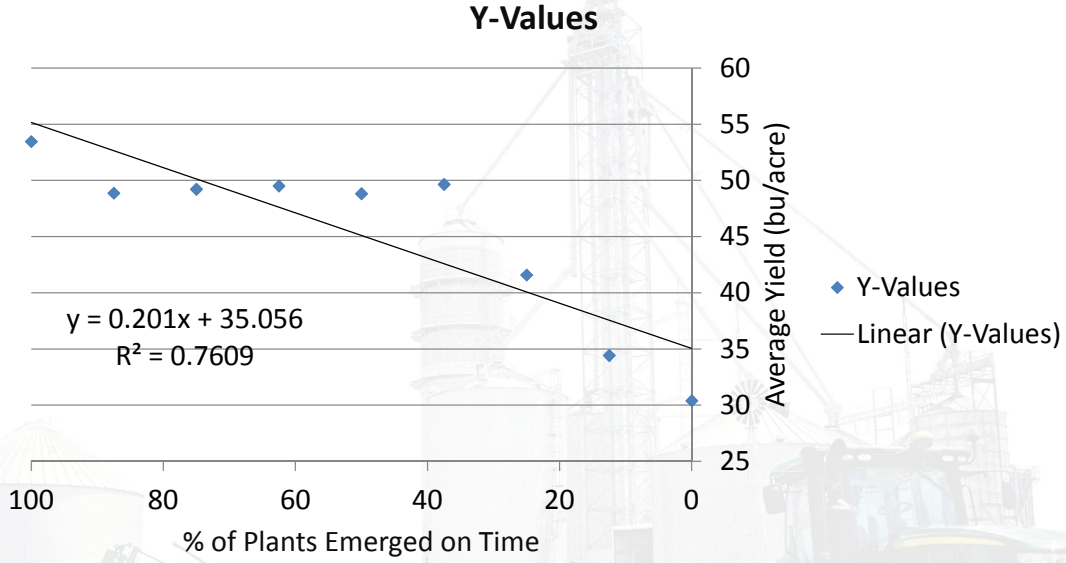
Results and Discussion

Response of Asgrow® AG4232 Brand



Results and Discussion

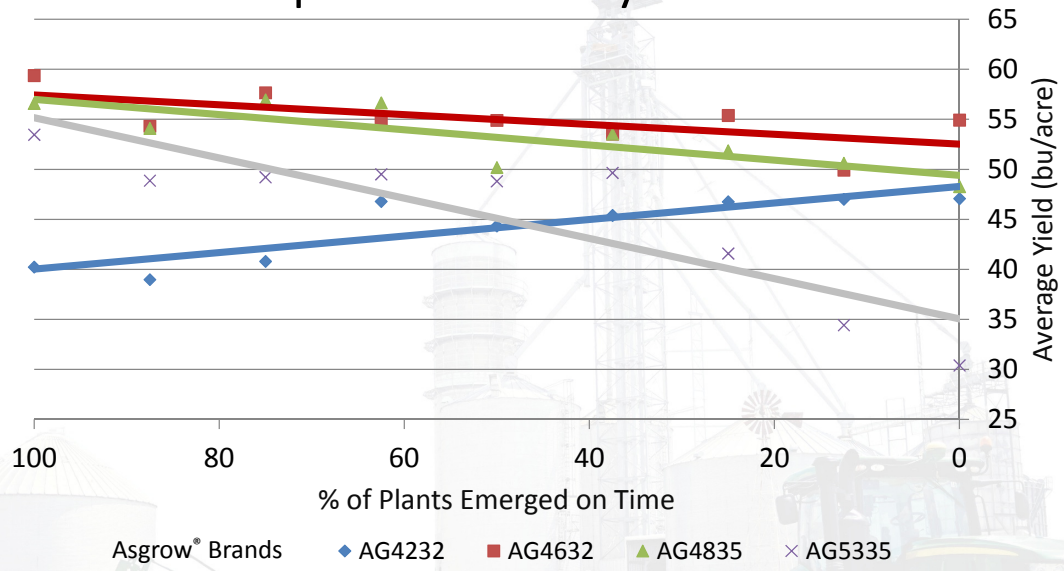
Response of Asgrow® AG5335 Brand



The Response of Asgrow® Soybean Brands to Differential Emergence

Results and Discussion

Response of All Soybean Products



The Response of Four Asgrow® Brand Soybean Product to Differential Emergence

Take Aways

- Soybean products responded differently to problems with emergence.
  - Increasing simulated emergence problems resulted in higher yields for one soybean products (AG4232 brand) and lowered yields for others (AG5335, AG4632, AG4835 brands).
  - The yield reduction of AG4632 and AG4835 brands due to increased emergence problems was much less than the yield reduction of AG5335 brand.
    - In this situation replanting AG4632 or AG4835 brand may not be cost effective to a grower.
- In this demonstration, earlier season soybean products were able to compensate for emergence problems better than products with a later relative maturity.

Legal Statements

The information discussed in this report is from a single site, non-replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

For more information regarding the intellectual property protection for the seed products identified in this publication, please see www.asgrowanddekalb.com. **Individual results may vary**, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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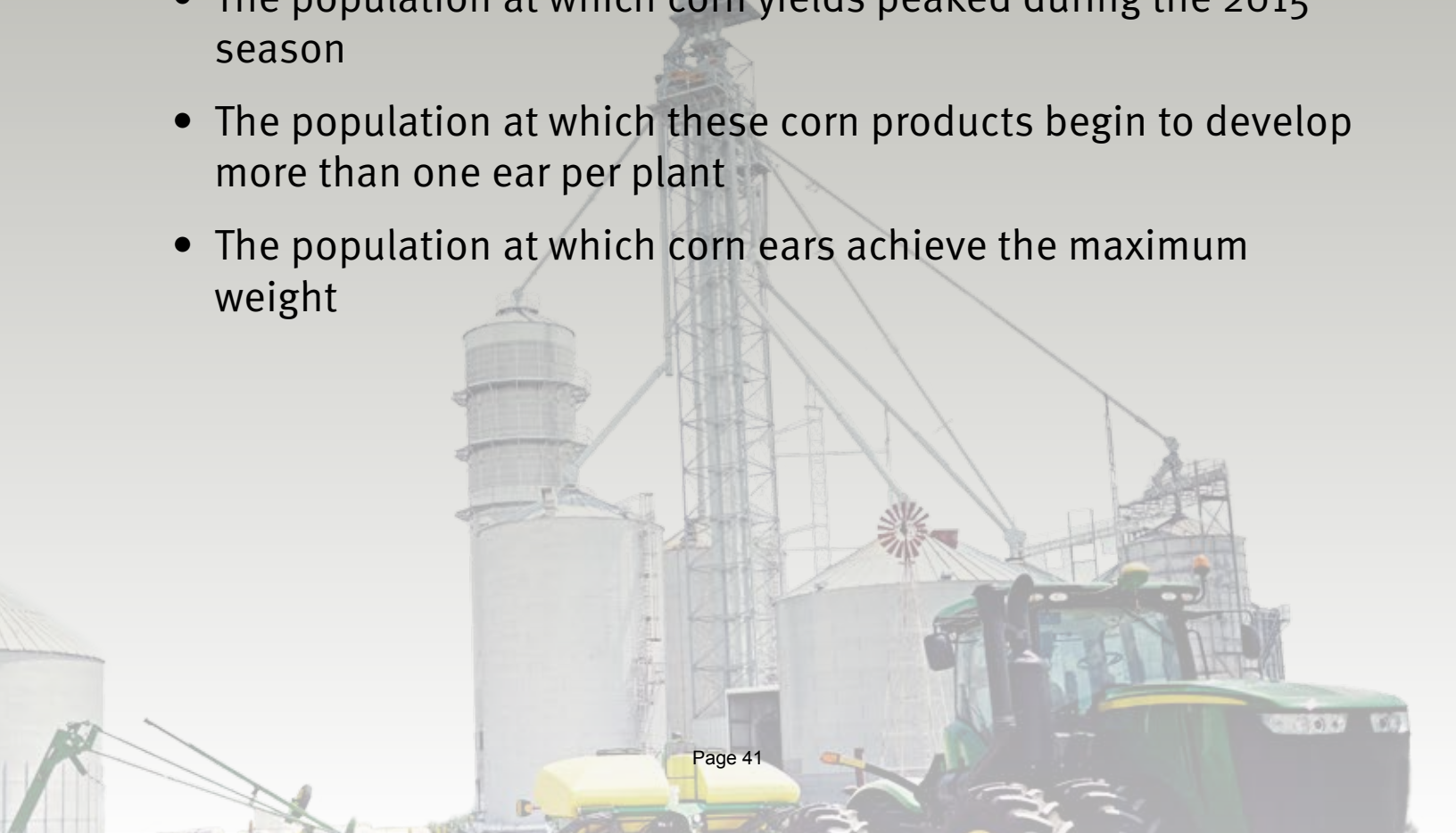
CRB10292015.

