2011

Demonstration Reports

DEKALB ASGROW DELTAPINE

THE LEARNING CENTER

at Scott, Mississippi

Dear Reader,

First - thank you for your time both in reading this booklet and in visiting Scott.

This book contains results from the demonstration plots that were in the field at Scott during 2011. Included in this data are results from corn, cotton, soybean, and new technology demonstrations. Technology is changing almost every facet of agriculture and our business is no exception. Examples of the exciting innovations contained in this book include yield/agronomic results from novel corn hybrids containing new technology, trials with new Genuity® Roundup Ready 2 Yield® soybeans, and multiple agronomic evaluations of the latest Deltapine® cotton varieties.

We here at the Scott Learning Center hope you find this information useful in your farming operation. Please remember that we sincerely desire that all of agriculture be successful. This success can only be built on a foundation of sound data of which, this book represents only a small part.

If you would like more details about the information contained here please feel free to contact me directly or your local Monsanto representative. If you see issues that should be included in the Learning Center demonstration plots or have opinions (good or bad) of what we have been doing in our work, feel free to drop us an email or give us a call. Also, please remember that everyone has an open invitation to visit Scott during the 2012 season.

Visit us on the web at:

http://www.monsanto.com/products/Pages/learning-centers.aspx

Hope to see you this summer,

Jay Mahaffey, Manager
Monsanto Learning Center – Scott, Mississippi

If you would like to take a tour of the Learning Center, please contact your local Monsanto Representative or you can contact us directly:

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Table of Contents

2011 Demonstration Reports

Weather Impacts on Crops and People

Environmental conditions at the Scott Learning Center throughout the 2011 growing season allowed for the collection of valuable data among the various cotton, corn, and soybean demonstrations. The growing season at Scott Learning Center began on March 10th with planting wrapping up on June 12th. The long planting window allowed for many different environments from normal plantings to later plantings behind wheat.

2011 Temperatures

In 2011, a few periods of record heat affected crop production in Mississippi. The Scott Learning Center had extended periods with heat indexes over 115°F and one period with reported heat indexes of over 125°F (Figure 1). Extreme heat can severely impact plants, as well as individuals working on the farm. When heat advisories are issued anyone working outdoors should take extra precaution. Strenuous outdoor activities should be conducted in the early morning or evening, workers should wear light-weight materials, drink plenty of water, and take frequent breaks in shade or air conditioning. Heat and sun exposure provide significant risk in our business and should be carefully managed.

Aside from the few outlier periods, temperatures recorded for the 2011 growing season were within the normal range. Only six days reached actual daytime high temperature above 100°F and only two nights recorded lows at or above 80°F (Figure 2). Moderate daytime and nighttime temperatures reduce crop stress and allow for more dry matter accumulation.

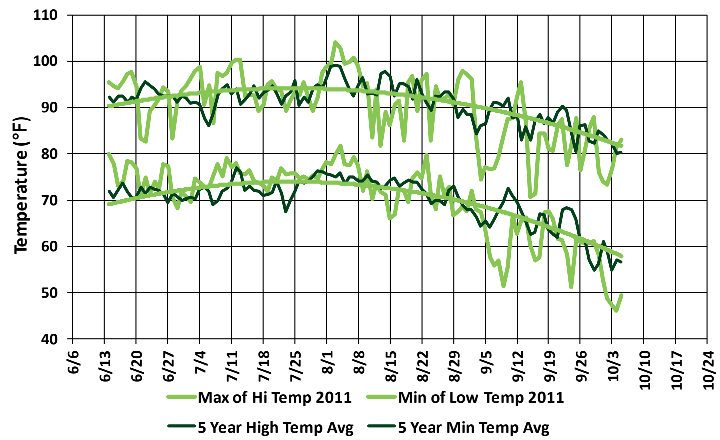

Figure 2. Minimum and maximum temperature for Scott, MS from June 7, 2011 to October 4, 2011 and five year average.

2011 Rainfall

During the 2011 growing season, the Scott Learning Center received over 12 inches of rainfall from several rain events spread out from mid-June to late-September. The timing of rainfall events was very useful to various crops; however, there were several multi-week periods with little to no rainfall. The absence of rainfall during these stretches created difficulties with the activation of residual herbicides, the application of plant growth regulators(PGR), and available crop moisture.

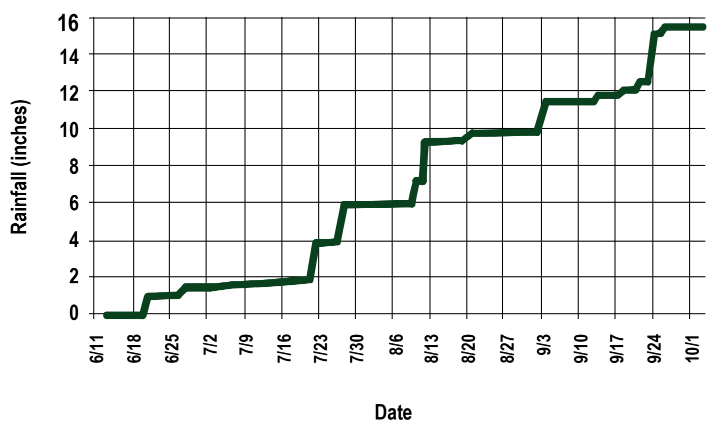

Figure 3. Accumulated rainfall for Scott, MS from June 11, 2011 to October 1, 2011.

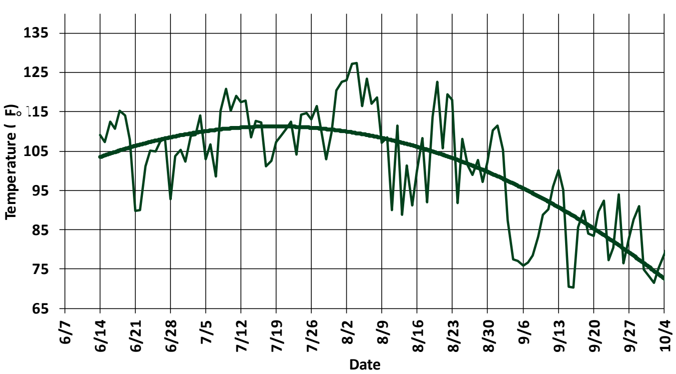

Figure 1. Heat index for Scott, MS from June 7, 2011 to October 4, 2011.

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Weather Impacts on Crops and People

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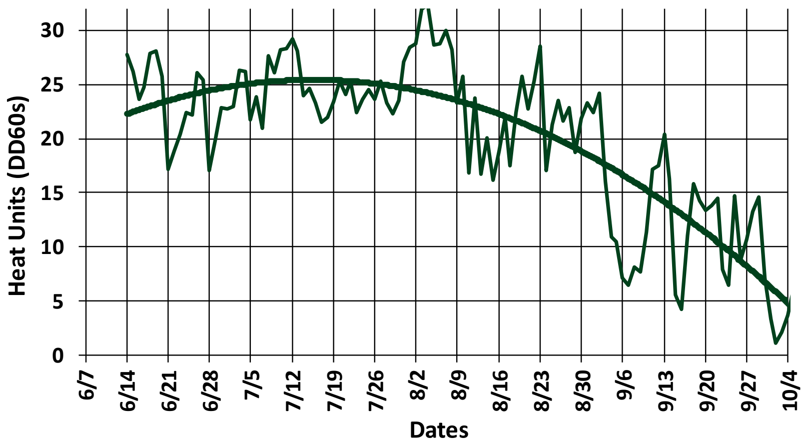

Figure 4. Heat unit accumulation per day (DD60s) for Scott, MS from June 7, 2011 to October 4, 2011.

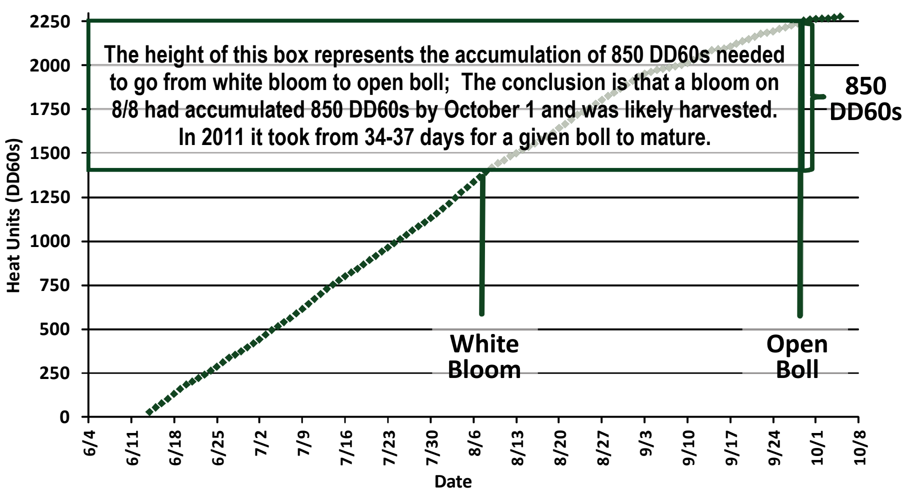

Figure 5. Heat unit accumulation (DD60s) for Scott, MS from June 4, 2011 to October 8, 2011 with representation of the boll maturity date for a white bloom on August 8th.

* The heat unit accumulation between white bloom and mature boll is 850 DD60s from August 8, 2011 to October 1, 2011.

2011 Heat Unit Accumulation (DD60s)

Heat unit accumulation varied throughout the 2011 growing season. The accumulated heat units per day ranged from around 10 DD60s late in the season to 30 DD60s during peak season (Figure 4). Figure 5 shows the heat unit accumulation throughout the growing season. The figure illustrates when white bloom and open boll stages occurred. A cotton boll needs approximately 850 DD60s to mature from white bloom to open boll. According to the accumulated heat units for the 2011 growing season, a square which bloomed on August 8th would have received 850 heat units by October 1st and would have likely been harvestable if protected from insects. In 2011, it took 34 to 37 days for a cotton boll to accumulate 850 DD60s. This data shows that in Scott, MS, enough heat units may be available in a given year to produce a later crop.

Summary Comments

The 2011 growing season at Scott Learning Center provided adequate environmental conditions to produce valuable data for many of the demonstrations. While some extreme heat indexes were recorded in early July and August, temperatures remained fairly moderate for the region. Rainfall events for Scott, MS were spread out, but week-long stretches in between rain caused some production issues. Heat unit accumulation for 2011 allowed time for late-planted crops to mature.

Sources:

Weatherplot.com. 2011. Meridian Environmental Technologies Inc. (retrieved 10/20/11).

Corn Response to Population, Row Configuration, and Soil Type

In response to grower requests, modern and/or recently released corn brands were planted to 38-inch twin rows (TR) or 30-inch single rows (SR), at three populations, and evaluated for yield on a sandy loam soil at the Scott Learning Center. Additionally, the same corn brands and populations were evaluated in 30-inch SR on a silty clay soil. These evaluations can be considered when determining planting population and row spacing options that can help maximize yield potential and profitability, while minimizing the risk of lodging and the costs associated with lodging and harvest loss.

Study Guidelines

Testing was conducted at the Monsanto Learning Center at Scott, Mississippi in 2011 to evaluate the effects and interaction of plant population, row spacing/row configuration, and corn brand on yield potential. Demonstrations were conducted in 2 locations, one with a silty clay soil and one with a sandy loam soil. Seven brands ranging from 111 to 118 day relative maturity were evaluated. Populations were 33,000; 36,000; and 39,000 plants per acre (ppa). Corn plots were planted using either a 38-inch TR or 30-inch SR configuration. At the location on silty clay, only 30-inch SR were established.

Results–Sandy Loam Location

Effect of Row Spacing/Configuration and Population.

Across all corn brands, the 38-inch rows yielded similarly regardless of population (Figure 1). The 38-inch TR yielded 196 bu/acre at 33,000 ppa and 193 bu/acre at 36,000 and 39,000 ppa, for an overall average of 194 bu/acre. Averaged across corn brands, the 30-inch SR responded differently to populations. In 30-inch SR, 36,000 ppa yielded 9 bu/acre more than at 33,000 ppa and 11 bu/acre more than at 39,000 ppa.

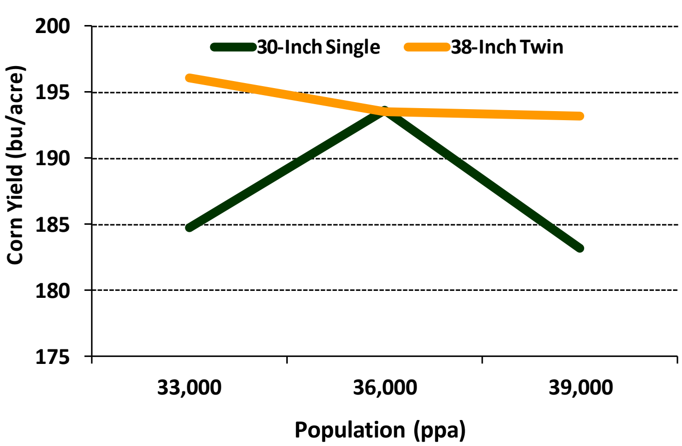

Figure 1. Effect of row spacing/configuration and population on corn yield across 7 brands in sandy loam soils.

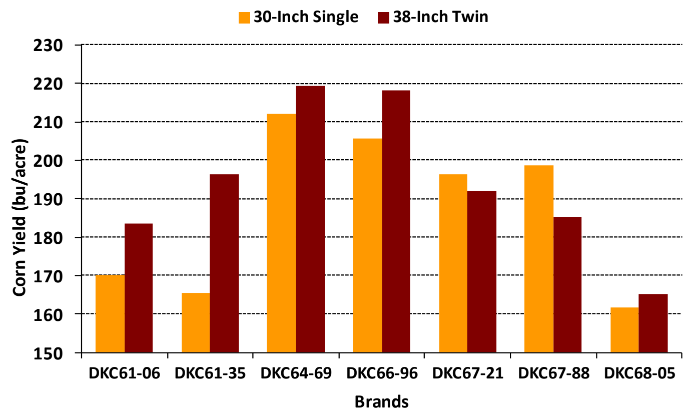

Figure 2. Effect of row spacing/configuration and corn brand on corn yield across 3 populations in sandy loam soils.

Effect of Row Spacing/Configuration and Corn Brand.

Most brands had greater yields in 38-inch TR compared to 30-inch SR (Figure 2). The magnitude of the response varied by brand.

Effect of Population and Corn Brand.

Yield response to different populations varied by corn brand (Figure 3). DKC67-21 and DKC68-05 brands decreased in yield as the populations increased. DKC66-96 brand showed very slight positive response to increased populations. DKC61-06, DKC61-35, DKC64-69, and DKC67-88 brands had maximum yield response at 36,000 ppa.

Effect of Population and Row Spacing/Configuration on Corn Brand Response.

Tested brands demonstrated a variety of responses to row spacing/configuration and population (Figure 4). The choice of brand had the greatest effect on yield potential, which emphasizes the importance of understanding how various brands perform in a local environment. The earlier brands (DKC61-06, DKC61-35, DKC64-69, DKC66-96) yielded the most and had a more positive response to population increases in 38-inch TR compared to later brands (DKC67-21, DKC67-88, DKC68-05) that tended to perform

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Corn Response to Population, Row Configuration, and Soil Type

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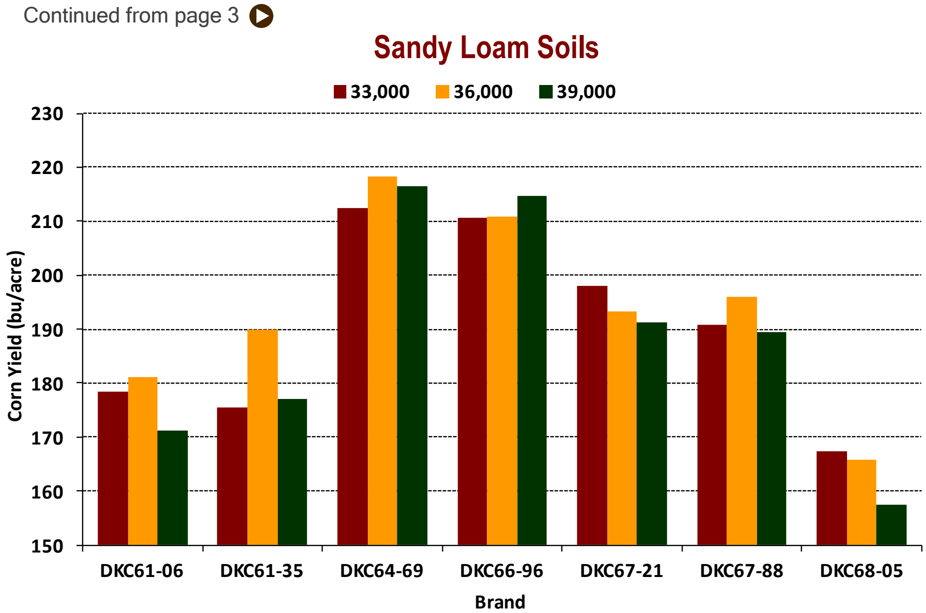

Figure 3. Effect of population and brand on corn yield across 30-inch single and 38-inch twin rows in sandy loam soils.