INFLUENCE OF PLANTING POPULATION ON EAR NUMBER AND SIZE IN MIDSOUTHERN CORN PRODUCTION

In order to learn more about ear flex in corn, a corn demonstration trial was conducted at the Monsanto Learning Center at Scott, MS to determine how corn plants respond to changes in population by ear size, ear weight, and yield. This study examined:

- How corn responds to decreasing population in ear size and number of ears per plant
- The population at which corn yields peaked during the 2015 season
- The population at which these corn products begin to develop more than one ear per plant
- The population at which corn ears achieve the maximum weight



INFLUENCE OF PLANTING POPULATION ON EAR NUMBER AND SIZE IN MIDSOUTHERN CORN PRODUCTION

In this trial, two DEKALB® Brand Products were planted at 17 different populations ranging from 10,000 to 42,000 KPA (kernels/acre). Samples were taken and data generated regarding ears/plant, ear weight, and yield. In 2015, corn yields were maximized in the 35,000-36,000 KPA range. Some, but very few, plants developed two ears below 15,000 KPA. Primary ear weight was maximized somewhere between 20,000 and 25,000 KPA. At higher populations, ears were smaller and weighed less. Average ear weight followed a similar trend, but was smaller at the lowest populations due to the existence of a few plants with two ears.

No increase in ear size occurred below 23,000 KPA and practically no plants developed two ears at populations above 15000 KPA. This data shows that using low population in attempt to produce two ears per plant to optimize yield does not provide the same yield benefit as planting the correct population initially.

Study Guidelines

- A corn demonstration trial was conducted at the Monsanto Learning Center at Scott, MS to learn more about how corn plants respond to changes in population by ear size, ear weight, and yield.
- There have been many studies on corn response to population. This is a follow up to those studies in defining the reaction of corn to population changes.

Study Guidelines

- How does corn respond to decreasing population in ear size and number of ears per plant?
- At what population did corn yields peak during the 2015 season?
- At what population do these corn products begin to develop more than one ear per plant?
- At what population do corn ears achieve the maximum weight?
- The fundamental question is: What is this characteristic that we refer to as “flex” in corn?

Study Guidelines

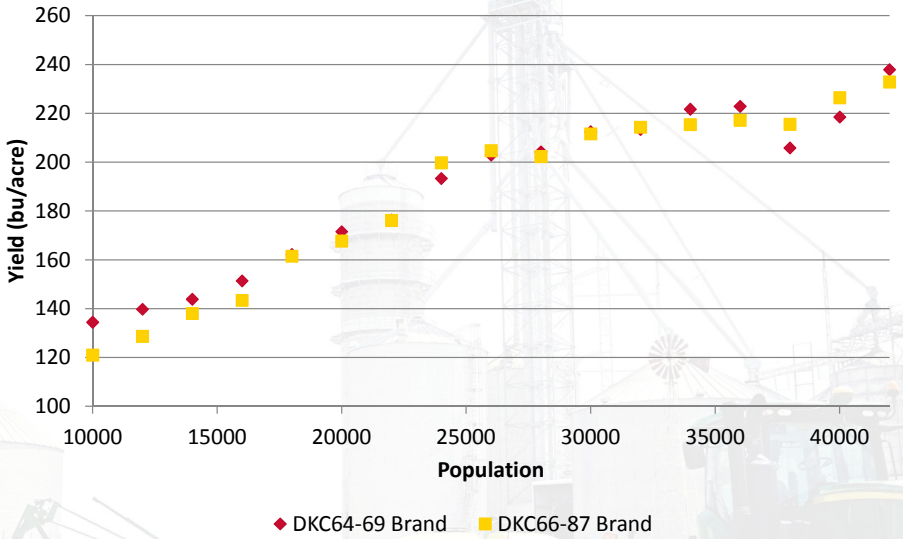
- Products used:
  - DKC64-69 brand– This product demonstrated as much flex as recorded in the Midsouthern corn seed from DEKALB® Brand.
  - DKC66-87 brand – This product demonstrates less flex, but is still very yield capable even at relatively low populations.
- Planting date:
  - 3/30/2015

Study Guidelines

- This demo was planted as follows:
  - 2 replications
  - Planted 4 rows by approximately 175 foot rows
  - Planted populations from 10,000 to 42,000 KPA (kernels/acre)
  - Stands were counted for proper analysis as needed
- This demo was sampled as follows:
  - 8 foot samples were harvested from each plot
  - Within each sample the ears were harvested individually
  - Ears were then shucked, shelled, and weighed individually
  - Data was generated as to ears/plant, yield, and ear weights in response to population
- Each plot was also machine harvested for yield

Results and Discussion

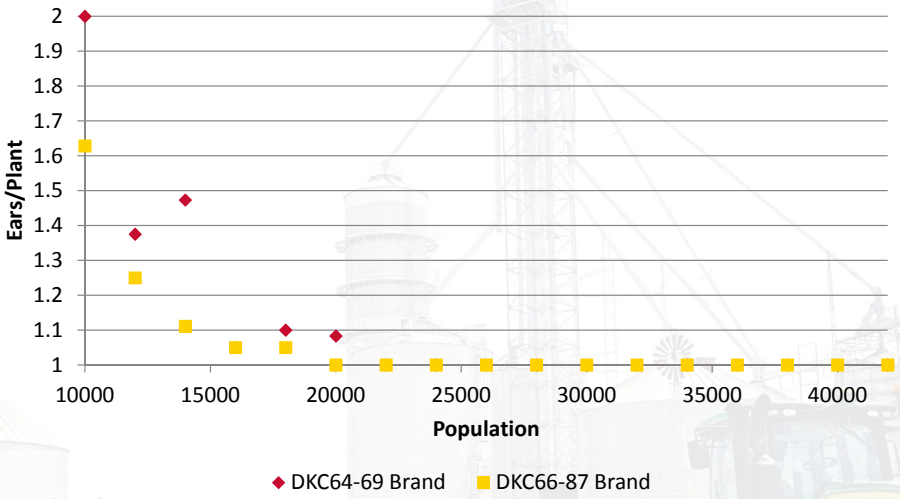
Figure 1. Yield by Population



Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Results and Discussion

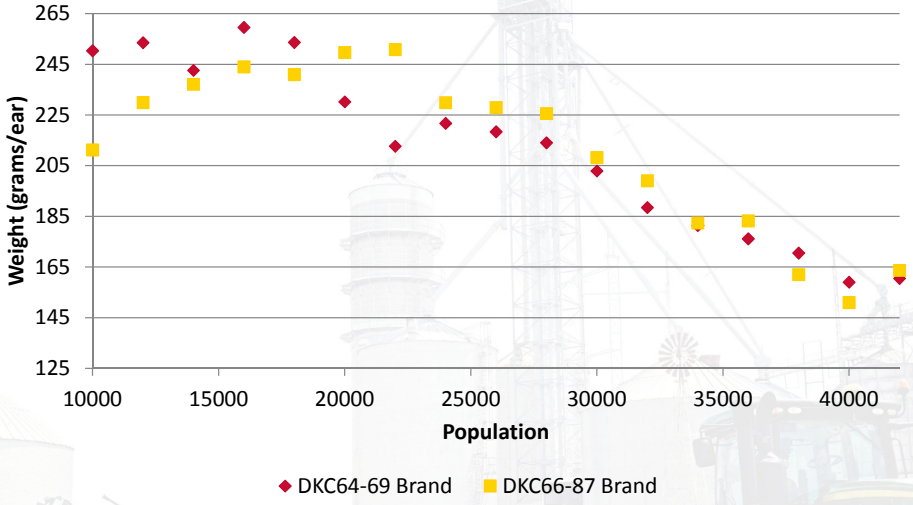
Figure 2. Ears per Plant by Population



Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Results and Discussion

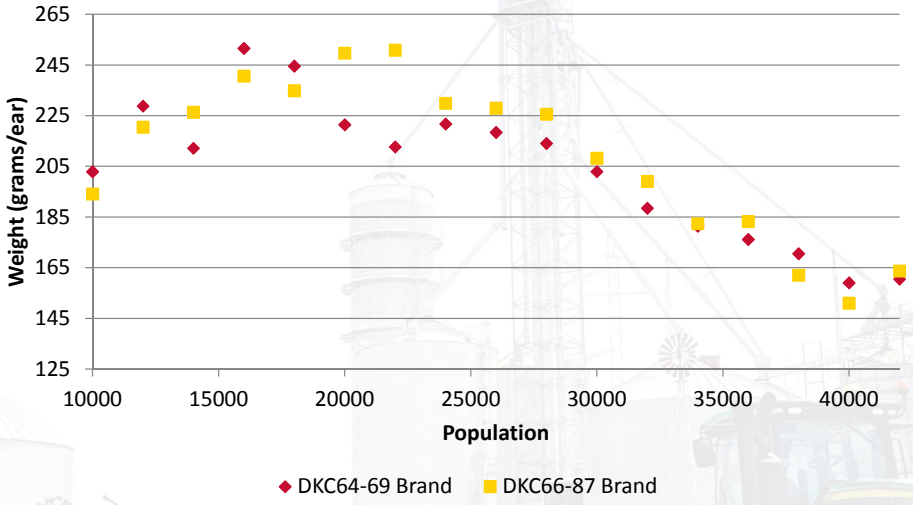
Figure 3. Primary Ear Weight by Population



Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Results and Discussion

Figure 4. Average Ear Weight by Population



Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Take Aways

- During 2015, corn yields were maximized in the 35,000-36,000 KPA range.
  - This is different than the previous 4-5 years where in some cases yield continued to go up as population increased.
- Very few plants had two ears develop below 15,000 KPA.
  - This is primarily a response to light in our environment.