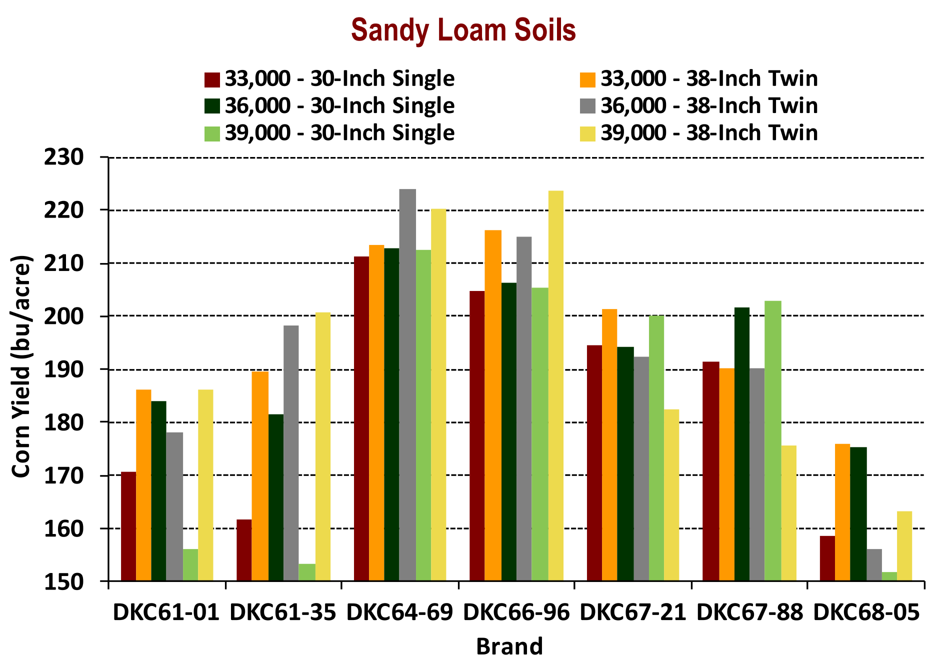

Figure 4. Effect of population and row spacing/configuration on corn brand yield performance in sandy loam soils.

better in 30-inch SR and generally had a negative yield response to higher populations in 38-inch TR.

Results–Comparison of the Sandy Loam Vs. Silty Clay Locations

The silty clay location yielded more and had a more positive yield response to higher populations than the 30-inch SR treatments at the sandy loam (Figure 5).

Brands differed in their response to soil type and population (Figure 6). Soil type had a large effect on the yield performance of DKC68-05 brand, which clearly performed better if placed on silty clay soils. Soil type did not have a large effect on the response of DKC64-69 or DKC67-88 brands to population, although DKC64-69 brand performed better on sandy loam soils, while DKC67-88 brand performed better on silty clay soils. Several other differences and similarities could be identified, which is an illustration of the importance of understanding how each brand reacts in different environments and soil types, at different populations.

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Corn Response to Population, Row Configuration, and Soil Type

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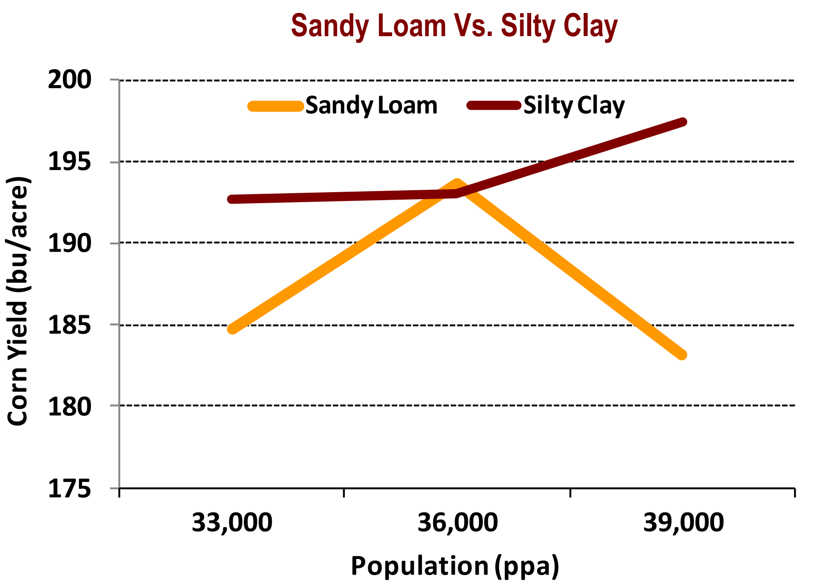

Figure 5. Effect of population on corn yield across 7 corn brands in 30-inch single rows in different soil types.

Summary Comments

Corn brand adaptation to the area was critical to optimizing yield potential. Both row spacings/ configurations provided good yield potential, with the 38-inch TR doing slightly better in most scenarios. Most often, 36,000 ppa was the optimal population. However, corn brands differed in their response to soil type, population, and row spacing/ configuration.

Overall, these demonstrations illustrate the importance of selecting brands that demonstrate consistent performance in an area. After selection, understanding how the individual brands perform on different soil types, respond to different populations, row spacings and configurations can help maximize yield potential.

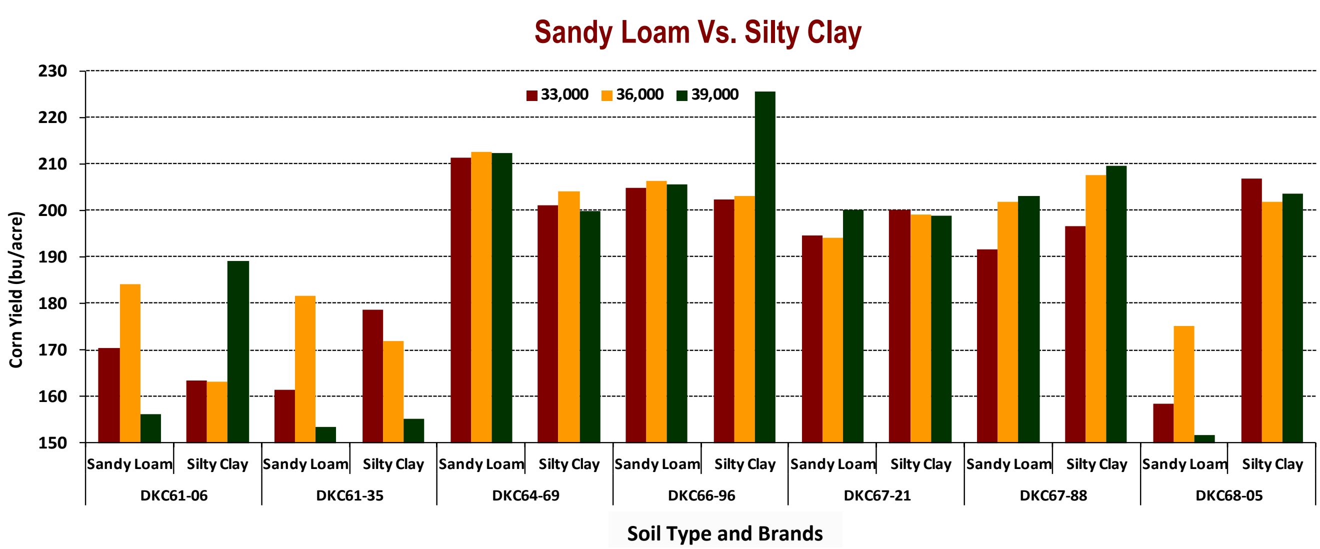

Figure 6. Effect of soil type and population on corn brand yield response in 30-inch single rows.

The information discussed in this report is from a single site, non-replicated, one-year 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.

Evaluation of New Corn Brands x Population

The responses of modern and/or recently released corn brands when planted at low, medium, and high populations were evaluated at the Scott Learning Center. Evaluations included yield, ear height, ear weight, and ear "momentum". These evaluations should be considered when selecting a planting population that will help maximize yield potential and profitability, while minimizing the risk of lodging and the costs associated with lodging and harvest loss.

Background

Traditionally, corn adapted for the southern United States has been tall with high ear placement. Additionally, corn fields in the south are at risk for weather-related damage, such as hurricanes. Damage from insects common in the south such as southwestern corn borer (SWCB), sugarcane borer (SCB), and European corn borer (ECB), can weaken the stalk and increase the chance for lodging. Considering the variables just mentioned, optimal yield potential would often have to be sacrificed for standability.

Corn breeders select for germplasm that can produce respectable yield potential in stressful environments. This can often be observed when comparing modern and older germplasm in stressful situations, such as increasing populations. Modern corn tends to maintain ear size at higher populations, compared to older corn that are more likely to have nubbin ears or barren stalks under stress. Even with the advancements in breeding, differences are still present among the modern corn brands in terms of how they respond to higher populations relative to yield potential and standability. Demonstration plots were established at Scott Learning Center to evaluate these differences.

Plot Establishment

Ten corn brands were evaluated in plots that were 150 feet long by 4 rows wide, and replicated twice. All four rows of each plot, planted on 38-inch beds, were taken to yield. Nitrogen was applied at 240 pounds/acre. Agronomic practices were standard for the area. Populations were 31,000; 35,000; and 39,000 plants/acre (ppa). Stand loss was minimal, so harvest populations can be used synonymously with planting populations. Planting date was April 1, 2011 and harvest date was August 15, 2011.

Yield (bu/acre) was taken for each plot and corrected to standard moisture. Plant characteristics were evaluated on 10 plants per plot. Characteristics evaluated include ear height (inches from the soil surface), ear weight (grams), and ear "momentum". The characteristic of ear "momentum" is calculated by multiplying ear height by ear weight.

While there are several factors that can contribute to lodging, ear "momentum" can be used as an indicator for lodging potential as it relates to ear height and weight. A higher ear "momentum" would tend to indicate potential for more lodging.

Results and Conclusions

Effect of Population on Yield.

Averaged across corn brands, higher populations resulted in higher yields (Figure 1). There was an 19 bushel/acre increase for 35,000 vs. 31,000 ppa. There was a 6 bushel/acre yield increase for 39,000 vs. 35,000 ppa.

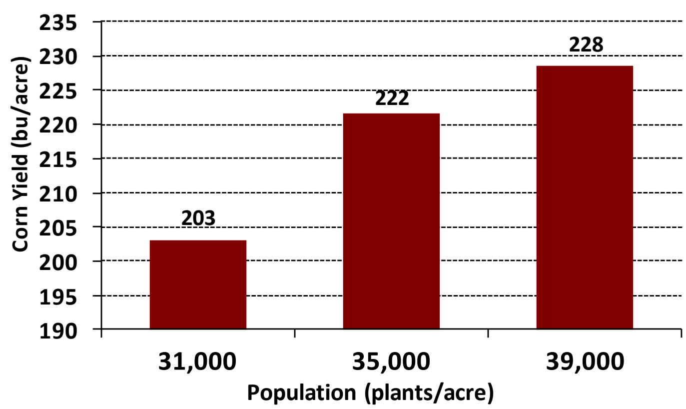

Figure 1. Yield response to higher populations averaged across 2 replications of 10 corn brands.

Effect of Population on Yield by Brand.

Not all corn brands have the same yield response to different populations (Figure 2). For each increase in population, nine of the ten corn brands had a positive yield response, albeit to different degrees. DKC64-69 brand produced similar yields at all three populations.

Summary continued on next page

Evaluation of New Corn Brands x Population

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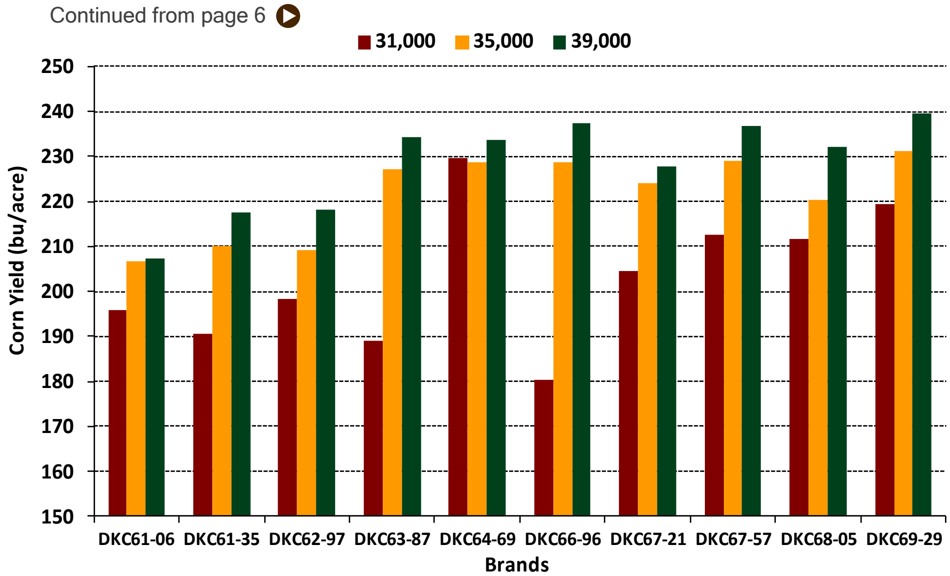

Figure 2. Yield response of corn brands to different populations.

Effect of Population and Corn Brand on Ear Height, Ear Weight, and Ear "Momentum".

Ear heights were influenced more by corn brand than population (Figures 3 and 4). The average effect of population on the ear height of a corn brand was 2.4 inches (5.9% of the average ear height). However, the average difference in ear heights across corn brands at each of the populations was 10.9 inches (26.7% of the average ear height). The degree to which the ear height of a corn brand changed due to population, varied by corn brand.

Ear weights were influenced more by corn brand than population; however, the effect of population on ear weight was greater than the effect of population on ear height (Figures 3 and 4). The average effect of population on the ear weight of a corn brand was 25.4 grams (10.6% of the average ear weight). However, the average difference in ear weights across corn brands at each of the populations was 86.8 grams (36.3% of the average ear weight). The degree to which the ear weight of a corn brand changed due to population varied by corn brand.

The measure of ear "momentum" is a means to gauge two aspects of the susceptibility of a corn brand for stalk lodging, by multiplying ear height and ear weight. The lowest population had the highest ear "momentum", due to having larger ears on average with similar ear height. The higher risk of lodging that is associated with a higher ear "momentum", is often offset by reduced competition for moisture and nutrients that can be seen at lower populations, and/or a corn brand's ability to cannibalize, and/or a corn brand's rind strength.

Comments and Examples

Corn brands differ in their response to higher populations in terms of their potential for increased yields, and also increased risk for lodging. It is important to understand how corn brands respond to different populations prior to deciding what planting population to use. Here are some examples of different responses seen in this demonstration:

1. DKC64-69 brand did not show a positive yield response to higher populations, and should not require the extra investment in seed. This enables plantings with optimal yield potential at lower planting rates, which can help preserve stalk strength, as well as help minimize lodging risk and maintain high yields for the grower at minimum investment.
2. DKC66-96 brand provided a large yield response to higher populations, and has lower ear heights, weights, and ear "momentum" that help reduce the risk of lodging, which makes it feasible to attempt planting the higher populations that can reward with more yield without greatly increasing the risk of lodging associated harvest losses.
3. DKC67-21 brand had a positive yield response to higher populations; however, lodging risk associated the high ear placement and ear weight of the corn brand need to be seriously considered prior to increasing populations.

Summary

When selecting corn brands and their respective planting populations, consider the following factors:

- What is the general yield potential for the corn brand in the environment that it will be placed?
- Is the corn brand likely to have a large enough yield increase at higher populations to cover the increased cost of seed?
- Is the risk for increased lodging at higher populations (as it relates to ear height and weight) worth the benefit of the potential increase in yields at higher populations?

Summary continued on next page

Evaluation of New Corn Brands x Population

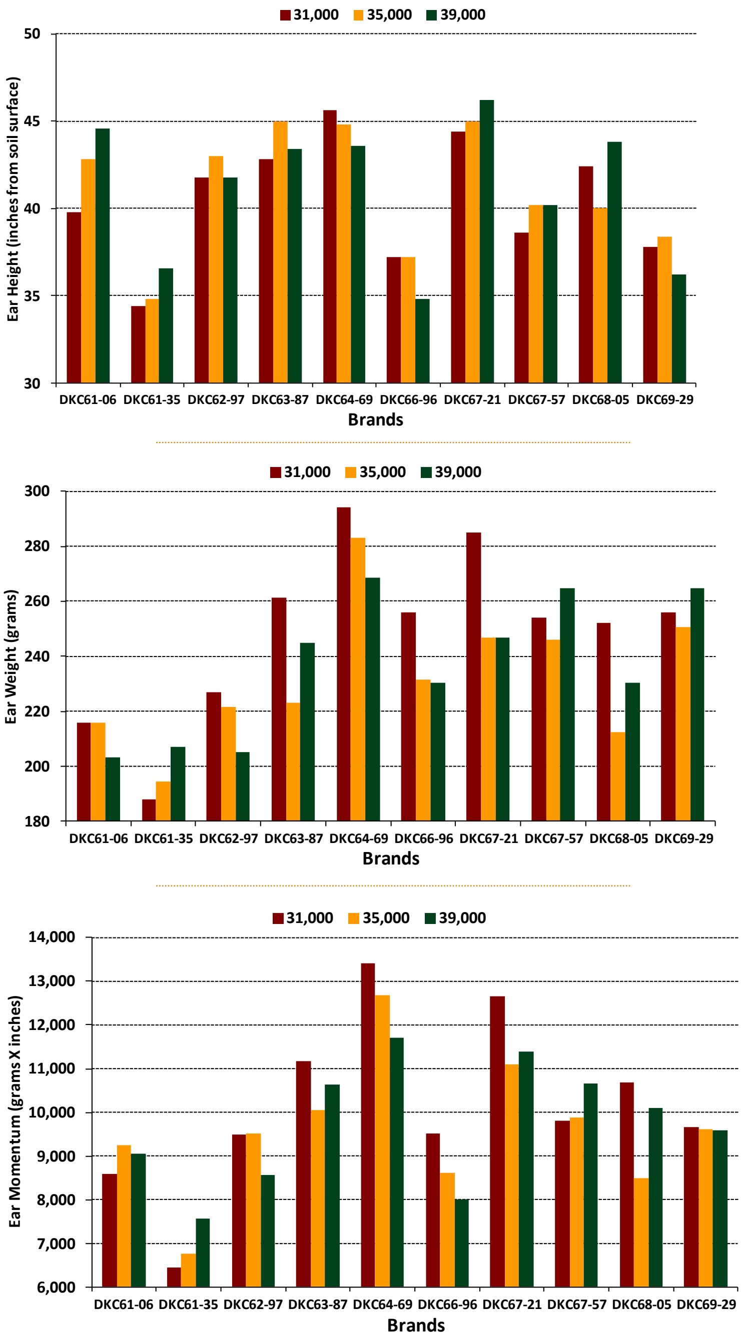

Figure 3. Differences in corn brand characteristics at various populations.

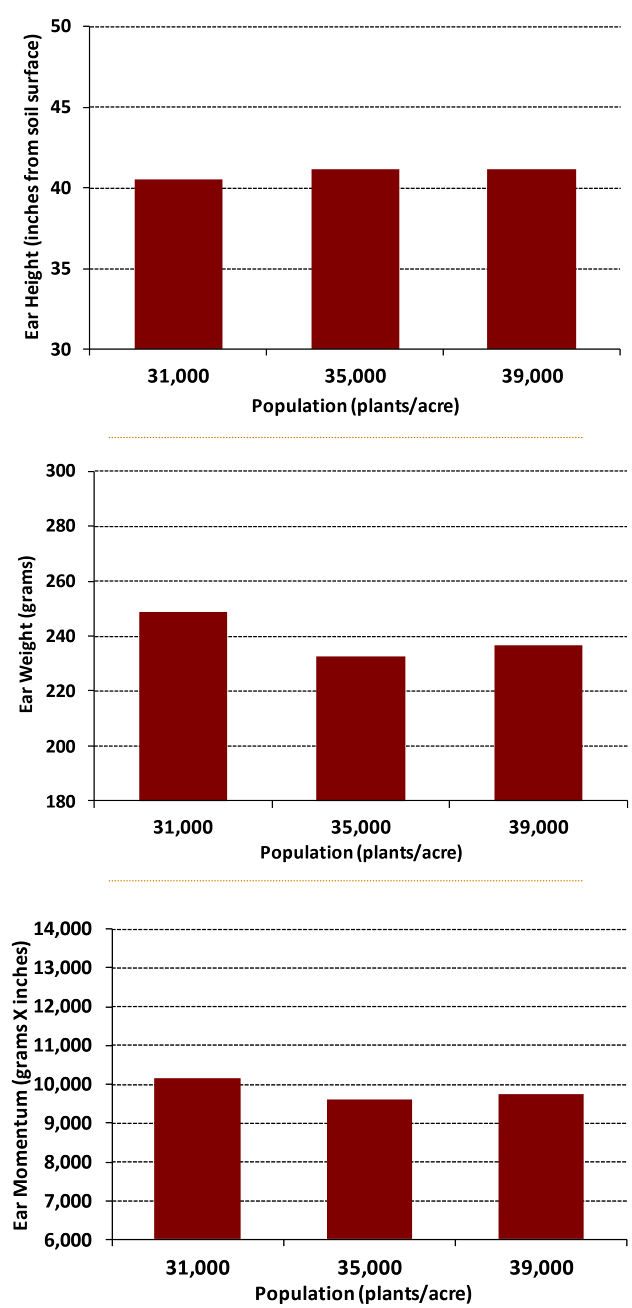

Figure 4. Effect of population on ear height, ear weight and ear "momentum" averaged across 10 corn brands.

The information discussed in this report is from a single site, two-replication, one-year 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.

Technology Development by MONSANTO ®

High Populations in Mid-South Corn Production

There is considerable discussion about corn yield potential in the Mid-South. Modern corn brands are allowing alterations in agronomic practices, such as higher populations, which can help increase yield potential. This demonstration was done to evaluate how the optimal population can help maximize yield potential across a group of corn brands. This demonstration clearly illustrates the changes in yield response of various brands with different planting populations.

Study Guidelines

Testing was conducted at the Monsanto Learning Center at Scott, Mississippi in 2011 to evaluate populations and row configurations for maximizing yield potential among corn brands. Four brands were planted in large plots (150 feet long by four rows wide) with two replications. Row configurations were single and twin row, both on 38 inch centers. Standard agronomic practices for the area were implemented, except for fertility, which can typically be a yield limiting factor. Fertilizer was applied to achieve a higher than normal yield goal. Phosphorus (P) and potassium (K) were applied at approximately twice the standard recommended rate. Nitrogen (N) was applied for a 300 bushel corn crop, using 1.3 pounds of N per bushel for a total of approximately 400 pounds of N/acre. Plots were monitored for emergence and harvested for yield.

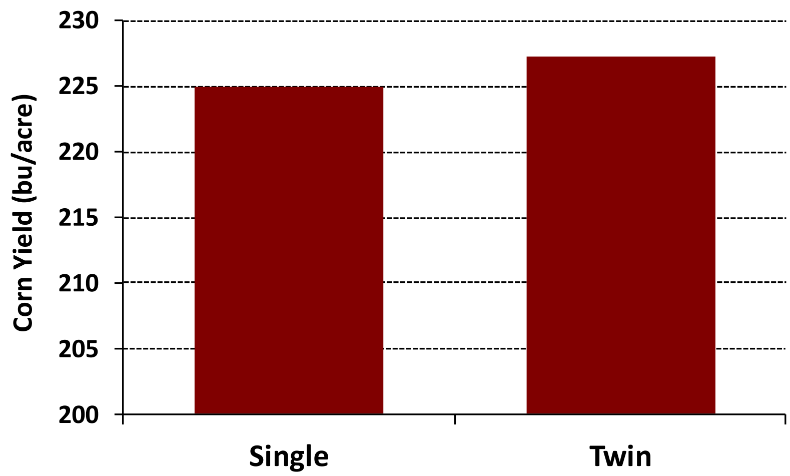

Figure 1. Effect of row configuration on corn yield across brands and populations.

Results

Overall.

Across brands and populations, greater than 98% of all seeds emerged and made a healthy plant. Three of the four brands tested averaged over 225 bushels/acre. DKC67-88 brand likely had lower yields as a result of lodging issues.

Effect of Row Configuration.

Twin rows yielded slightly more than single rows across populations and brands (Figure 1).

Effect of Population.

Across brands, yields reached a plateau at approximately 42,000 plants/acre (ppa) (Figure 2).

Effect of Brand.

The brand response to population seemed independent of row configuration (data not shown). Brands responded differently to increases in populations (Figure 3). DKC64-69 brand showed very little yield response

Figure 2. Effect of population on corn yield across brands and row configurations.

Summary continued on next page

High Populations in Mid-South Corn Production

Continued from page 9

above 36,000 ppa. DKC66-96 brand still had positive yield responses at 48,000 ppa. DKC67-88 brand showed a negative yield response when planted above 42,000 ppa, and had considerable lodging issues. DKC68-05 brand responded positively up to 42,000 ppa, and decreased yield at 48,000 ppa.

Summary Comments

Results from this demonstration illustrate the need for specific placement and population recommendations for individual brands to help maximize yield potential. When working towards increased corn yield potential, significant increases in planting population should only be made after careful consideration. Attention to details such as nutrient management should be made to help minimize the potential risks of lodging, mal-adaptation, and/or yield loss.

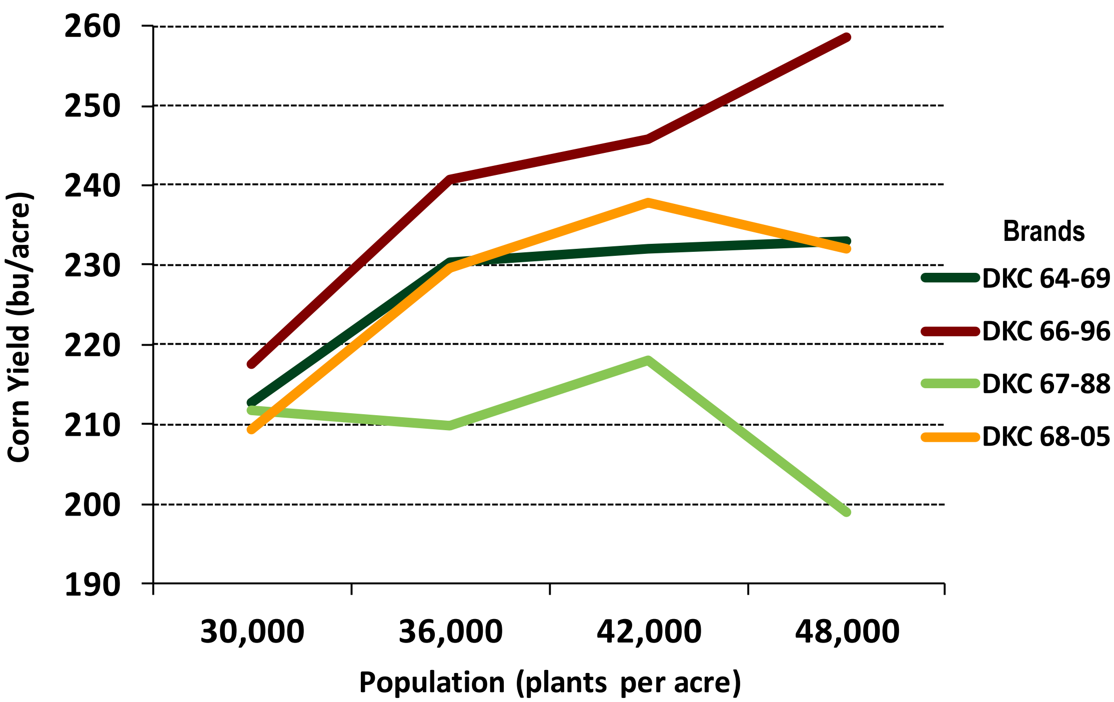

Figure 3. Effect of brand and population on corn yield.

The information discussed in this report is from a single site, non-replicated, one-year 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.

Impact of Multiple Stress Factors on Corn Yield Potential

Corn plants face multiple stresses throughout the growing season which can reduce yield potential. Some stresses may be avoided by proper planning, proper equipment adjustment, and timing of inputs.

Study Guidelines

A demonstration trial was conducted in 2011 at the Monsanto Learning Center near Scott, Mississippi to evaluate the impact of multiple stress factors on corn yield potential in the South. The factors evaluated are shown in Table 1.

Two corn products (DKC66-96 brand and DKC67-88 brand) with different base genetics and relative maturities (RM) of 116 and 117 days were planted on April 13th and harvested on August 20th. Each treatment was replicated twice.

Yield comparisons for each factor with and without stress are shown in Table 2. In addition, yield comparisons based on increases in the number of stress factors per plot are shown in Figure 1.

Results and Conclusions

Each stress factor caused decreases in yield when compared to normal management. Low planting population and late fertility had similar effects on yield potential. The normal planting population out yielded the low planting population by 9.6 bu/acre and the normal fertility program out yielded the late fertility by 8.7 bu/acre. Late irrigation had a somewhat reduced impact but also lowered yield potential with a 3.4 bu/acre yield difference between normal and late irrigation. Improper stagger, or seed spacing, had the least influence of all but still impacted yield with a 1.9 bu/acre yield difference between normal and improper stagger. Finally, as the number of stress factors increased the decrease in yield became larger (Figure 1). The plots with no stress had an average yield of 170.3 bu/acre. The addition of each stress caused incremental decreases in yield ranging from 2.2 bu/acre to 5.3 bu/acre. Plots that had four stress factors had the lowest average yield of 155.8 bu/acre.

Table 1. Normal and stress factors evaluated in the trial: plant population, fertility, irrigation, and seed placement stagger.

Factor	Management	Yield (bu/acre)
Plant Population	Normal	36,500 seeds/acre
	Low	32,000 seeds/acre
Nitrogen (N) Fertility	Normal	on time with 2 splits of 120 units each
	Late	delayed 10 days past normal with 2 splits of 120 units each
Irrigation	Normal	as needed
	Late	10 days late
Stagger	Normal	properly adjusted
	Improper	side-by-side planting

Table 2. Yield (bu/acre) for each factor with and without stress.

Factor	Management	Yield (bu/acre)
Plant Population	Normal	168.2
	Low	158.6
N Fertility	Normal	168.0
	Late	159.3
Irrigation	Normal	165.2
	Late	161.8
Stagger	Normal	164.5
	Improper	162.6

Summary continued on next page

Impact of Multiple Stress Factors on Corn Yield Potential

Continued from page 11

This study reinforces several crop management processes that are essential to reach optimum yield potential. First, it is critical to make good, up-front decisions regarding corn product selection and plant population while setting a realistic yield goal. Second, equipment adjustments, such as stagger settings, planting depth and consistency, and disk openers are essential to establish the correct plant population. Third, small alterations in timing, such as late irrigation and fertility applications, can have a negative impact on yield potential. If these factors are inadequate to provide what is needed for optimal plant growth they can also contribute to yield loss. This demonstration supports the idea that the more stresses that are present, the lower the yield potential.

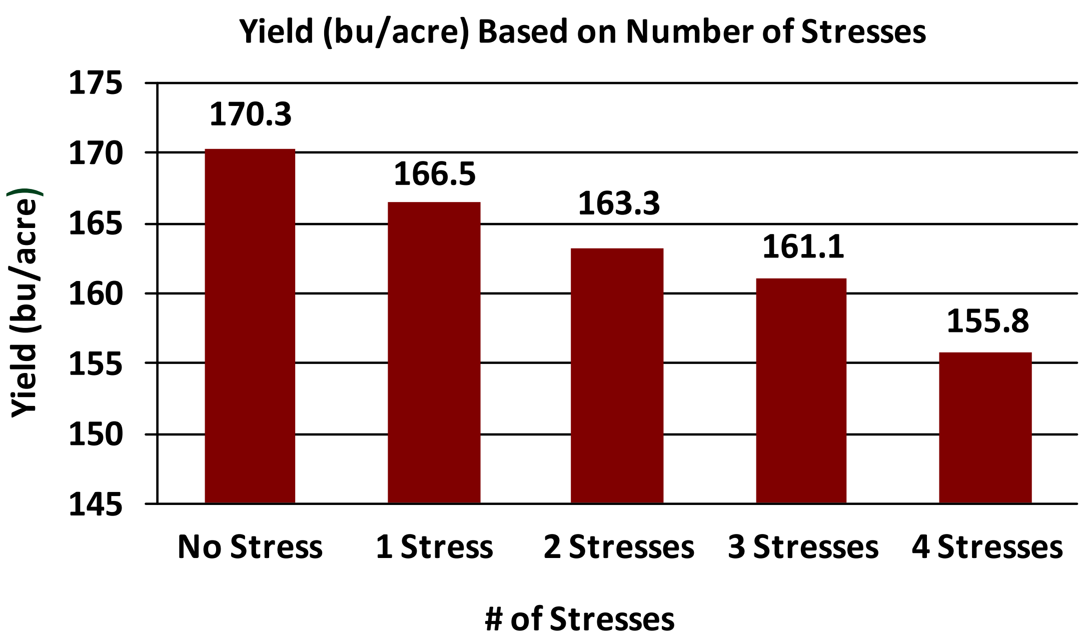

Figure 1. Yield (bu/acre) based on number of stress factors.

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Impact of Staggering on Twin Row Corn

Twin row corn planting has become a viable system in the Mid-South. Twin row planting has been shown to have several potential benefits including optimizing light interception, allowing for increased plant populations, and helping to improve standability. In the past, demonstration plots have been conducted to compare single row and twin row systems, but questions still remain as to the yield potential of twin rows vs. single rows and the effect of the stagger.

Study Guidelines

In 2011, a study was conducted at the Scott Learning Center to compare a) properly staggered twin row systems (stagger = 100%), b) side by side planting in twin rows (stagger = 0), c) twin rows with plants intentionally staggered incorrectly (stagger = 40%), and d) single rows. DKC61-06 brand (111 RM) and DKC 66-96 brand (116 RM) were planted on April 12, in plots (151 feet long by four rows wide) with three replications. Single and twin row configurations were planted on 38-inch centers. Twin rows were planted 7.5 inches apart (Figure 1). Plant populations were 36,000 seeds per acre for both single and twin row plots (Figure 2). Agronomic practices were in alignment with local standards. Calculations were made to allow the Monesum® Twin-Row planter to be intentionally off by 40%. Plots were harvested on August 25, 2011.