Take Aways

- Primary ear weight was maximized somewhere between 20,000 and 25,000 KPA.
  - Ears were as large as they could be at populations below that.
  - At higher populations, ears were smaller but weighed less.
- Average ear weight followed a similar trend, but actually got smaller at the lowest populations due to the existence of a few plants with 2 ears.

Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Take Aways

- For example:
  - If the plants at 23,000 KPA had the largest possible ears at approximately 230 grams per ear and the 42,000 KPA population had ears weighing approximately 150 grams per ear, the ears were close to 35% smaller in the high population, but the low population only contained approximately 55% of the plants of the high population.
  - This calculates to a 40 bu/acre difference in yield and agrees with the combine harvested yield difference.
- This data shows that using low population in attempt to produce two ears per plant to optimize yield does not provide the same yield benefit as planting the correct population initially.
  - No increase in ear size occurred below 23,000 KPA and practically no plants developed two ears at populations above 15000 KPA.

Influence of Planting Population on Ear Number and Size in Midsouthern Corn Production

Legal Statements

The information discussed in this report is from a single site, twice replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

RESPONSE OF NEW DEKALB® BRAND CORN PRODUCTS TO PLANTING POPULATION

Many new corn products are responsive to population, making planting rate decisions even more important than before. Recently adopted corn products are often of the "fixed" ear type, meaning that they are not able to compensate greatly for either a reduction in stands or planting populations that are not optimized for the genetics planted. Past evaluations at the Monsanto Learning Center at Scott, MS have shown that planting population is an essential decision in planning and planting a corn crop. Generally speaking, when planting a product with fixed ear type into fields and/or systems with higher yield potential, the highest population should be used.

In this trial, seven DEKALB corn products were planted at three different populations in both sand and mixed silty clay loam to determine how new corn products respond to different planting populations in different soil types. Although in previous years some products responded better to higher populations, most products in this trial performed well at 36,000 plants/acre, but not at higher populations. Environmental factors may have limited yield potential in 2015.

Ear placement and the potential for harvest lodging should be carefully considered when choosing a planting population. In this trial, all corn products responded positively to increasing population. This would likely not occur in a year with lodging prior to harvest. Product-specific information can be the key to making decisions for the correct planting scenario. Seek local data-based advice when choosing a planting population.

Background

- This demo is repeated each year to evaluate the response of new corn products to planting population.
- The basis for this study is that many new corn products should be planted at higher populations than traditional products.
  - Correct population decisions are very important to maximize the yield potential of new products as they become available.
- The switch to fixed versus flex type products has driven the need for this type of study.

Study Guidelines

- A corn demonstration trial was conducted at the Monsanto Learning Center at Scott, MS to examine how new corn products respond to different planting populations.
- Corn was planted on two distinct soil types: deep sand and mixed silty clay loam.

Study Guidelines

- Seven DEKALB® corn brands used for this demo:
  - DKC63-60 brand
  - DKC64-89 brand
  - DKC66-59 brand
  - DKC66-87 brand
  - DKC67-14 brand
  - DKC67-72 brand
  - DKC68-26 brand

- DKC27-55 brand – planted only in sandy site at 35,000 kernels/acre (not included with final data)

Study Guidelines

- Three planting populations were used
  - Low: 33,000 seeds/acre
  - Medium: 36,000 seeds/acre
  - High: 39,000 seeds/acre
- Each product was planted at each population in each soil type.
- Emergence and stand establishment was similar in all products (in excess of 98.5%) so data is reported using planting populations.

Study Guidelines

- All field/agronomic work was completed per local standards
- Demo was done under full irrigation
- 240 pounds of total nitrogen was applied as in-furrow liquid in a split application
- Demo was planted March 31, 2015

Results and Discussion

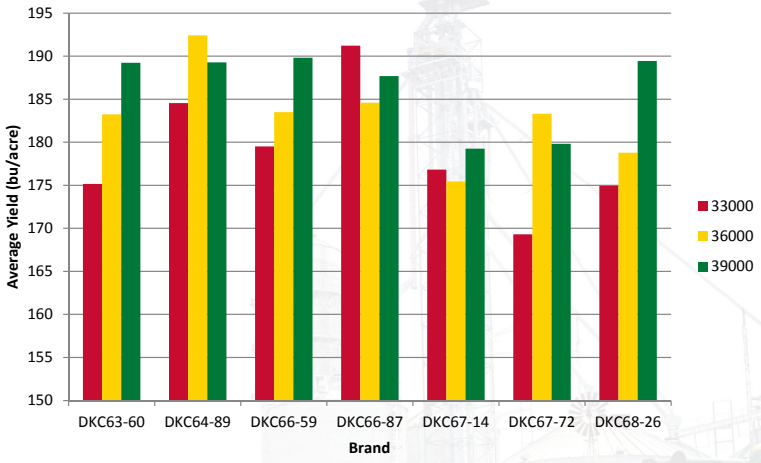


Figure 1. Average yield of seven corn products by planting population in deep sand planting site.

*DKC27-55 brand was planted in this site at 35,000 kernels/acre and yielded 74.8 bu/acre.

Results and Discussion

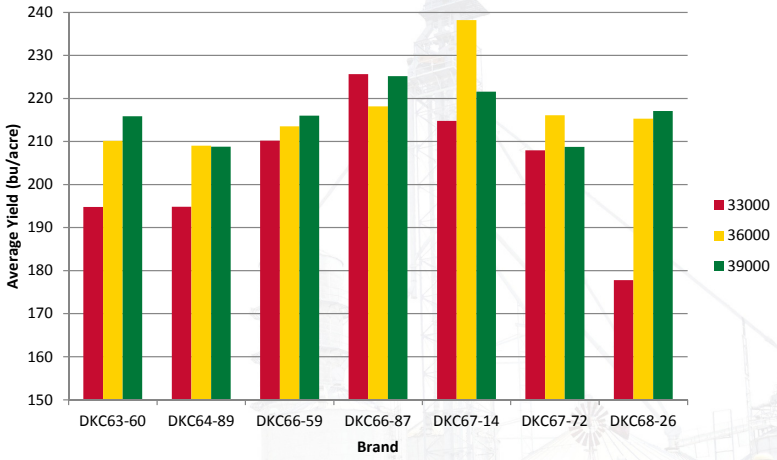


Figure 2. Average yield of seven corn products by planting population in mixed silty clay loam planting site.

Results and Discussion

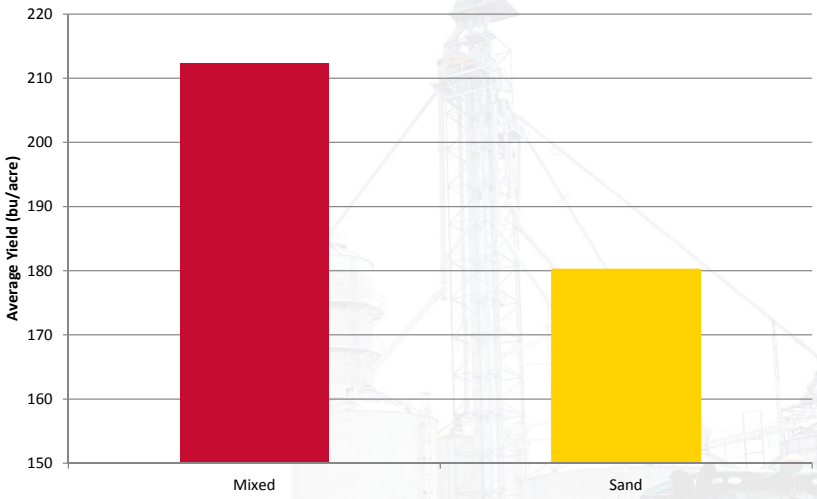


Figure 3. Average yield across corn products and planting populations by soil type.