Summary continued on next page

Figure 1. Single and twin row configurations planted on 38-inch centers.

Figure 2. Plant spacing for single and twin row plantings at 36,000 seeds per acre. Twin row planting is correctly staggered (stagger = 100%) with lines between plants creating an isosceles triangle.

Impact of Staggering on Twin Row Corn

Continued from page 13

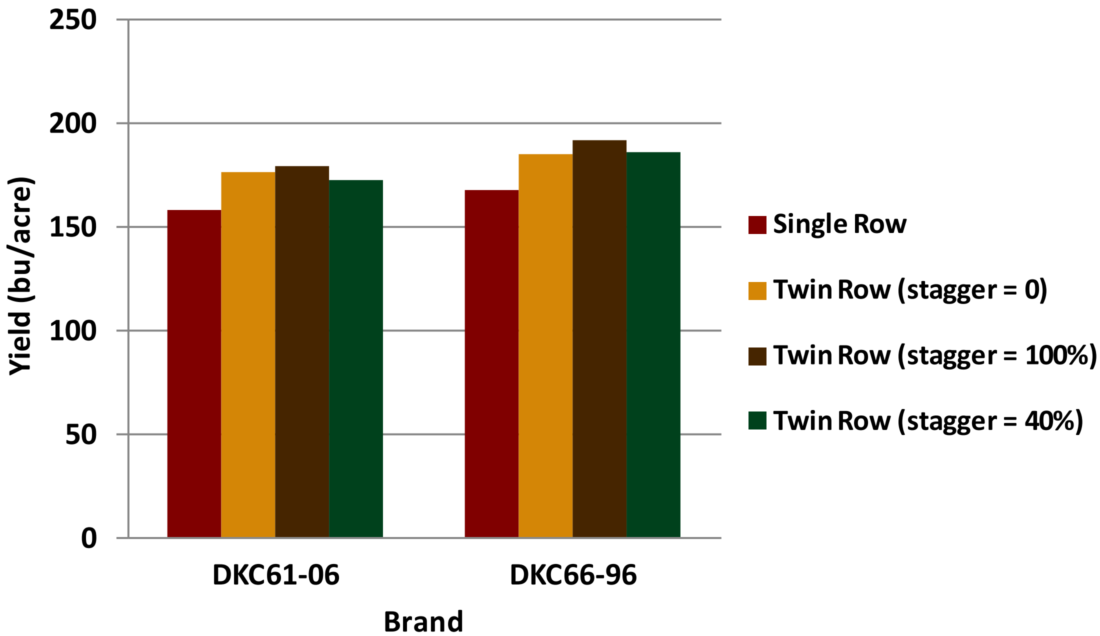

Figure 3. Average yield (bu/acre) of two DEKALB brands in single row, side-by-side (stagger = 0), correctly staggered (stagger = 100%), and incorrectly staggered (stagger = 40%) twin row systems.

Results

In this study, single rows yielded an average of 163 bu/acre while the average of all twin row treatments was 182 bu/acre. Twin rows out-yielded single rows by close to 20 bu/acre, or about 12%. Historically, yield responses with twin rows fall into a 3 to 8% increase. Properly staggered twin rows yielded the highest with an average of 186 bu/acre. Side by side twin rows and twin rows staggered at 40% of correct performed better than single rows with yields of 181 bu/acre and 179 bu/acre, respectively (Figure 3). Although the yield differences between correctly staggered twin rows and incorrectly staggered or side-by-side twin rows were slight, they were consistent across both brands.

Summary Comments

The twin system can help drive plant spacing uniformity both down a given row and across rows. Proper adjustment and setup of the twin row planter is essential to maximize the benefits of a twin row system. Optimal use of the twin row system requires proper seedbed preparation and establishing a wide, flat bed as well as proper planter adjustment.

The information discussed in this report is from a single site, non-replicated, one-year 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.

Corn Yield Response to Population and Row Configuration

The effect of population and row configuration on corn performance continue to be topics of high interest for many growers. Research data continues to demonstrate that the individual response of each corn product can vary. In 2011, the Scott Learning Center planted up-and-coming corn products at low, medium, and high populations to evaluate the response to row configuration. This study was a continuation of a demonstration intended to answer questions on the agricultural practices of plant population and row configuration, and assist growers when selecting seed.

Study Guidelines

Testing was conducted at the Monsanto Learning Center at Scott, Mississippi in 2011 to evaluate the effects and interaction of plant population, row spacing, and germplasm on yield potential. Corn plots were planted using either a 38-inch single-row or twin-row configuration. Twin rows were planted 7.5 inches apart on a 38-inch bed with a Monosem® Twin-Row planter. Populations were 30,000; 32,000; 36,000; and 40,000 plants/acre. All treatments were replicated and planted in large plots (151 ft x 4 rows). Nitrogen was applied at 240 lbs/acre, and standard agronomic practices for the area were implemented.

DEKALB® DKC64-69 brand, DKC66-96 brand, and DKC67-88 brand, all with Genuity® VT Triple PRO® technology, were chosen for this demonstration. DKC64-69 is a 114 day product that is medium in height with mid-placed, large ears. DKC66-96 is a 116 day product with a shorter plant type and relatively small, low-placed ears. DKC67-88 is a 117 day product that is tall with high ear placement of medium- to large-sized ears.

Results

When comparing the average of the three corn products across all treatments, DKC64-69 outyielded DKC66-96 and DKC67-88 by nearly 15 bu/acre and 19 bu/acre, respectively (data not shown).

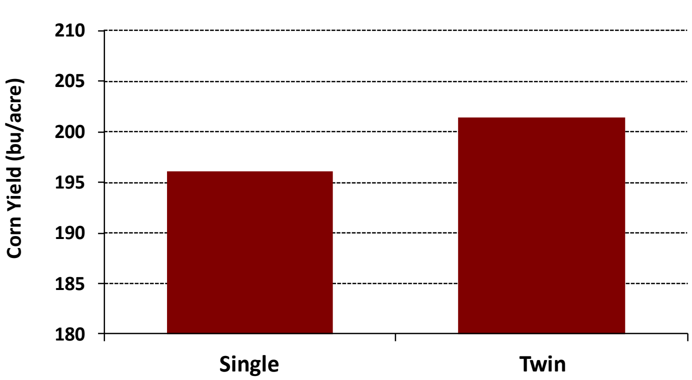

Figure 1. Yield results by row configuration.

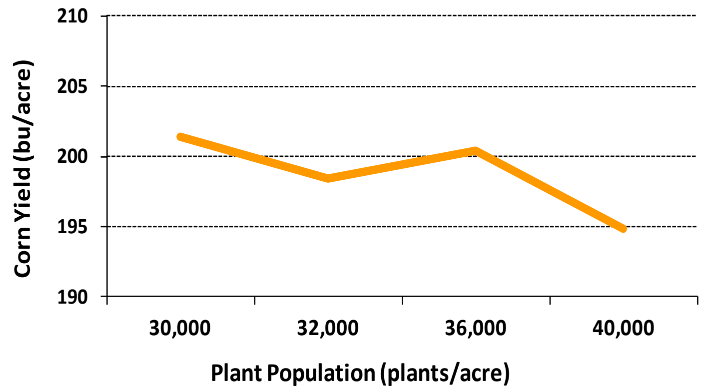

Figure 2. Yield response by planting population.

On average, twin rows produced 2% more yield (5.3 bu/acre) than single rows (Figure 1). While the yield response to plant population across products suggests a decrease in yield with high plant population (Figure 2), this trend is very dependent on which corn product was planted. Across all three products, yields at 30,000; 32,000; and 36,000 plants/acre were fairly similar. However, the average yield across 30,000; 32,000; and 36,000 plants/acre was 2.6% greater than 40,000 plants/acre.

Summary Comments

Results from this study can provide information on average yield response to row configuration and planting population. Additionally, the row configuration and population data become more valuable when considering which product to place on what acre. For DKC64-69, the interaction of row configuration and population did not have a strong effect on differences in yield; however, 36,000 plants/acre in both single and twin rows had the highest yield (Figure 3).

DKC66-96 responded to the twin row configuration with 10% more yield (21.2 bu/acre) than single rows. Based on the results, utilizing twin rows along with higher plant populations with DKC66-96 can increase yield potential (Figure 3).

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Corn Yield Response to Population and Row Configuration

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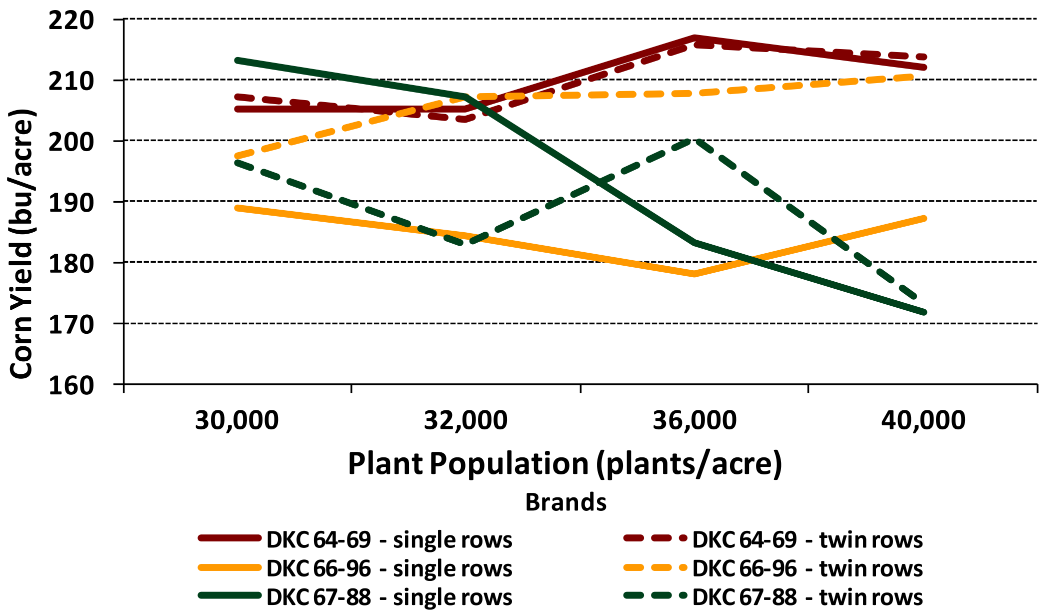

Figure 3. Yield response of DKC64-69, DKC66-96, and DKC67-88 brands, in 38-inch single rows and twin rows, planted at four different planting populations.

For DKC67-88, there was an increase in average yield for single row configuration compared to twin rows. Increasing population had a negative response in yield for single rows, while 36,000 plants/acre provided the highest yield in twin rows for DKC67-88 (Figure 3).

Results from a similar demonstration at the Scott Learning Center in 2010 indicated that germplasm can strongly affect the optimum plant population and row configuration in terms of yield potential. Additionally, corn with shorter plant heights and lower ear placement were more likely to withstand wind damage that can cause stalk lodging. This adaptation allows for higher plant populations, near 38,000 seeds/acre, and thereby higher yield potential. Results from DKC66-96 in 2011 somewhat support the success of higher plant populations with shorter plant products.

Yield potential is greatly influenced by the interaction of product, plant population, and planting configuration. Continued studies such as these should be able to direct the systems approach that is most valuable on a particular acre in order to maximize profitability.

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Effects of Fertilizer and Irrigation Placement on Corn Yield Potential

Many growers irrigate and fertilize every other row in an effort save time and lower cost. This demonstration trial was developed to evaluate if fertilizer and irrigation are needed on every corn row. Theories vary regarding fertilizer and irrigation placement. One idea is that applying fertilizer to one row and irrigating the opposite row may decrease leaching of nitrate-nitrogen and increase yield potential. Another thought is that providing irrigation and fertilizer to the same row will provide the highest yield potential.

Study Guidelines

A demonstration trial was conducted in 2011 at the Monsanto Learning Center near Scott, Mississippi to evaluate the effects of fertilizer placement and irrigation scenarios on corn yield.

One corn product with a relative maturity (RM) of 114 days was planted on May 10th and harvested on September 1st. The corn plots were planted on a 38-inch bedded system, using a Monoseum® Twin-Row planter at a population of 37,000 plants/acre.

Furrow irrigation was used as needed. The irrigation treatments included application to: every row, every other row, fertilized row only, and unfertilized row only. A split application of 200 units of 28% liquid nitrogen (N) solution was applied with 50% at planting 50% at lay-by. The fertilizer treatments included N application to: every row and every other row. The irrigation and fertilizer combinations make up five treatments that are listed in Table 1. Figure 1 illustrates an example of a fertilizer and irrigation treatment applied to a plot.

Table 1. Fertilizer placement and water positioning treatments.

Treatment	Fertilizer	Water
1	Every Row	Every Row
2	Every Row	Every Other Row
3	Every Other Row	Every Row
4	Every Other Row	Fertilized Row Only
5	Every Other Row	Unfertilized Row Only

For weed control, a pre-emergence application of Harness® Xtra at a rate of 2.4 quarts/acre tank-mixed with 22 ounces of Roundup WeatherMAX® agricultural herbicide was made. A lay-by application of Warrant® Herbicide at a rate of 24 ounces/acre plus Atrazine at a

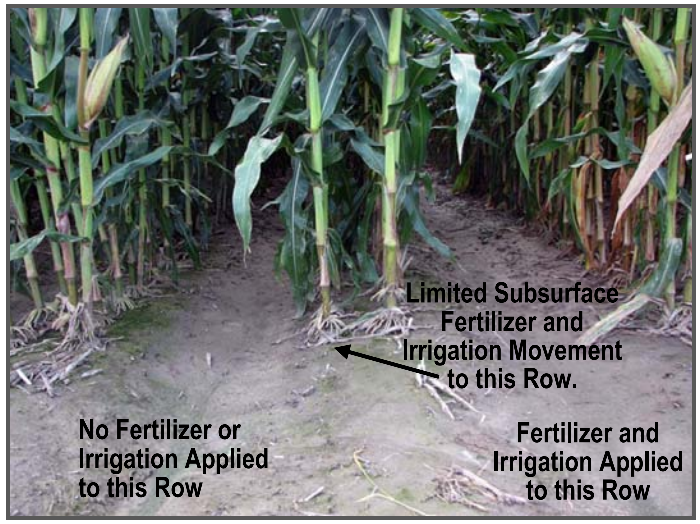

Figure 1. An example of treatment 4: fertilizer every other row and water applied to the fertilized row only.

rate of 24 ounces/acre was also applied. Yield comparisons of the treatments are shown in Figure 2. In addition, a few corn ear comparisons are shown in Figures 3 and 4.

Results and Conclusions

Rainfall during the 2011 season was approximately 8 inches below normal from March to September. In the plots that did not receive irrigation, N may have been less mobile in the soil and less available to the plants when compared to a year with normal rainfall. Therefore, the yield response to the fertilizer treatments in the non-irrigated plots may be exaggerated. In looking at the results, fertilization of every row constituted the highest yield with an average of 182 bu/acre (Figure 2). In limited rainfall years, such as 2011, growers can expect decreases in yield potential when irrigating every other row and fertilizing non-irrigated rows in twin row production. When fertilizing and irrigating every other row, care should be taken to verify the row being irrigated is also fertilized.

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Effects of Fertilizer and Irrigation Placement on Corn Yield Potential

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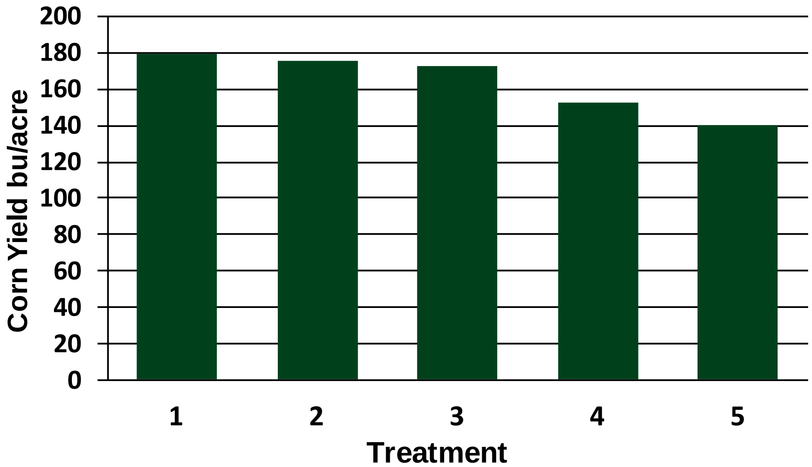

Figure 2. Yield (bu/acre) of each fertilizer and irrigation treatment.

Treatment key:

1 = fertilized every row/irrigated every row

2 = fertilized every row/irrigated every other row

3 = fertilized every other row/irrigated every row

4 = fertilized every other row/irrigated fertilized row only

5 = fertilized every other row/irrigated unfertilized row only

Figure 3. Corn ears from treatment 1: fertilizer and irrigation every row.

Figure 4. Corn ears from treatment 5: fertilizer every other row and irrigated in the unfertilized row only.

The irrigation portion of these results is similar to results reported by Patel et al[1]. In 2006, Patel et al. reported treatments that were irrigated in every row yielded 19 bu/acre more compared to treatments that were irrigated in every other row.