Take Aways

- In previous years of this study, some products responded better to higher populations, into the 45,000 kernel/acre range.
- During 2015, most products responded favorably to planting populations of 36,000 kernels/acre, but not to higher planting populations.
- It is likely that environmental factors (mainly humidity) limited yield during 2015.

Take Aways

- When choosing a planting population, ear placement and the potential for harvest lodging should be carefully considered.
  - Lodging was not an issue in this trial and all corn products responded positively to increasing population. This would likely not occur in a year with lodging prior to harvest.
- Seek data-based local advice when choosing a planting population.

Take Aways

- DKC27-55 brand was included in the sand location due to interest in short-season corn in the South.
  - Planted at 35,000 seeds/acre and yielded 74.8 bu/acre
- This study demonstrated that, for the most part, it was not well adapted to this region.

Legal Statements

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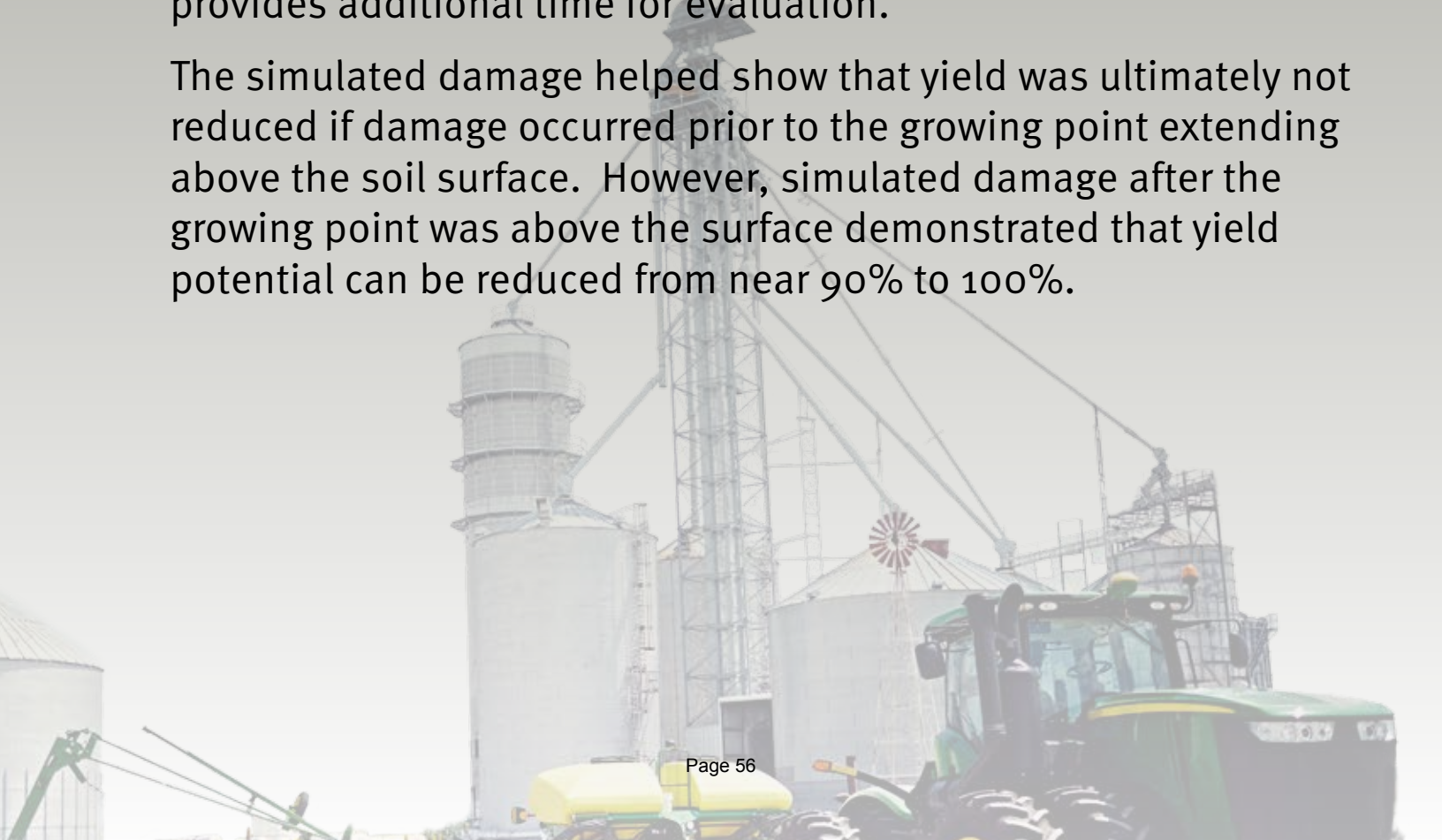
RESPONSE OF THREE CORN PRODUCTS TO EARLY SEASON DAMAGE

The Monsanto Learning Center near Scott, MS has conducted several simulated demonstrations over the years to help determine the ability of young corn plants to recover from hail and possible frost damage. The ability to recover helps determine if a damaged crop can be left or needs to be destroyed and replanted to have a near normal yield potential. Generally, it is recommended to wait 7 to 10 days before evaluating the plant's health after damage to see if the plant has healthy re-growth. The longer growing season in the southern states provides additional time for evaluation.

The simulated damage helped show that yield was ultimately not reduced if damage occurred prior to the growing point extending above the soil surface. However, simulated damage after the growing point was above the surface demonstrated that yield potential can be reduced from near 90% to 100%.



Background

Weather events in 2015 across the Mid South resulted in significant amounts of severely damaged early vegetative corn. The damage resulted in a desire to determine:

- How corn plants respond to damage in a southern environment?
- If damaged corn fields should be kept or destroyed and replanted?

Background

- Generally, if the growing point (Figure 1) is below the soil surface when damage occurs, young corn plants can recover from severe frost or hail damage. However, withered or blackened leaves may occur (Figure 2).
- Frost damage can occur at temperatures greater than 28° F, but air temperatures can become lethal when they fall below 28° F for more than a few hours.[1]

Figure 1. The Growing Point Contains Miniature Tassel and Potential Ears.

Figure 2. Frost Damage to an Early Vegetative Corn Plant in a Northern Location.

Results and Discussion

- Hail damage (Figure 3) is more common than frost damage in the Mid South. Though hail damaged fields can appear ugly, it is best to be patient and wait a few days to see if plants begin to have new growth.
- Hail damaged plants can be subject to rotting because of the injured tissue.
- Disease pathogens may use plant wounds as entry points.

Figure 3. Hail Damage to Corn Plant at a Northern Location

Study Guidelines

- A corn demonstration trial was conducted at the Monsanto Learning Center near Scott, MS to address questions being asked by Southern farmers:
  - How do corn plants respond to early-season vegetative damage that occurs at three different stages of crop growth?
  - Do early damaged fields have acceptable yield potential?

Background

- Three corn products were planted on April 23, 2015 at 38,000 seeds/acre:
  - DEKALB® DKC62-08 Brand (112 RM)
  - DEKALB® DKC66-87 Brand (116 RM)
  - DEKALB® DKC67-72 Brand (117 RM)
- Two replications and four rows of each product were planted.
- Three simulated crop damage treatments were performed:
  - 10 days before 6 collared leaves were visible
  - At 6 collared leaves (growing point emergence)
  - 10 days after 6 collared leaves were visible

Background

- Simulated plant damage was achieved by damaging or cutting plants off with a string trimmer.

Figure 4. Simulated Plant Damage Prior to 6 Collared Leaves.

Figure 5. Simulated Plant Damage 10 Days after 6 Collared Leaves.