Fertilizing and irrigating every row can help achieve the highest yield potential, especially in a year with below average rainfall. When fertilizing and irrigating every other row, be sure that the fertilizer and irrigation are applied to the same row.

Sources:

[1] *Patel et al. 2006. Influence of different methods of irrigation and nitrogen levels on crop growth rate and yield of maize (Zea mays L.). Indian J. Crop Science, 1(1-2): An additional source used to create this article: 175 -177 (2006);*

Gary A. Lehrsch et al. 2000. Nitrogen Placement, Row Spacing, and Furrow Irrigation Water Positioning Effects on Corn Yield. Agronomy Journal - AGRON J , vol. 92, no. 6, 2000.

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Cotton Double-Cropped Behind Wheat

With the increased pest protection provided by Genuity® Bollgard II® technology, the eradication of the boll weevil, and the availability of early maturing varieties, cotton planted following wheat harvest has become an interesting proposition for growers in the Mid-South. This demonstration was established to evaluate the effect of plant growth regulator (PGR) application, planting density, and variety selection on the success of double-cropped cotton behind wheat.

Study Guidelines

Six Deltapine® varieties were planted on May 31, 2011, at 42,000 and 52,000 plants per acre (ppa). Three PGR regimens were evaluated; untreated check (UTC), passive, and aggressive (Figure 1). Plots were irrigated once with 0.75 inches of water to supplement the 3.5 inches of rainfall that was received throughout the season.

Figure 1. Application rates and dates for various PGR regimens.

	Dates and Rate of PGR (oz/acre) Applied		
	June 30	July 21	July 28
UTC	0	0	0
Passive	0	12	12
Aggressive	8	16	24

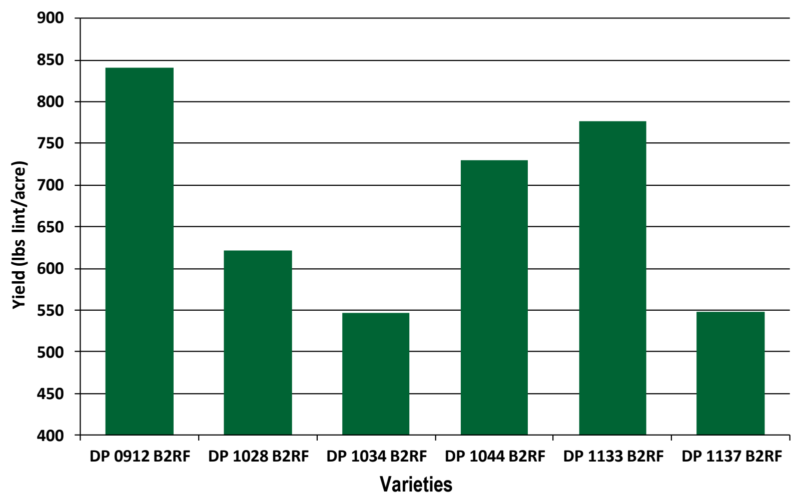

Figure 2. Yield of various cotton varieties averaged across populations and PGR regimens.

Results

Variety.

Several varieties showed promise of very high yield in this system including DP 0912 B2RF, DP 1133 B2RF, and possibly DP 1044 B2RF (Figure 2).

Population x PGR Regimen.

At lower populations, the less aggressively PGR managed plots yielded more than the more aggressively managed plots (Figure 3). At higher populations, aggressively managed plots yielded more than passively managed plots and were able to generate yield in excess of 2 bales despite being planted on May 31st.

Variety x Population x PGR Regime.

The individual results for each combination of variety, PGR regime, and population treatment are provided in Figure 4.

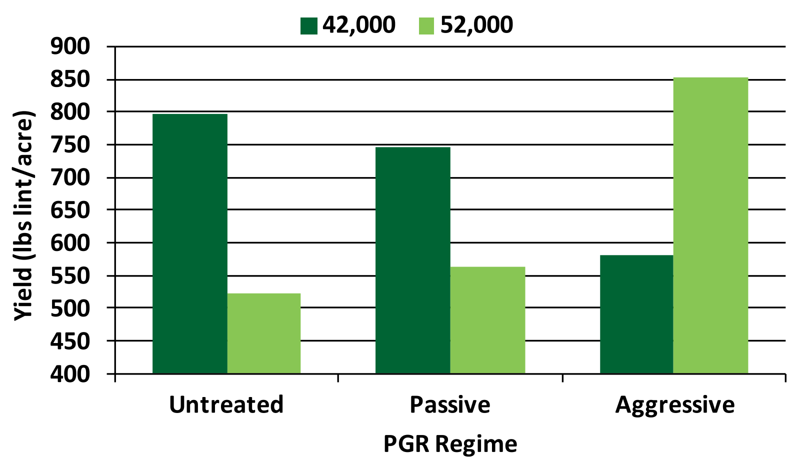

Figure 3. Effect of population and PGR regimens on cotton yield when averaged across varieties.

Summary continued on next page

Cotton Double-Cropped Behind Wheat

Continued from page 19

Discussion

When considering double cropping cotton following wheat, aggressive management will likely be necessary. Higher populations allow the field to generate equivalent or higher yield potential in shorter amounts of time versus lower planting densities which force the plant to generate fruiting positions further up and out on the plant. However, higher densities demand more aggressive PGR applications to increase the odds for success.

Cotton growth is heat driven. When accumulating heat quickly, as a late planted crop would, PGRs are diluted faster so applying them more often and in higher doses can be help manage the crop for higher yield potential. Risks associated with weather, insects are likely to be higher when planting late, but careful consideration of the above factors can help to mitigate risk.

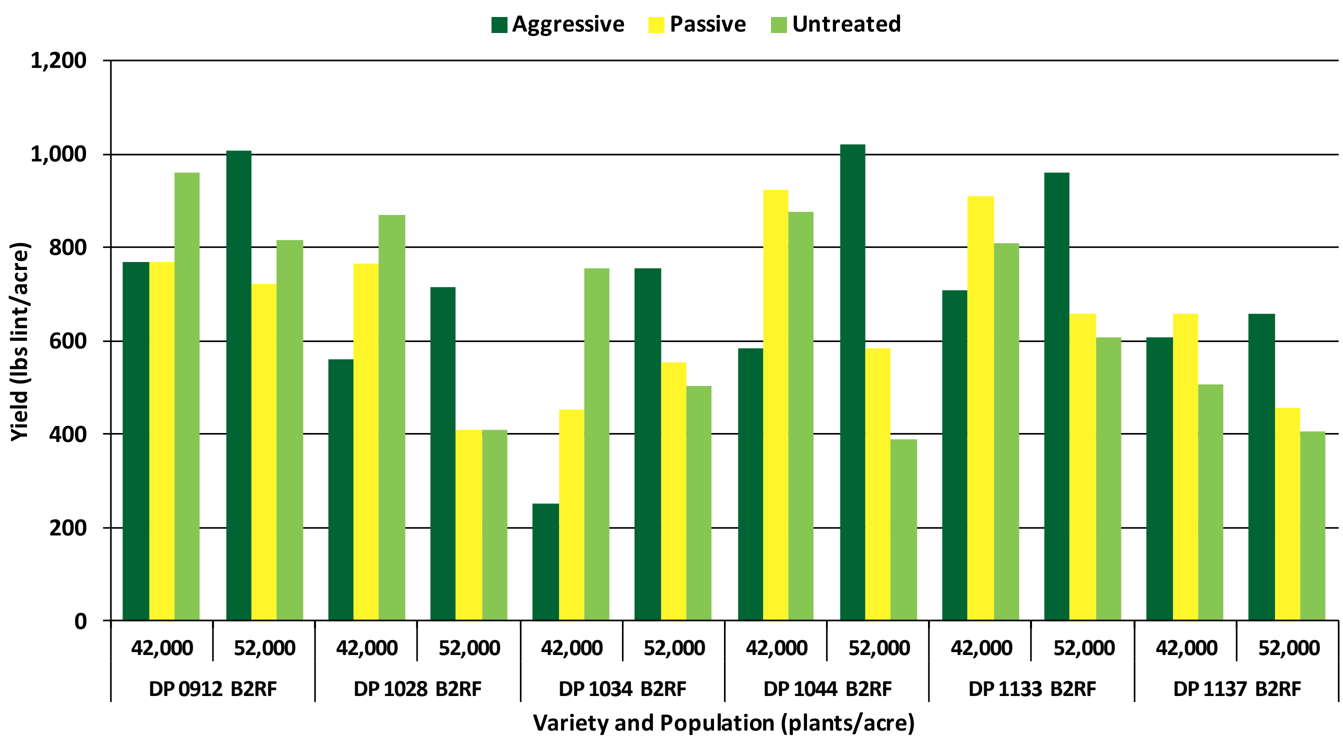

Figure 4. Effect of PGR regimen and population on cotton yield for different varieties.

Note: These results are not intended to provide you with a blueprint on how to grow any specific variety but merely to give the benefit of some research with them. Your experience and knowledge will remain an invaluable component to the successful management of any variety. This information is being provided to you to aid you in making decisions and giving advice regarding the management of these varieties. The information is not intended to totally supplant your experience and knowledge base on the proper management of your individual crops.

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Effect of PGR Strategies on Cotton Yield Potential

A key factor in producing high-yielding cotton is managing the perennial and indeterminate growth habit of the cotton plant with plant growth regulators (PGRs). Proper use of PGRs, such as mepiquat chloride (Pix®), can be critical to help maximize yield potential in any given year, while the mismanagement of PGRs can result in reduced yield potential. When determining the proper application timing of PGRs, several factors such as soil type, soil fertility, irrigation, and field history should be considered. Environmental factors can also influence PGR strategies and their effectiveness. However, understanding a particular variety's growth habit and response to a PGR application is one of the most important factors in developing sound PGR management strategies. Plant response to PGRs can vary depending on the cotton variety, plant genetics, and the environment during and after application. This makes blanket PGR recommendations very difficult and often impractical.

Demonstration Guidelines

In order to better understand the growth habits and response of the Deltapine® Class of 09, 10, 11, and 12 cotton varieties, a study was conducted at the Learning Center at Scott, Mississippi to investigate the effects of passive and aggressive PGR management strategies. Seven cotton varieties were planted at 42,000 seeds/acre on May 9, 2011 and the trial was irrigated (Table 1).

Deltapine® Cotton Varieties

Class of 09	Class of 10	Class of 11	Class of 12
DP 0912B2RF	DP 1028 B2RF	DP 1133 B2RF	DP 1252 B2RF
	DP 1034 B2RF	DP 1137 B2RF	
	DP 1048 B2RF		

Table 1. Deltapine cotton varieties in the PGR management strategy demonstration.

Cotton varieties were planted in 12 row plots with 4 rows receiving the aggressive PGR management strategy, and 4 rows receiving the passive PGR management strategy and 4 rows left as an untreated check. The passive and aggressive treatments of a 4.2% mepiquat chloride are provided in table 2. The passive treatment was designed to be optimal for less aggressive growing varieties and less than optimal for more aggressive growing varieties. Plots were harvested with a commercial cotton picker. Seed cotton was ginned and weighed to determine lint yield per acre.

PGR Management Strategies (4.2% mepiquat chloride)

PGR Strategy	Timing (nodes)	Date	Rate
Passive	12 nodes	June 30	8 oz/acre
	15 nodes	July 8	8 oz/acre
	20 nodes	July 21	16 oz/acre
Aggressive	8 nodes	June 17	8 oz/acre
	12 nodes	June 30	16 oz/acre
	20 nodes	July 21	20 oz/acre

Table 2. Timing, date, and rate of the passive and aggressive PGR management strategies.

Results

Not all varieties respond similarly to the same to PGR applications, therefore measuring and comparing actual growth can help indicate the agronomic status of a field. PGR management strategies have traditionally been learned by producers during the first few years after introduction. This demonstration is an attempt to help learn and apply specific management strategies earlier in the life cycle of the cotton product.

Cotton varieties selected for the trial differed in response to PGR management strategies (Figure 1). A passive PGR strategy resulted in a higher final yield for five of the seven selected varieties, while two cotton varieties produced higher yields with the more aggressive PGR management strategy.

The largest yield difference when comparing the same variety across the two PGR regimes was 275 lbs lint/acre for DP 0912 B2RF, which yielded more under the aggressive PGR strategy. DP 0912 B2RF is an early maturing cotton variety, which may have responded favorably to the aggressive treatment during 2011 due to the relatively early heat unit accumulation which characterized the 2011 growing season. The largest difference in favor of the passive PGR management strategy was 114 lbs lint/acre for DP 1028 B2RF.

The different PGR management strategies also affected the height of cotton plants at harvest. All cotton varieties reported the tallest plants in the untreated check (UTC) (Figure 2). Six of the seven varieties reported shorter cotton plant height under the aggressive PGR management strategy. Cotton varieties DP 1028 B2RF, DP 1034 B2RF, and DP 1133 B2RF all reported a high percent height reduction for the aggressive PGR strategy compared to the untreated check (Figure 3).

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Effect of PGR Strategies on Cotton Yield Potential

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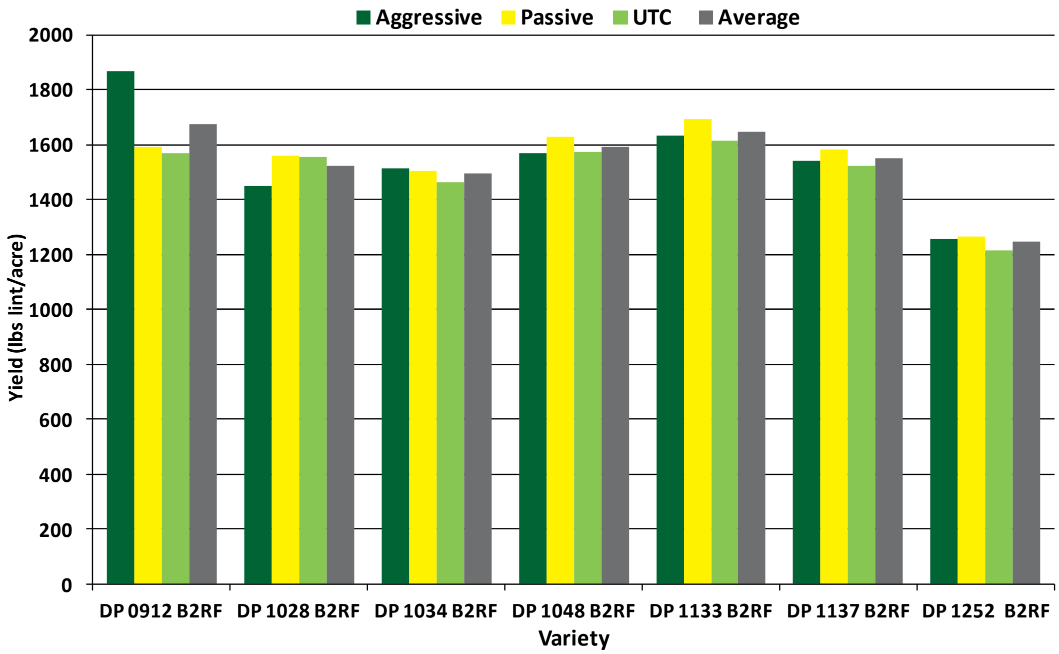

Figure 1. Effect of PGR strategies on yield (lbs lint/acre) of Deltapine® Class of 09, 10, 11, and 12 cotton varieties. UTC = untreated check

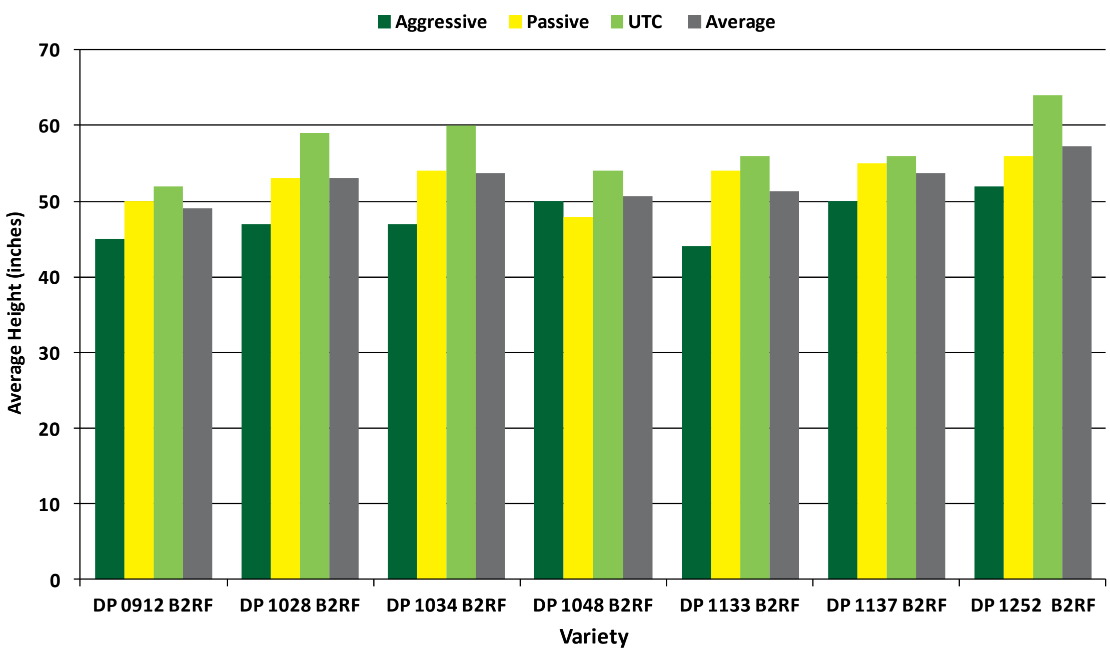

Figure 2. Effect of PGR strategies on harvest height (inches) of Deltapine® Class of 09, 10, 11, and 12 cotton varieties. UTC = untreated check

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Effect of PGR Strategies on Cotton Yield Potential

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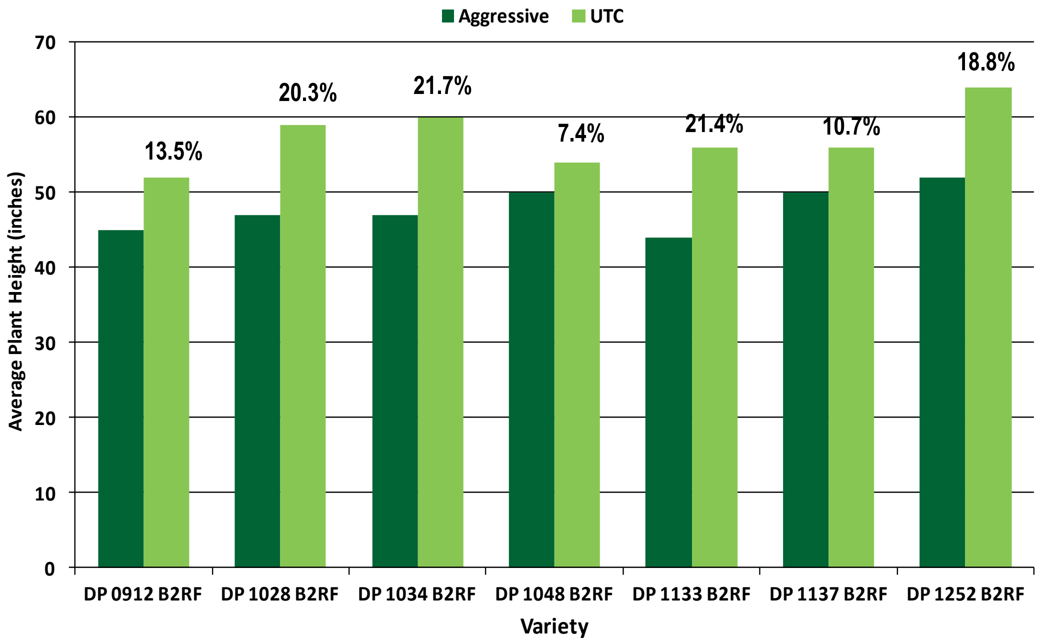

Figure 3. Average percent height reduction when comparing the harvest height (in inches) of the aggressive PGR management strategy to the untreated check.

Shorter plant height generally indicates a reallocation of photosynthate into non-vegetative development and may increase harvest efficiency for producers.

Conclusions

As expected, not all cotton varieties responded the same to PGR applications. In five out of seven comparisons between the aggressive and passive PGR management strategies, yield differences were less than 60 lbs lint/acre. Of the tested varieties, DP 0912 B2RF produced the highest overall yield at 1867 lbs lint/acre under the aggressive PGR strategy. This suggests that during 2011, DP 0912 B2RF may have had very strong early season growth, which required higher PGR rates and frequent applications to adequately manage vegetative growth. When comparing yield to the harvest height of the cotton varieties, the second shortest variety at harvest, DP 0912 B2RF, with the aggressive PGR strategy had the highest yield, while the tallest variety, DP 1252 B2RF as an untreated check had the lowest yield. These results would suggest that boll rot or other yield-reducing factors may have had an effect on taller cotton plants.

Care should be taken to observe all varieties with respect to their growth patterns. When making PGR application decisions on these and all cotton varieties, remember to look at the node elongation of node 4-5 from the top of the plant, soil moisture, agronomic practices and weather patterns. This study gives a snapshot of responses in only one growth environment, location and year, but may provide insight into recommendations of what to look for in growth and development of the Deltapine® Class of 09, 10, 11, and 12 cotton varieties.

Note: These results are not intended to provide you with a blueprint on how to grow any specific variety but merely to give the benefit of some research with them. Your experience and knowledge will remain an invaluable component to the successful management of any variety. This information is being provided to you to aid you in making decisions and giving advice regarding the management of these varieties. The information is not intended to totally supplant your experience and knowledge base on the proper management of your individual crops.

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Response of Four Deltapine® Varieties to Irrigation

Cotton is one of the most drought-tolerant crops grown in the southern US. It has been a traditional dryland crop in the South for many years due to its ability to compensate in adverse environments. However, there are key periods of cotton growth that benefit from sufficient moisture and cotton can respond to adequate water by producing yields proportional to rainfall or irrigation. The purpose of this research demonstration was to evaluate the response of four Deltapine® cotton varieties to irrigation and identify products that are well-suited to dryland conditions and/or stressed environments.

Study Guidelines

In 2011, a study was conducted at the Scott Learning Center to evaluate the response of four Deltapine cotton varieties to two irrigation treatments. Four varieties were planted on April 15 in 0.33 acre plots (24 rows wide x 200ft) with two replications. Irrigation treatments were dryland and furrow irrigated. Agronomic practices were in alignment with local standards. PGR was applied as needed. Furrow irrigation was used as needed in irrigated plots. Approximately 10 inches of rainfall occurred in the plots in 8 to 10 events throughout the growing season. Several multi-week periods without rain occurred during the season. Plots were harvested on October 18.

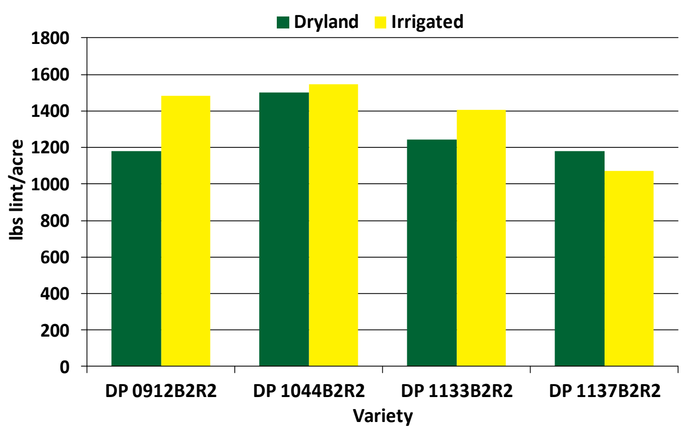

Figure 1. Average yield (lbs of lint per acre) of four Deltapine cotton varieties under irrigated and dryland conditions.

Results

Not all of the Deltapine varieties in the study performed the same in response to drought (Figure 1). High yields in the 3 bale/acre range were recorded in several plots. DP 0912 B2RF and DP 1133 B2RF varieties both responded favorably to irrigation. DP 1137 B2RF yielded slightly more in dryland conditions than in irrigated plots. This could be due to excess vegetative growth in the irrigated plots. DP 1044 B2RF variety showed only a slight yield response (less than 50 lbs lint/acre) to irrigation.

Conclusions

The response of DP 1044 B2RF variety to irrigation indicates that it could potentially be a product well adapted for dryland conditions and stressful production environments such as double cropping and droughty or thin soils.

Drought is considered a leading cause of yield loss in cotton. Considering the expense of irrigation, identifying cotton varieties that may be able to use water more efficiently or compensate better in dry conditions, can help maximize cotton yield potential and profitability.

Source:

Edmisten, K., Crawford, J., and Bader, M. 2007. Drought management for cotton production. [Online] http://www.ces.ncsu.edu; McWilliams, D. 2003. Drought Strategies for Cotton. Circular 582.[Online] http://aces.nmsu.edu.

The information discussed in this report is from a single site, non-replicated, one-year 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.

Two-In-One Skip Row Cotton Evaluations

Growers are interested in standardizing row spacing across crops. This would help to: optimize grain yields and production systems, maintain the viability and yield potential of cotton, and allow easier growth control in cotton. This trial was initiated in response to grower questions about various cotton row spacing options and configurations.

Study Guidelines

A demonstration trial was conducted in 2011 at the Monsanto Learning Center near Scott, Mississippi to compare 30-inch, 2:1 skip row planting systems to 38-inch solid row planting systems in cotton. The trial evaluated multiple cotton varieties at different plant populations.

Five cotton varieties, with maturities ranging from early to late, were planted on April 19, 2011 and harvested in late September. Three plant populations were used and are shown in Table 1. Agronomic management, in general, was similar to the local standard. The exceptions to this were seeding rate and the rates and timing of plant growth regulator (PGR) application(s). PGR (4.2% mepiquat chloride; .35 lb. active ingredient per gallon) was applied as needed per label recommendations on three different dates (Table 2). In an effort to allow for larger, more vegetative, plants which are able to compensate for the skipped row, PGR applications were delayed in the skip row planting systems. In addition, the PGR rates were as much as 50% lower in the 2:1 skip row planting systems compared to the 38-inch solid row plantings. This compensation is critical in the 2:1 skip row planting configuration to help achieve yield potentials that are competitive with the 38-inch solid row configurations.

Plant height and yield data were both collected from the trial. Table 3 lists plant height and yield data by variety, plant population, and row configuration.

Table 1. Plants per row foot for each planting population and planting system.

Plant Population Per Acre (PPA)	38-inch Solid Planting	30-inch, 2:1 Skip Row Planting
	Plants Per Row Foot	
27,000	2	2.66
41,000	3	4.00
55,000	4	5.33

Table 2. Mepiquat chloride plant growth regulator application, as needed, shown by date and rate.

Date of application	38-inch Solid Row Planting	30-inch, 2:1 Skip Row Planting
	PGR Rate (oz/acre)	
June 1st	6	0
June 30th	16	12
July 8th	20	10

Results

Across populations, plant heights were similar even with reduced amounts of PGR in the 2:1 skip row plantings. This indicates a potential for less intense agronomic management in a 2:1 skip row planting scenario. However, monitoring and appropriate management will still be necessary. In addition, locally adapted varieties appear to do well in both row configuration planting systems. Growers should consider these factors when selecting varieties and/or production systems. The use of a 2:1 skip row planting system in cotton production could allow for advantages over solid row systems and be compatible with grain crops on 30” rows.

Contrary to some popular beliefs, this protocol demonstrates that 2:1 skip row plantings may not save seed and technology fees for Genuity® Bollgard II® Cotton with Roundup Ready® Flex Cotton because less seed is typically planted. In this study, three plant populations were evaluated for yield potential in both the 2:1 skip and solid planted system. All planted populations in the 2:1 skip row pattern resulted in denser finished stands due to the increased seeding rate per foot of planted row. In effect, we have placed the unplanted seeds which would have been on the skipped row back into the two planted rows in the 2:1 skip. This increased density allows the 2:1 skip row the chance to compensate for the skips with potentially more fruiting positions per foot of planted row.

Summary continued on next page

Two-In-One Skip Row Cotton Evaluations

Continued from page 25

Table 3. Yield comparisons by variety, plant population, and row configuration.

Variety	Plant Population (seeds/acre)	38-inch Solid Row	30-inch 2:1 Skip	38-inch Solid Row	30-inch 2:1 Skip Row
		Plant Height (inches)		Yield (lbs lint/acre)	
DP 0912 B2RF	27,000	49	44	1407	1077
	41,000	49	53	1251	1436
	55,000	51	53	1355	1279
DP 1028 B2RF	27,000	56	54	1330	1288
	41,000	53	52	1247	1264
	55,000	56	51	1219	1193
DP 1034 B2RF	27,000	52	62	1150	1226
	41,000	50	50	1122	1179
	55,000	53	47	1177	1367
DP 1133 B2RF	27,000	51	49	1235	1441
	41,000	49	54	1290	1323
	55,000	49	50	1400	1229
DP 1137 B2RF	27,000	53	51	1372	1300
	41,000	55	50	1262	1300
	55,000	53	49	1317	1134

Sources

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Variety x Population x PGR in Cotton

Over the last 20 years, planting seed quality in cotton has improved due to several factors including better seed processing techniques and improvements in seed treatment fungicides/technology. Optimal plant populations in the field have become easier to achieve due to the aforementioned reasons, as well as later planting dates and less disease pressure. Additionally, reduced phytotoxicity from residual herbicide applications has improved cotton stands.

Many of the varieties today are less determinate and respond to lower populations with a reduced tendency to have excessive agronomic growth. The opposite is true in higher populations where vegetative growth can become very difficult to manage, particularly in the event of insect- or climate-induced fruit shed. For these reasons, many growers are planting reduced populations. These populations are in the 40,000 seeds/acre range versus the historical 55,000 seeds/acre. In 2011, the Scott Learning Center evaluated the interaction of cotton variety, population, and plant growth regulator (PGR) use on cotton height at cutout and lint yield.

Study Guidelines

A demonstration trial was conducted at the Monsanto Learning Center in Scott, Mississippi to evaluate the effects of cotton variety, plant population, and PGR rates/timing on plant height at cutout and lint yield. Numerous growers in the South fluidly move from cotton to corn and vice versa. For this reason, understanding how the two crops are different with respect to emergence and population is important.

Four Deltapine® cotton varieties were planted at seeding rates of 28,000; 41,000; and 55,000 seeds/acre (Table 1). These populations represented 2, 3, and 4 seeds/foot. Two PGR regimes were implemented: passive and aggressive (Table 1). All varieties were Genuity® Bollgard II® with Roundup Ready® Flex cotton. Planting occurred on May 12, 2011 and harvest was September 20, 2011. Plant height at cutout and yield data were collected.

Table 1. Description of variables evaluated in this study.

COTTON VARIETIES	■ **DP 1034 B2RF** ■ **DP 1048 B2RF** ■ **DP 1133 B2RF**
SEEDING RATE	■ **28,000 seeds/acre** ■ **41,000 seeds/acre** ■ **55,000 seeds/acre**
PGR REGIME	**Passive:** ● **8 oz on June 30** ● **12 oz on July 8** **Aggressive:** ● **8 oz on June 17** ● **12 oz on June 30** ● **12 oz on July 8**

Results

Population. Across both PGR treatments, acceptable yields were achieved even at the lowest population. At 28,000 seeds/acre, cotton yield was 2103 lbs lint/acre, while yields were 1957 and 2166 lbs lint/acre at 41,000 and 55,000 seeds/acre, respectively, when averaged across PGR treatments.

On average, 68% of the seed planted produced a plant for harvest. Emergence conditions were very good this season. This cotton stand result is similar to the 70% average observed at the Scott Learning Center; however, it is much lower than the 99% emergence observed in corn at the Scott Learning Center.

PGR. Across populations, the aggressively treated cotton yielded slightly more than the passively treated cotton (Figure 1). When averaged across populations, the aggressive PGR system (2097 lbs lint/acre) yielded 43 lbs lint/acre more than the passive system (2054 lbs lint/acre).

Plant height was reduced more in the aggressive system (average plant height of 54 inches) than in the passive (average plant height of 60 inches), but it varied with the growth habit of the variety (Figure 2). Large differences in average plant height were not observed across populations in either the aggressive PGR or passive PGR system (Figure 2).

Variety. All four varieties yielded very well in the demo, with average yields ranging from 1848 lbs lint/acre in DP 1137 B2RF to 2245 lbs lint/acre in DP 1048 B2RF. Most of the varieties follow the

Summary continued on next page

Variety x Population x PGR in Cotton

Continued from page 27

trend of needing more aggressive PGR management at higher populations, but to varying degrees depending on determinancy level (Figure 3).

All varieties in the aggressive PGR system responded similarly with shorter plant height compared to the passive PGR system (Figure 4). Additionally, the average plant height for all 4 varieties in the aggressive treatment was very similar; 55 inches for all varieties but DP 1133 B2RF, and it was 53 inches.

Population x PGR. Important trends were observed when examining population x PGR system. Low populations yielded better in the passively managed PGR system (Figure 1). Mid populations were somewhat indifferent to PGR management regime. Higher populations typically yielded more when aggressively managed with PGR.

Conclusions

While corn yield potential can be limited from the start of the season if the desired stand is not achieved, changes in cotton population may force shifts in management to make a cotton crop successful. This difference between corn and cotton allows for cotton management changes in response to planted vs. emerged populations.

In general, cotton responded positively in yield to:

- Reduced PGR applications at lower populations (Figures 1 and 5).
- More aggressive PGR applications at higher populations (Figures 1 and 5).