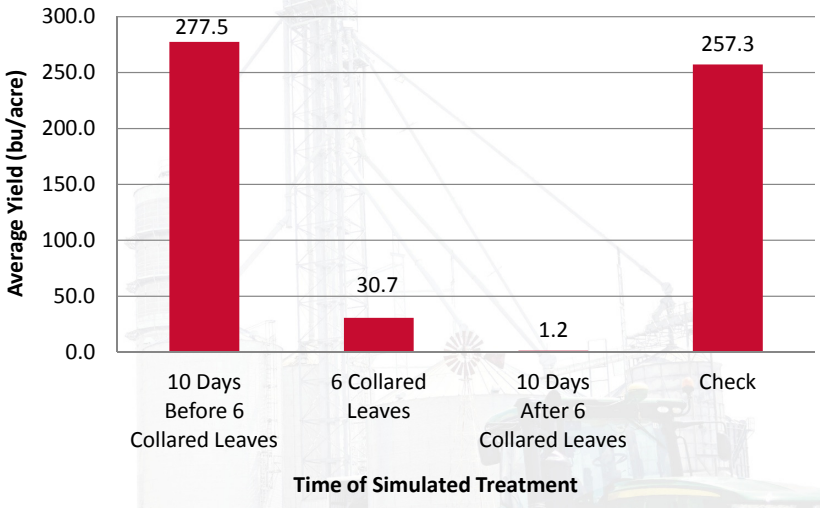
Results and Discussion

- Simulated damage to plants before the growing point emerges from the ground (6 collared leaves) appears to have little or no effect on corn yield. Results are similar to a 2010 Monsanto Learning Center Demonstration at Scott, MS.[2]
- Significant yield reduction occurred when simulated damage occurred at or after 6 collared leaves; most plants died.
- The latest simulated damage (10 days after 6 collared leaves) resulted in a yield of zero to near zero in several of the replications.

Results and Discussion

Average yield for the three products in the 10 days before 6 collared leaves treatment was higher than the average yield of the untreated checks and the other two treatments.

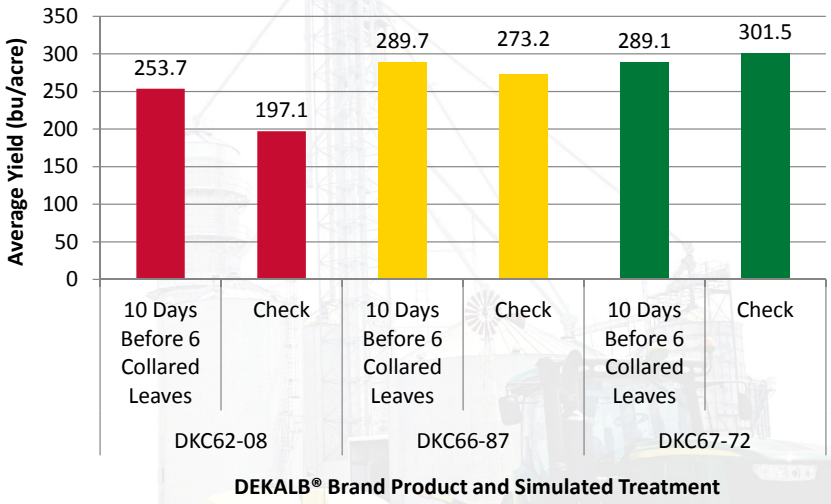
Figure 6. Average Yield Comparison of the Three Corn Products for Each Simulated Treatment.



Results and Discussion

The average yields of DEKALB® DKC62-08 Brand and DEKALB® DKC66-87 Brand were higher than their respective checks by 56.6 and 16.5 bu/acre respectively, while DEKALB® DKC67-72 Brand was 12.4 bu/acre less than its check.

Figure 7. Average Yield Comparison for Treatment and Check When Simulated Damage Occurred 10 Days Before 6 Collared Leaves.

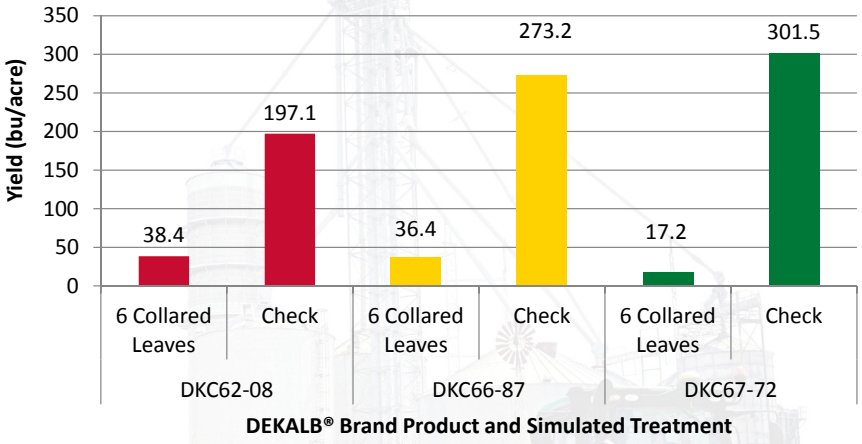


Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

The average yields of DEKALB® DKC62-08 Brand, DEKALB® DKC66-87 Brand, and DEKALB® DKC67-72 Brand were significantly lower than their respective untreated checks by 158.7, 236.8, and 284.3 bu/acre respectively.

Figure 8. Average Yield Comparison for Treatment and Check When Simulated Damage Occurred At 6 Collared Leaves.

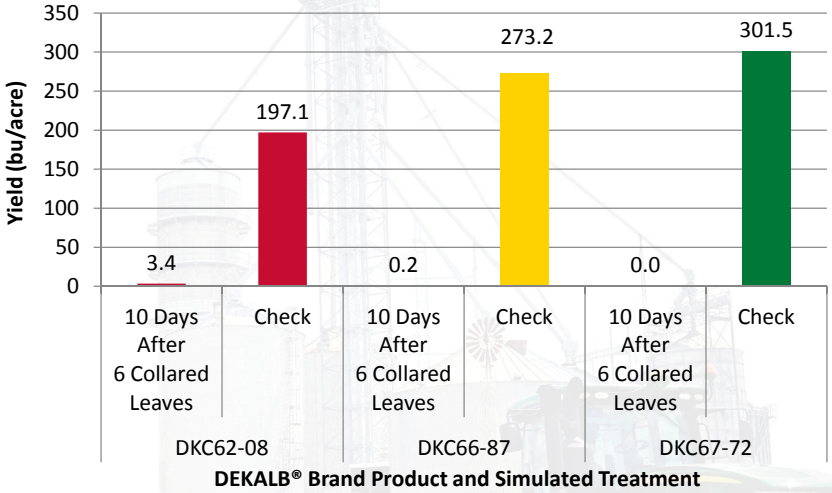


Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

The average yields of DEKALB® DKC62-08 Brand, DEKALB® DKC66-87 Brand, and DEKALB® DKC67-72 Brand were significantly lower than their respective checks by 193.7, 273.0, and 301.5 bu/acre respectively.

Figure 9. Average Yield Comparison for Treatment and Check When Simulated Damage Occurred 10 Days After 6 Collared Leaves.

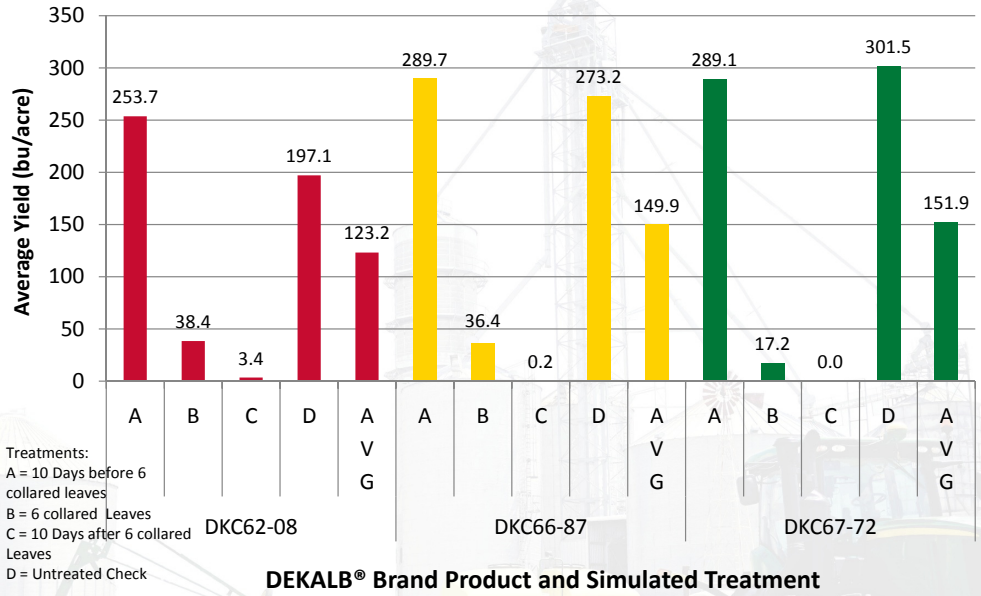


Results and Discussion

The significantly lower yields for the simulated damage at 6 collared leaves and 10 days after 6 collared leaves would indicate that the growing point in most or all of the plants was killed, resulting in plant death or the inability to produce an ear.