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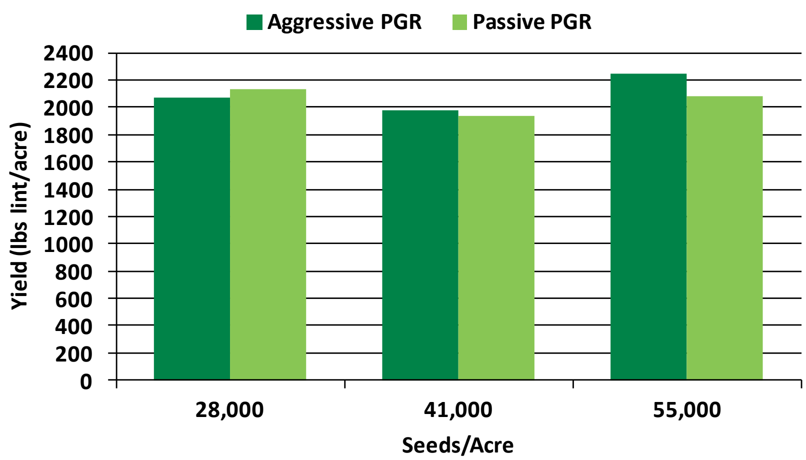

Figure 1. Effect of PGR regime on cotton lint yield at each seeding rate.

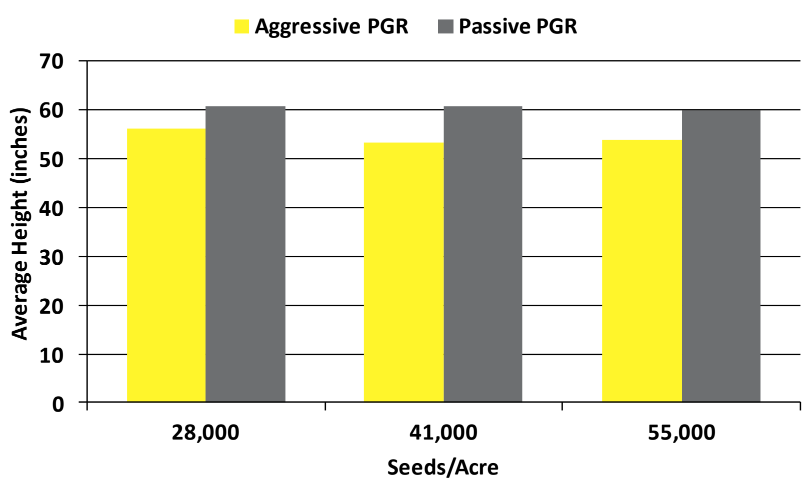

Figure 2. Effect of PGR regime on average cotton height at cutout.

Variety x Population x PGR in Cotton

Continued from page 28

This relationship can allow growers to design a management system suited to their farm based on the following:

- Yield goals. Having the proper yield goal in mind with respect to the yield potential of the field.
- Variety selection/adaptation. Variety selection is important and this demo points out the fact that varieties are not all the same. DP 1133 B2RF is an example of the exception. It responded positively to aggressive PGR management at all populations (Figure 5).
- Tolerance of risk from weather x variety x management style. For example, DP 1048 B2RF at high populations with aggressive PGR application was the highest yielding in this demo at 2601 lbs lint/acre (Figure 5) and 56 inches at cutout (Figure 6). Managing DP 1048 B2RF for higher yield could require a somewhat more aggressive management style to drive earliness and ensure optimal harvestability at season's end. DP 1034 B2RF at low populations with reduced PGR applications still made 4+ bales (2092 lbs lint/acre), was 63 inches at cutout, and likely carries the lowest risk in the group (Figures 5 and 6). As a result, either the higher input or lower input system can be a successful production system depending on the management applied to each field and variety by an individual grower.

Note: These results are not intended to provide you with a blueprint on how to grow any specific variety but merely to give the benefit of some research with them. Your experience and knowledge will remain an invaluable component to the successful management of any variety. This information is being provided to you to aid you in making decisions and giving advice regarding the management of these varieties. The information is not intended to totally supplant your experience and knowledge base on the proper management of your individual crops.

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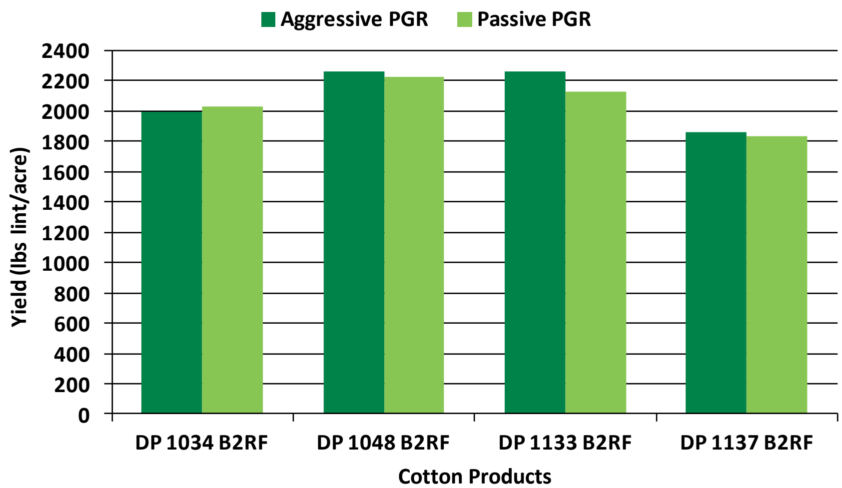

Figure 3. Effect of PGR regime on lint yield for each cotton variety.

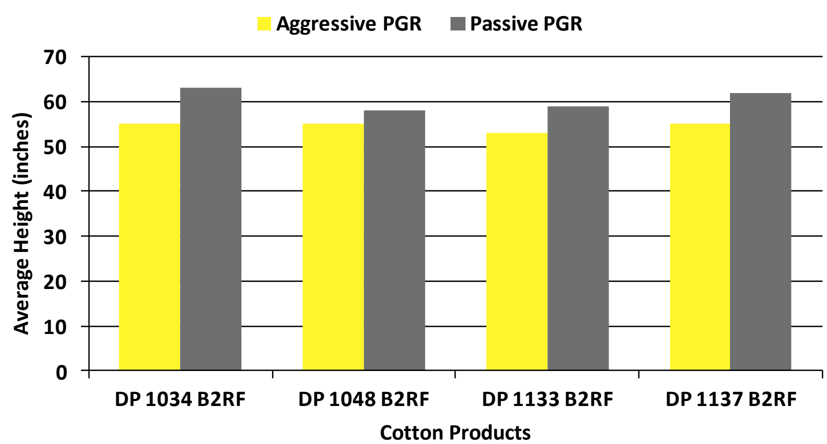

Figure 4. Effect of PGR regime on average cotton height for each cotton variety.

Variety x Population x PGR in Cotton

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Figure 5. Effect of cotton variety x population x PGR regime on cotton lint yield.

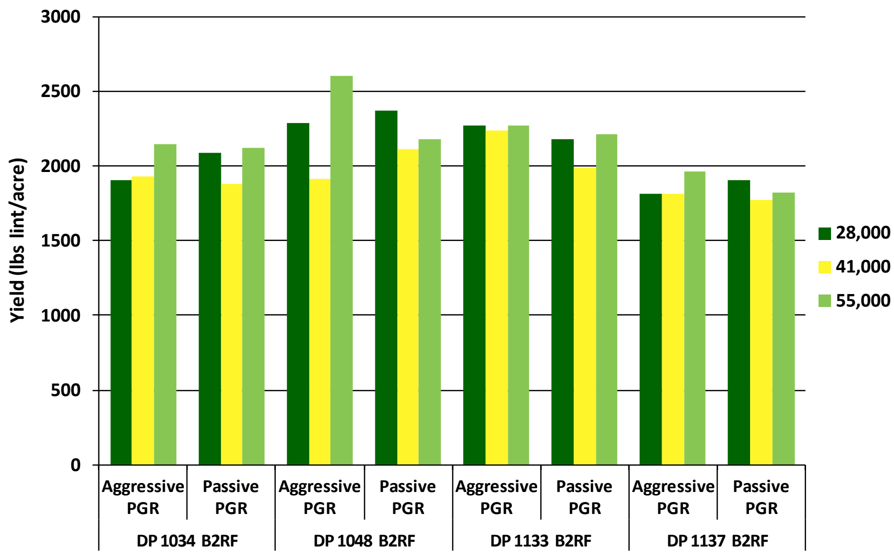
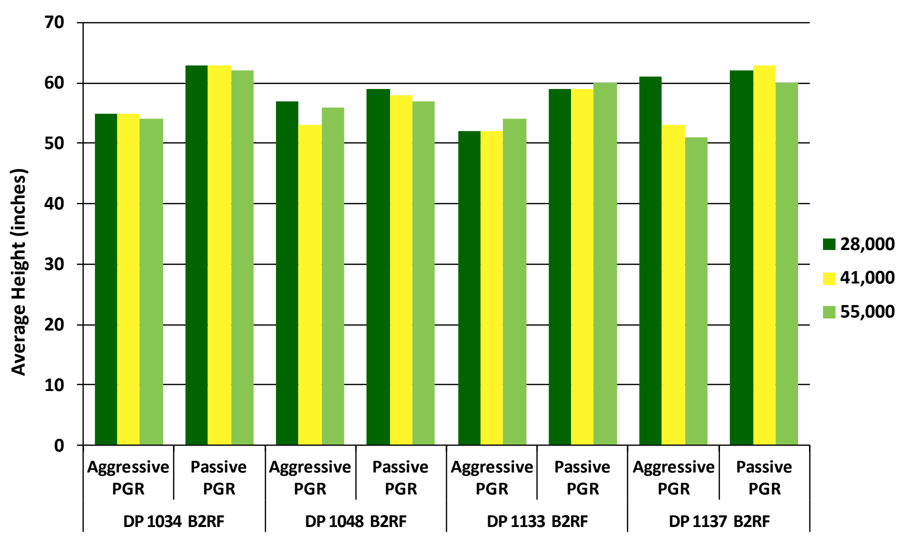


Figure 6. Effect of cotton variety x population x PGR regime on average cotton height.



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Cotton And Soybean Response to Late Planting

Ideally, cotton and soybeans should be planted by mid-May in Mississippi. However, planting can be delayed for reasons such as double-cropping behind wheat, replanting poor stands, or unfavorable weather. Late planting generally requires modifications to the agronomic system. This demonstration testing was established in response to grower questions about late planting, especially after wheat.

Study Guidelines

Demonstration were conducted by the Monsanto Learning Center in Scott, Mississippi in 2011 to evaluate the yield response of cotton and soybean varieties to late planting. Evaluated in the demonstration were six Deltapine® Genuity® Bollgard II® with Roundup Ready® Flex cotton varieties ranging from early to mid maturity, and a total of eight Asgrow® Genuity® Roundup Ready 2 Yield® soybean brands ranging in maturity from mid group IV to late group V. The cotton and soybean brands were planted late on June 13, 2011, and evaluated under both dryland and irrigated conditions. There were two replications for each crop variety grown under dryland or irrigated conditions. Crops were grown under local standard agronomic practices, with the exception of population and plant growth regulator (PGR) treatment differences in cotton. Under dryland conditions, cotton varieties were planted at 47,000 seeds per acre, with 12 oz/acre of mepiquat-chloride PGR applied on August 15, 2011. Under irrigated conditions, cotton varieties were planted at 55,000 seeds per acre, with mepiquat-chloride PGR applied at 12 oz/acre on July 28, 2011 and 24 oz/acre on August 15, 2011. Soybean brands were planted at 155,000 seeds per acre for both dryland and irrigated conditions. Cotton varieties were harvested on November 10, 2011, and soybeans were harvested on October 25, 2011.

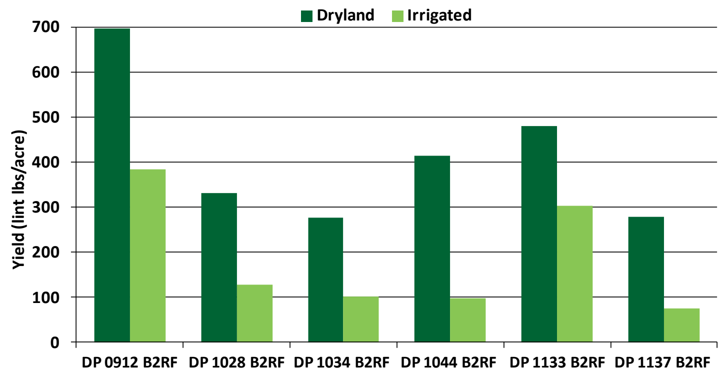

Figure 1. Yield of Deltapine® Genuity® Bollgard II® with Roundup Ready® Flex cotton varieties planted late under dryland and irrigated growing conditions.

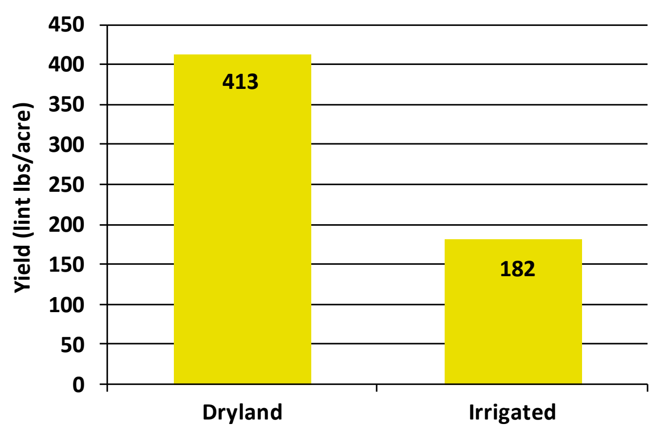

Figure 2. Average yield of six Genuity® Bollgard II® with Roundup Ready® Flex cotton varieties planted late as affected by dryland and irrigated growing conditions.

Results and Discussion

Cotton

Cotton yields ranged from 278 to 697 lbs lint/acre under dryland conditions, and from 76 to 384 lbs lint/acre under irrigated conditions (Figure 1). Yields were well below that which could be obtained with an earlier planting of cotton. The early maturing DP 0912 B2RF variety out-yielded all other varieties in the demonstration testing. Yields for all varieties were higher when grown under dryland conditions, with cotton yields on average more than double that obtained under irrigated conditions (Figure 2). Cotton yielded less under irrigated conditions because vegetation growth was prolonged and fruiting decreased.

Cotton yields typically begin to decline when planted after mid-May in Mississippi.[1] Since cotton has a long growing season requirement, frost is a concern for a late planted crop. Managing cotton for earliness by planting an early maturing variety can be important with a late planting. Good management practices for irrigation initiation, fertilization, and PGR applications are also important. Managing late planted cotton in response to environmental conditions can be a better strategy than trying to follow a pre-designated plan.[2]

Summary continued on next page

Cotton And Soybean Response to Late Planting

Continued from page 31

Soybeans

Soybean yields ranged from 49 to 63 bu/acre under dryland conditions, and from 48 to 56 bu/acre under irrigated conditions (Figure 3). All brands in the testing yielded well, and the yields were good compared to what could be obtained with an earlier planting of soybeans in the area. High yields resulted when soybeans were grown under both dryland and irrigated conditions. However, many of the brands yielded more when grown under dryland conditions, with an average of 5 bu/acre more compared to irrigated conditions across all brands. The dryland system generally yielded more than the irrigated system, possibly due to interactions with soybean maturity, disease pressure, and lodging at harvest.

Brand selection and planting dates are two of the most important considerations in soybean production.[1] Maturity group V and VI soybean varieties are generally more productive in Mississippi when planted in June. However, it appears that relatively late group IV soybean varieties could be considered as planting is more delayed into the double-crop season. Planting soybeans in narrow rows helps to increase productivity by promoting quicker canopy closure, better weed control, and improved light interception. Late planted soybean seeding rates should also be increased to account for potential losses from seedling diseases, increased insect pressure and shorter soybean plants.

Summary

When planted late in this demonstration, soybean brands performed more consistently than cotton varieties across the range of maturities tested. The early maturity cotton variety (DP 0912 B2RF) could achieve similar crop value compared the highest yielding soybean brands for double-cropping. However, the comparison would be dependent on cotton and soybean prices.

The risks will always be higher for both crops in double-crop situations, when compared to normal planting dates. Proper brand selection and optimal management are key imperatives that can help to mitigate some of the risk. Selecting early varieties is particularly important with cotton. Optimal agronomic practices for double-crop situations, including reduced fertility, appropriate PGR applications, proper plant density, and judicious irrigation decisions can all contribute to earliness in cotton. Disease and insect management can be particularly important with a late planting of soybeans.

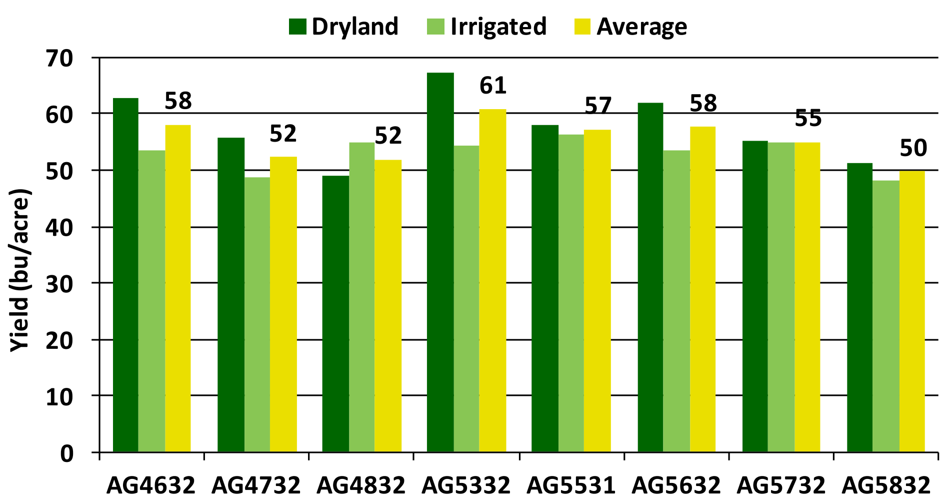

Figure 3. Yield of Asgrow® Genuity® Roundup Ready 2 Yield® soybean varieties planted late under dryland and irrigated growing conditions.