Results and Discussion

Figure 10. Average Yield of Each Product for Each Simulated Treatment



Treatments:
A = 10 Days before 6 collared leaves
B = 6 collared Leaves
C = 10 Days after 6 collared Leaves
D = Untreated Check

Response of Three Corn Products to Early Season Plant Damage

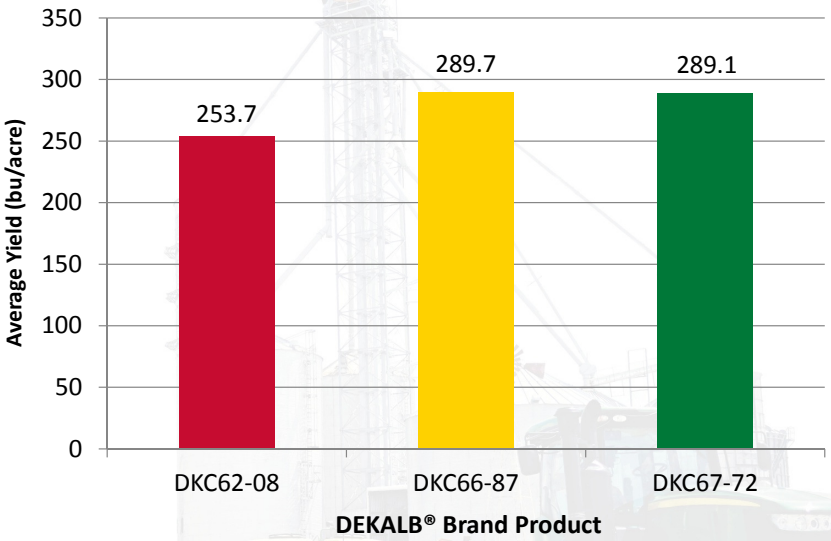
Results and Discussion

- Some corn products tend to yield more in response to the damage. Reason is not well understood, but may be related to shifts in timing of pollination.

Results and Discussion

DEKALB® DKC66-87 Brand was the highest yielding product with an average yield at 289.7 bu/acre followed by DEKALB Brand® DKC67-72 at 289.1 bu/acre and DEKALB® DKC62-08 Brand at 253.7 bu/acre.

Figure 11. Average Yield of Each Product When Simulated Damage Occurred Before 6 Collared Leaves.

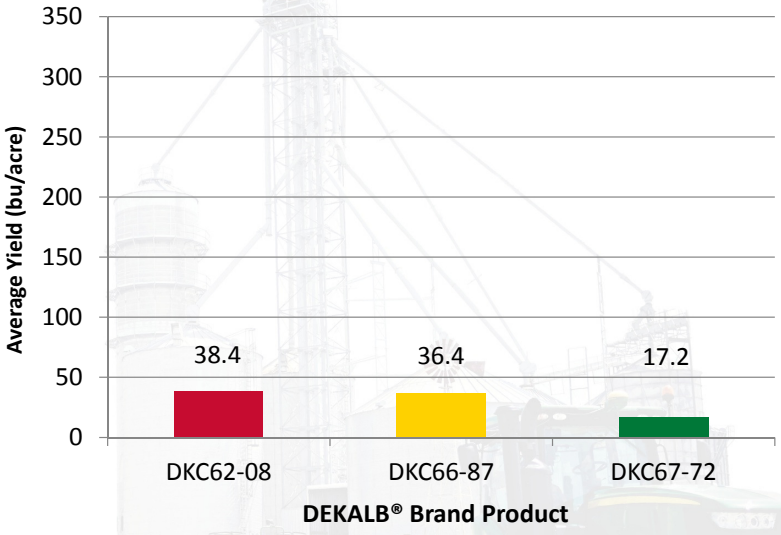


Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

DEKALB® DKC62-08 Brand was the highest yielding product with an average yield at 38.4 bu/acre followed by DEKALB® DKC66-87 Brand at 36.4 bu/acre and DEKALB® DKC67-72 Brand at 17.2 bu/acre.

Figure 12. Average Yield of Each Product When Simulated Damage Occurred At 6 Collared Leaves.

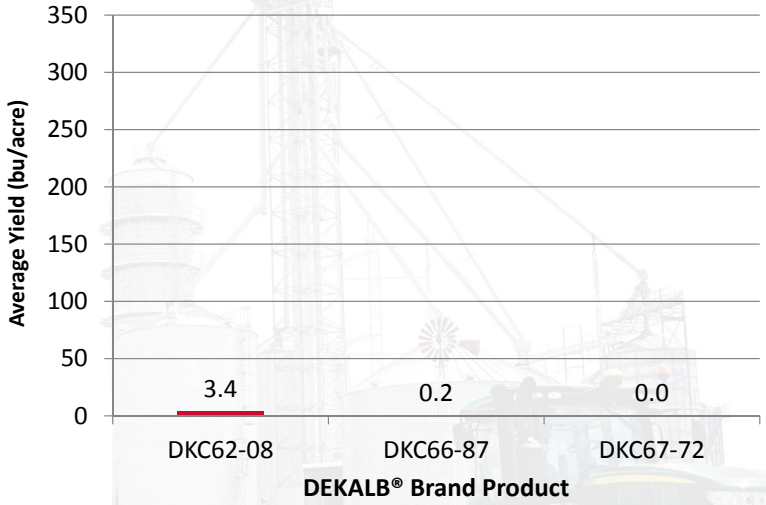


Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

DEKALB® DKC62-08 Brand was the highest yielding product with an average yield at 3.4 bu/acre followed by DEKALB® DKC66-87 Brand at 0.2 bu/acre and DEKALB® DKC67-72 Brand at 0.0 bu/acre.

Figure 13. Average Yield of Each Product When Simulated Damage Occurred 10 Days After 6 Collared Leaves.

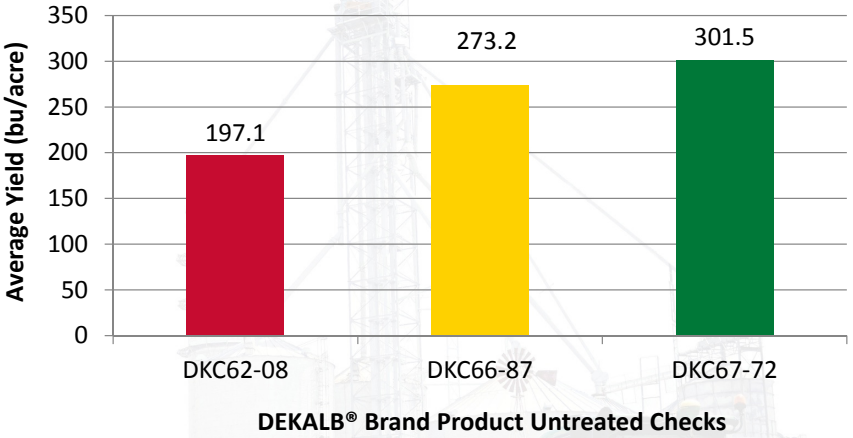


Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

The average check yield of DEKALB® DKC67-72 Brand (117 RM, fullest season product), was the highest of the three products. However, it showed the lowest yield of each product when subjected to simulated damage.

Figure 14. Average Yield of Each Product As An Untreated Check



Response of Three Corn Products to Early Season Plant Damage

Results and Discussion

Sources:

[1] Nielsen, R.L. and Christmas, E. 2002. Early season frost & low temperature damage to corn and soybean. Corny News Network Articles. Purdue University. https://www.agry.purdue.edu/ext/corn/news/articles.02/Frost_Freeze-0520.html

[2] Effect of frost and hail damage to early season corn. 2010 Demonstration Report. The Learning Center at Scott, Mississippi. Monsanto Company. http://www.monsanto.com/products/documents/learning-center-research/2010/summary%20slc%202010%20-%20%20effect%20of%20frost%20and%20hail%20damage%20to%20early%20season%20corn.pdf

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COTTON VARIETY RESPONSE TO DIFFERENT PGR APPLICATION REGIMES

The vegetative and reproductive growth of cotton can vary greatly depending on the variety. To control this growth, plant growth regulators (PGRs) can be used to help force a shift from vegetative to reproductive growth to establish acceptable yield potential. Cotton varieties all respond differently to PGR treatments; therefore, it is important to understand the response of new cotton varieties to PGR application rates and timing.

This demonstration was designed to show the response of new cotton varieties to different techniques of applying PGRs. To simulate differential PGR application techniques a passive regime, an aggressive regime, and an untreated check was set up and managed for each variety in the demonstration. The passive regime received a PGR application (mepiquat chloride, 4.2% formulation) of 8 ounces/acre on July 20th at 15 nodes and 10 ounces/acre on August 3rd at 19 nodes for a total in-season application of 18 ounces/acre. The aggressive regime received a PGR application of 12 ounces/acre on July 2nd at 8 nodes, 16 ounces/acre on July 20th at 15 nodes, and 20 ounces/acre on August 3rd at 19 nodesfor a total in-season application of 48 ounces/acre. An untreated check was also established to help indicate the level of growth control by the two different regimes.