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Comparison of 30-Inch vs. 38-Inch Rows in Soybean

Twin-row planting has been shown to have several potential benefits including maximizing light use and allowing for greater plant root development. Because of these potential benefits, an effort is being made to evaluate narrow row spacings that could optimize soybean yields and be compatible with cotton production.

Study Guidelines

In 2011, a study was conducted at the Scott Learning Center to evaluate narrow row spacing in soybeans. Four Asgrow® soybean brands (AG4303, AG4531, AG4730, and AG5606) were evaluated for yield in 38-inch twin-row and 30-inch single-row systems. Populations in both systems were 140,000 seeds per acre. Plots went in on May 1, 2011 and were harvested on September 3. Agronomic practices were in alignment with local standards.

Results and Discussion

In this study, 30-inch single rows yielded an average of 64 bushels per acre while 38-inch twin rows averaged 59 bushels per acre across the various brands. Single rows out-yielded twin rows by close to 5 bushels per acre. Three of the four soybean products in the study had greater yields in 30-inch single rows compared to 38-inch twin rows (Figure 1). Canopy closure in the 30-inch rows occurred at about the same time or a few days earlier than in the twin rows.

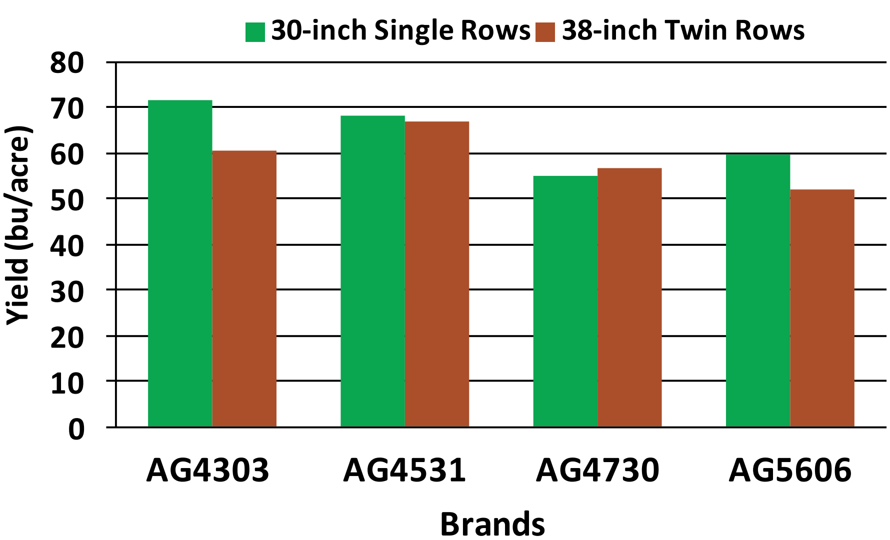

Figure 1. Average yields (bu/acre) of four soybean brands with different relative maturities planted in 30-inch single rows and 38-inch twin rows.

Summary

In this area, canopy closure generally occurs earlier in both 30-inch single rows and 38-inch twin rows compared to 38-inch single rows. There are several benefits to this including: better sunlight interception at earlier stages of plant growth, lower canopy and soil temperatures, and more efficient use of resources in the field.

Twin-row systems appear to be an option for soybean production in the Mid-South and have the added benefit of being compatible with cotton production. One component not included in this study is the impact of drainage on soybean yield potential in narrower rows. Some southern growers are moving from flat planted, narrow-row systems to 30-inch single-row or 38-inch twin-row bedded systems, based on drainage requirements.

References

L. Stalcup. Planting corn and soybeans in twin rows offers efficiency. Corn and Soybean Digest. Dec. 1, 2009. [Online] http://cornandsoybeandigest.com (Verified 11/1/11).

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

Evaluating Suboptimal Soybean Stands

Planting into a poor seedbed, planter adjustment problems, poor quality seed, soil crusting, inadequate or excessive soil moisture, seedling diseases, and numerous environmental issues can contribute to less than ideal soybean stands. Soybean replant decisions can be difficult for consultants and growers to make. Furthermore, the soybean plant can physiologically adjust to the adjacent plants in the field by adding branches, pods per plant, seeds per pod, and an increasing seed size. For a second year, the Scott Learning Center evaluated suboptimal soybean stands in order to better understand the criteria for replanting.

Study Guidelines

A demonstration trial was conducted at the Monsanto Learning Center in Scott, Mississippi to evaluate the effects of reduced plant population on soybean yield. This was the second year of a study initiated in 2010 at the Scott Learning Center.

Twin rows were planted 7.5 inches apart on a 38-inch bed with a Monosem® Twin-Row planter. Different soybean stand regimes were implemented in order to compare a “normal” stand with reduced plant populations, skip stands, replanting into an existing stand, and replanting a new stand (Table 1). Special modifications were made to the planter plates to allow the planting of skippy stands.

Table 1. Description of the nine soybean stands evaluated in this study.

Treatment	Soybean Stand (seeds/acre)
1	140,000 Planted
2	85,000 Uniformly planted
3	85,000 w/ 12-inch skips
4	85,000 w/ 24-inch skips
5	65,000 Uniformly planted
6	65,000 w/ 12-inch skips
7	65,000 w/ 24-inch skips
8	Plant 65,000 into 65,000 planted
9	65,000 killed and replanted @ 140,000

Twelve-inch and 24-inch skips were randomly inserted across selected plots. Prior to planting, populations were calculated using the skips as a variable to result in the end target population. The number of skips increased as final plant population decreased.

Maturity Group IV and Group V soybean products, Asgrow® AG4531 brand and AG5606 brand, were planted on May 2, 2011. The replanting date was May 19, 2011. Weeds were controlled with a preemergence (PRE) application of Warrant® Herbicide at 40 oz/acre plus Sencor® herbicide at 0.33 lbs/acre, and if needed, Roundup WeatherMAX® herbicide at 22 oz/acre behind the planter. Postemergence weed management consisted of a layby application of PARRLAY® herbicide at 16 oz/acre plus Roundup WeatherMAX herbicide at 22 oz/acre. Demonstrations were furrow irrigated as needed. All plots were harvested on October 10, 2011.

Results and Conclusions

Previous research has indicated that skips of less than 2 feet generally have little effect on soybean yield[1]. Areas where skips from 2 to 3 feet were observed may result in a yield reduction up to 13%[1].

No differences were seen between maturity groups when data was combined. Results from this research support the observation that soybeans have a tremendous ability to compensate for missing plants (Figure 1). The yield range among the nine soybean stands was only 5 bu/acre, with a high of 44 bu/acre and a low of 39 bu/acre. Results from 2010 showed the average yield across varieties and planting dates differed by only 7 bu/acre, with high and low yields of 71 and 64 bu/acre, respectively[2]. The 2011 data once again confirms that a producer can expect to achieve favorable yields with a plant population down to 65,000 seeds/acre if the planting skips are 2 feet or less in length down the row.

Very little yield difference was observed when comparing yield data from a “normal stand” of 140,000 planted (43 bu/acre), a reduced stand of 65,000 uniformly planted (42 bu/acre), planting 65,000 into 65,000 (44 bu/acre), and destroying a 65,000 stand to replant 140,000 (39 bu/acre). Replanting 65,000 into a 65,000 stand resulted in only a slight increase in yield (2 bu/acre) over the left-alone 65,000 stand (Figure 1). A reduction in yield was observed when a low plant population was killed and replanted. As a general rule, lower yield potential can be expected with later planting dates.

Summary continued on next page

Evaluating Suboptimal Soybean Stands

Continued from page 34

Previous university research concluded that there is no yield advantage to filling in thin stands (66,000 or greater plants/acre) with rowed beans[3]. Reasons for this response include the potential damage the second planting can cause to the original thin stand. Additionally, the yield potential of the second planting is lower because of the later planting date and competition from the original stand.

References

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[2]Scott Learning Center Summary, Evaluating suboptimal soybean stands, 2010.

[3]Semmel, T, EP Christmas, and GC Marini. An evaluation of supplemental planting to increase marginal stands of narrow row soybean using a 30 inch planter. (American Society of Agronomy, Annual meetings, 10-14 Nov. 2002. Indianapolis, IN). Agronomy Abstracts 2002.

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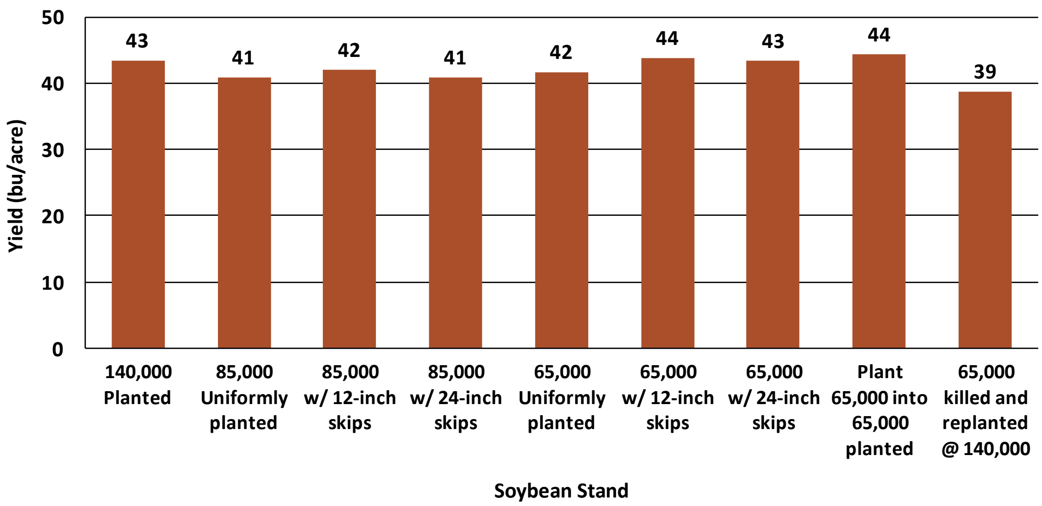

Figure 1. Effect of soybean stand on yield. Results averaged across maturity groups.

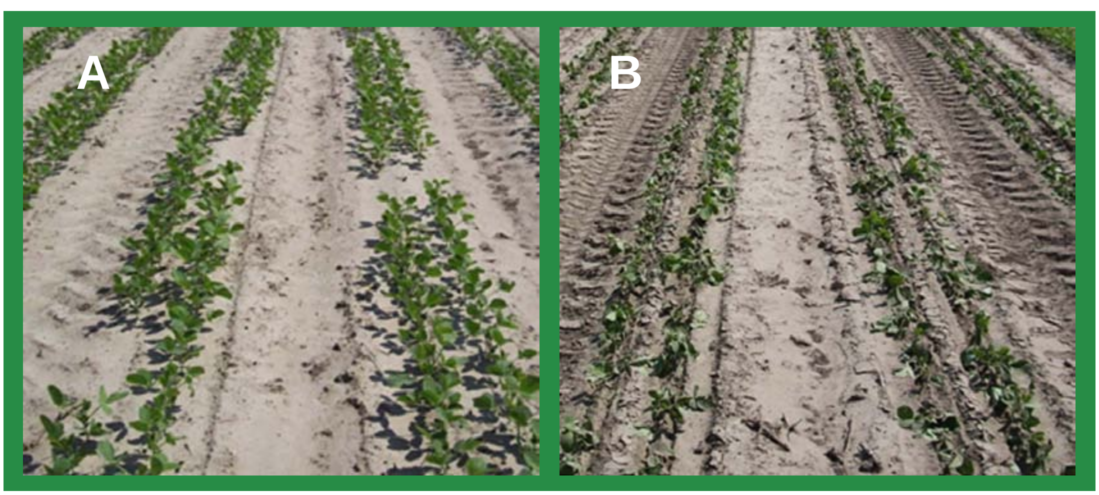

Figure 2. (A) Randomized 12-inch skips and

(B) Replanting 65,000 into 65,000.

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Evaluation of Deep Tillage in Soybeans

Soybean production on some of the less productive soils in the Mid-South can be challenging and only marginally profitable. Deep tillage or subsoiling in the fall has been shown to improve the productivity of soils by reducing the adverse effects that can be caused by compaction. This demonstration was conducted to help define the conditions when subsoiling is most beneficial.

Study Guidelines

Demonstration trials were conducted by agronomists from the Monsanto Learning Center in Scott, MS in 2011 to evaluate the effect of deep tillage (subsoiling) on soybean yield. Strip trial demonstrations were conducted at two grower locations on silt loam soils using similar management practices. Treatments were conventional tillage (disc bedder to a depth of 4 to 5 inches) and deep tillage (Paratill® subsoiler to a depth of 16 to 20 inches). Tillage was conducted in early October 2010 after rice harvest. Maturity group IV Roundup Ready® soybean products were planted on April 25, 2011 in twin rows (two drills spaced 7.5 inches apart) on a 38-inch raised bed system under furrow irrigation. Plots were harvested on October 10, 2011 using grower equipment and a weigh wagon. Soybean yields were converted to bushels per acre (bu/acre) adjusted to 13% moisture.

A four row Paratill® subsoiler was used in the demonstration trials for the deep tillage operation conducted in the fall.

Results and Discussion

Soybean yields ranged from 54 to 56 bu/acre in strip plots under conventional tillage, and from 58 to 62 bu/acre in strip plots under deep tillage. Averaged across these two locations, deep tillage conducted in the fall resulted in a soybean yield increase of 5 bu/acre more than conventional tillage (Figure 1). Conditions were dry when tillage was conducted in the fall of 2010, followed by an extremely dry winter and summer with record high temperatures and below average rainfall during the 2011 growing season.

Compaction of soil from large equipment or other causes can alter soil structure and reduce its productivity. Compaction can also adversely affect the amount and movement of air, water, heat, and nutrients in the soil, thereby affecting plant growth.[1] Deep tillage (subsoiling) in the fall can help minimize the adverse effects of soil compaction. By loosening up the soil material, deep tillage can enhance water infiltration and allow for higher rates of internal water movement. Loose soil can help store more water, allow for better drainage of excess water, improve soil aeration, and allow soils to warm more quickly in the spring. Surface runoff and soil erosion can also be reduced.[2]

Summary continued on next page

Evaluation of Deep Tillage in Soybeans

Continued from page 36

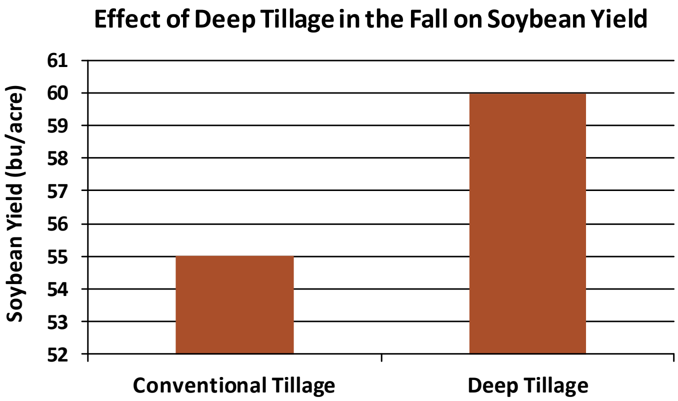

Figure 1. Effect of deep tillage in the fall on soybean yield .

Research conducted in Mississippi showed that the yield response of soybeans to deep tillage was greater under drier growing conditions. Testing conducted over a five-year period (1994-1998) on a clay soil showed that deep tillage in the fall increased the yield of non-irrigated soybeans above that produced from a conventional disked treatment. However, yields were similar when soybeans were grown under irrigation.[3] Testing conducted in 2006, under irrigation on a clay soil, showed a positive soybean yield response with deep tillage over shallow tillage and no-till, and with planting on raised beds over flat beds. The data showed a 12 to 14 bu/acre yield advantage with deep tillage over conventional tillage.[4] Research indicates that implementing methods to improve surface and internal drainage can prove profitable in soybean production.

Summary

This demonstration testing showed that deep tillage in the fall can help enhance soil productivity and soybean profitability under growing conditions in the mid-southern U.S. Testing should continue into the 2012 growing season to further define the benefits of deep tillage, and under what conditions subsoiling would be beneficial in soybean production.

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Insect Resistance Management
Planting Refuges, Preserving Technology

Before opening a bag of seed, be sure to read, understand and accept the stewardship requirements, **including applicable refuge requirements for insect resistance management**, for the biotechnology traits expressed in the seed as set forth in the Monsanto Technology/Stewardship Agreement that you sign. By opening and using a bag of seed, you are reaffirming your obligation to comply with the most recent stewardship requirements.

RESPECT THE REFUGE® RESPECT THE REFUGE® Roundup Ready® 2 TECHNOLOGY LIBERTY LINK® IGNITE® HERBICIDE TOLERANT

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