COTTON VARIETY RESPONSE TO DIFFERENT PGR APPLICATION REGIMES

The demonstration was set up to offer a ‘worst case scenario’ for managing cotton variety growth by planting late (on June 6th), planting at a high population (52,000 seeds/acre), and planting in soil with strong soil fertility.

When plant growth is managed properly late-planted cotton often has excellent yield potential. Many of the cotton varieties yielded over 1,500 lbs lint/acre. In this demonstration a wide response in yield was observed across the new cotton varieties even when no PGR was used. Several of the varieties required PGR use in one regime or the other to maintain acceptable yield levels.

In this demonstration cotton plants had excellent fruit retention which helped to manage vegetative growth; this also caused the plants to respond even better than expected to the passive PGR application. Results from this demonstration also help to make the case that especially in late planting situation very aggressive insect control in combination with judicious PGR use can help in establishing acceptable yield potential.

Background

- Cotton varieties all respond differently to PGR treatments.
  - It is important to understand the response of new cotton varieties to different PGR application techniques (timing and rates).
  - PGRs are used to help force a shift from vegetative to reproductive growth to establish acceptable yield potential.
- Questions asked:
  - Which varieties require more aggressive growth control?
  - Which varieties require little to no growth control?
  - How do different PGR treatments affect plant height of different varieties?
  - How do new varieties respond when planted late in the environment at the Monsanto Learning Center at Scott, MS?

Study Guidelines

- Treatment List:
  - Untreated check (UTC) – No growth control
  - Aggressive regime –
    Season total of 48 ounces/acre of mepiquat chloride (4.2% formulation).
    - 8 nodes – July 2 (12 ounces/acre)
    - 15 nodes – July 20 (16 ounces/acre)
    - 19 nodes – August 3 (20 ounces/acre)
  - Passive regime – no first application, set up for ½ rates of the aggressive regime
    Season total of 18 ounces/acre of mepiquat chloride (4.2% formulation).
    - 8 nodes – July 2 (none)
    - 15 nodes – July 20 (8 ounces/acre)
    - 19 nodes – August 3 (10 ounces/acre)

Regime	Date	Growth Stage	PGR Rate (ounces/acre)
Aggressive	July 2	8 nodes	12
	July 20	15 nodes	16
	August 3	19 nodes	20
Passive	July 2	8 nodes	0
	July 20	15 nodes	8
	August 3	19 nodes	10

Study Guidelines

- This demonstration was set up to offer the worst case scenario for managing cotton varieties in any system.
- The following parameters were used:
  - Late planting date
    - Planted on June 6th, 2015. One month after typical cotton planting.
    - Late planting causes rapid growth via relatively high heat accumulation and typically requires aggressive growth management.
  - High population
    - 52,000 seeds/acre, ≈ 20% higher than normal.
    - Increases interplant competition and makes growth control even more difficult.
  - Strong soil/fertility
    - Serves to make growth control more difficult.
- Harvest date: October 20, 2015

Results and Discussion

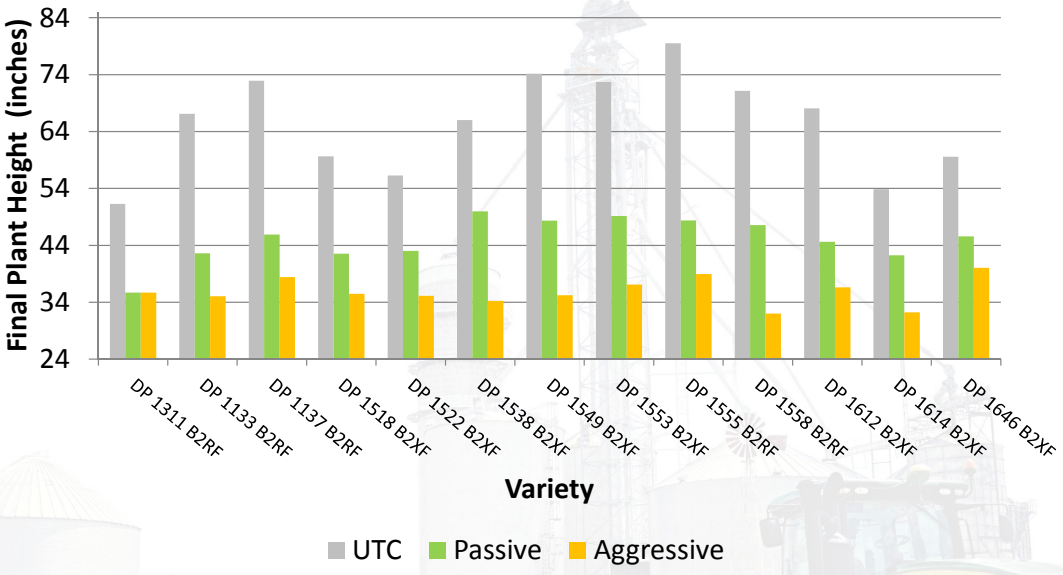


Figure 1. Height of cotton plants by variety and PGR regime.

Results and Discussion

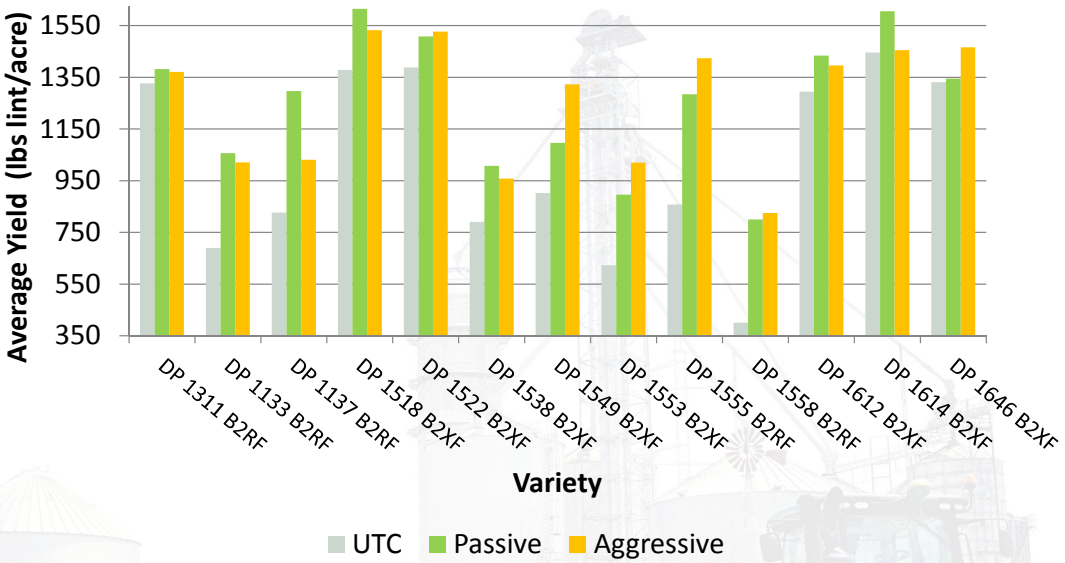


Figure 2. Cotton yield (lbs lint/acre) by variety and PGR regime.

Results and Discussion

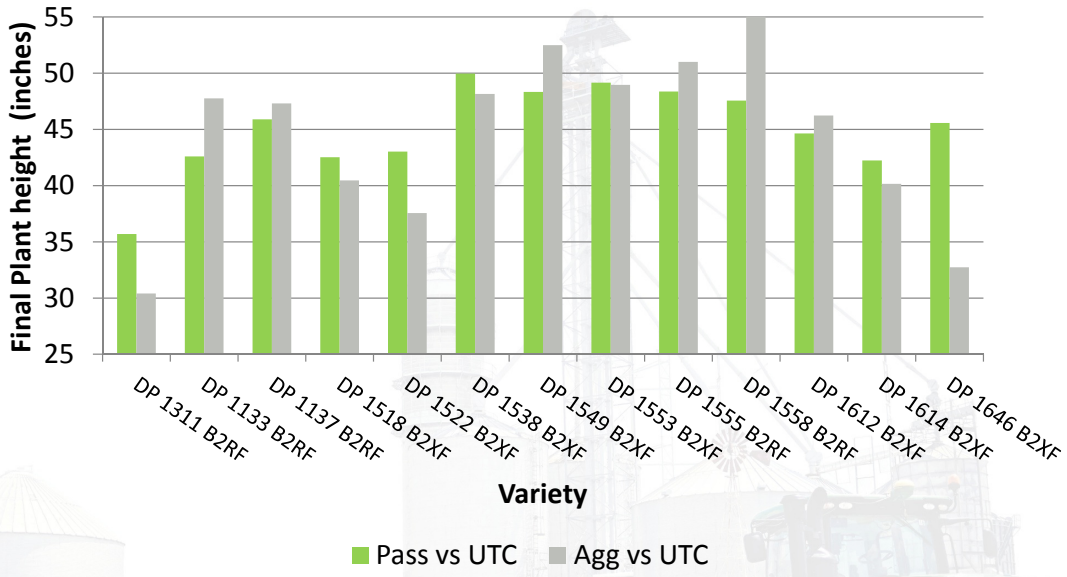


Figure 3. Cotton plant height of PGR regime when compared to untreated check.

Results and Discussion

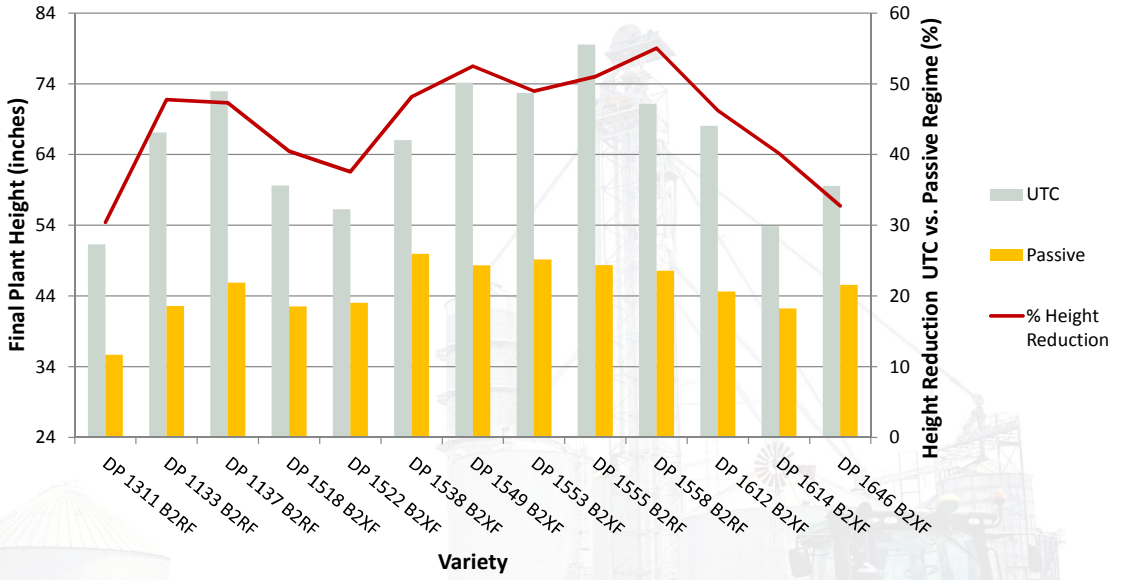


Figure 4. Final plant height of cotton by variety comparing untreated check and aggressive PGR regime.

Results and Discussion

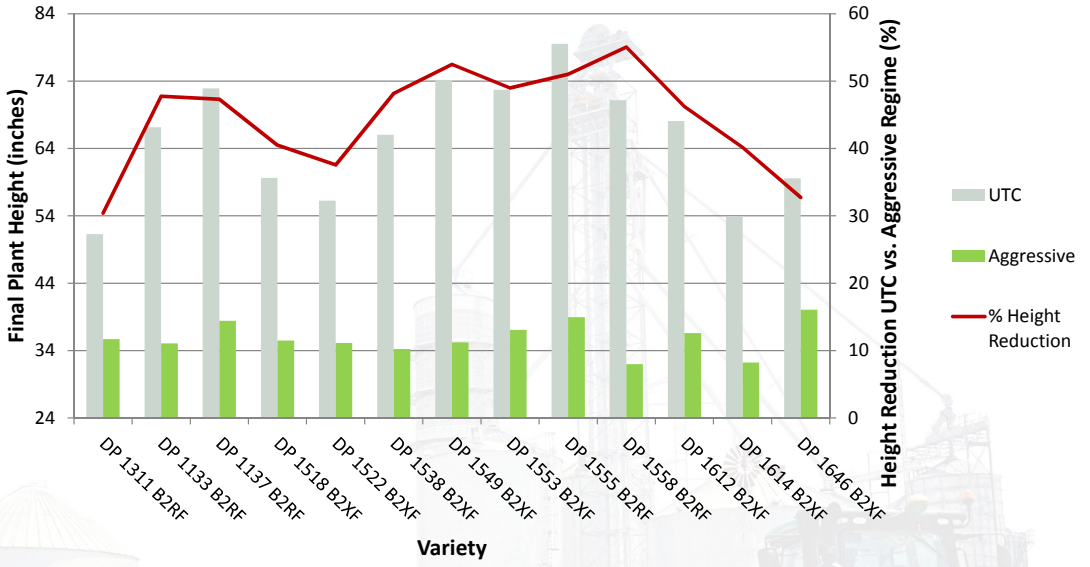
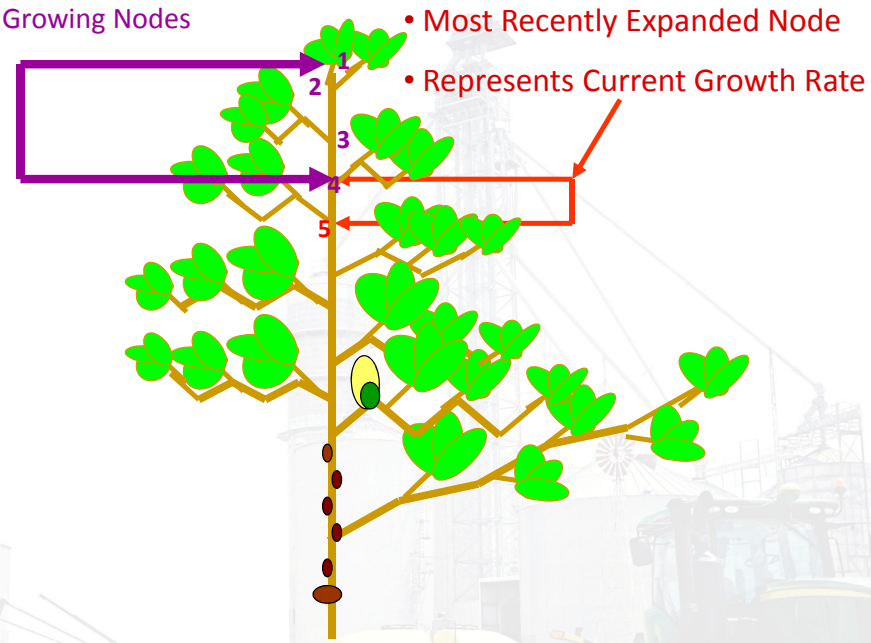


Figure 5. Final plant height of cotton by variety comparing untreated check and passive PGR regime.

Results and Discussion



Results and Discussion

PGR Monitoring and Management

TL Size of a US Quarter count as 1 to node 4

Node between 4 and 5 from the top – "The one that bends"

Results and Discussion

Tools Estimating PGR Application Rates and Timing

- Understand the plant growth process
- Mepiquat chloride is:
  - Not degraded by the plant
  - Active at ≈ 10ppm dry wt.
- Response to mepiquat chloride over time
  - Rate
  - Timing
  - Plant size
  - Previous applications

Cotton Variety Response to Different PGR Application Regimes

Take Aways

- When managed properly, late-planted cotton often has excellent yield potential.
  - The highest yielding variety was DP 1518 B2XF under the passive PGR regime at 1600 lbs lint/acre.
  - Many cotton varieties yielded over 1500 lbs lint/acre when managed correctly.
- A wide response in yield was observed across the new cotton varieties.
  - Many of the cotton varieties yielded well even when no PGR was used.
  - Several of the varieties required PGR use in one regime or the other to maintain acceptable yield levels (i.e. DP 1555 B2RF and DP 1549 B2XF).

Take Aways

- Several of the new Deltapine® cotton varieties show tremendous yield potential.
- Remember, height reduction is not yield.
  - Height is often the best measure of variety responses to PGR applications.
  - The final plant height in the UTC plots often gives an indication of the innate growth potential across a range of varieties.
- Excellent fruit retention helped to manage growth during this demonstration.
  - Varieties responded even better than expected to the passive treatments.
  - This also helps to make the case that particularly in late plantings, very aggressive insect control (Lygus/fleahopper) in combination with judicious PGR use can help establish acceptable yield potential.

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