2010 Demonstration REPORTS

The LEARNING CENTER

at Scott, Mississippi

Technology Development by MONSANTO

Dear
Reader

Our mission at the Learning Center is to provide valuable agronomic and technical information that will help keep you on the forefront of yield, efficiency, and profitability. To enhance your experience at the Learning Center, we plan to continue showcasing new technologies in our product pipeline and provide summaries of important research conducted onsite. With this in mind, summarized here are the results from several trials we conducted at the Learning Center in 2010. I hope you find the information contained in these summaries to be valuable to your farming operation, and I look forward to hosting you at the Learning Center again in 2011!

To schedule a tour of the SLC please call either Krista Fratesi at 662-742-4281 or me at 662-742-4282. We can also be reached at: learning.center-scott@monsanto.com.

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Sincerely,

Jay Mahaffey, Manager
Monsanto Learning Center – Scott, MS

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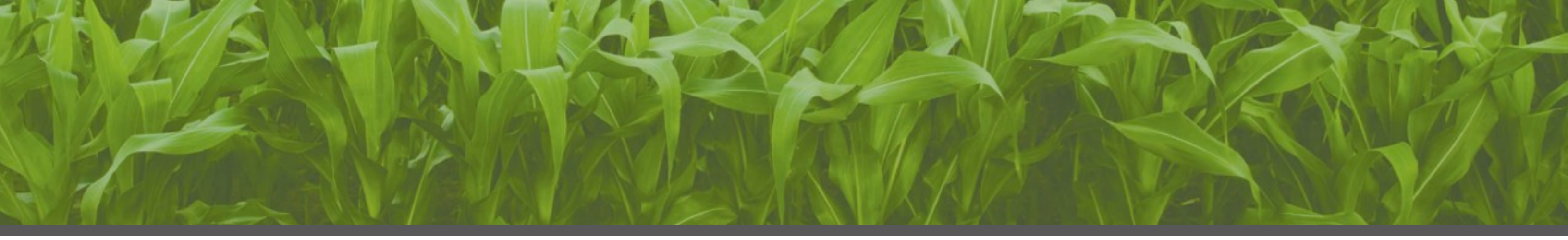

Corn Replant Strategies

Decisions on whether to leave an existing planted stand or to replant it can be difficult. When deciding to replant corn, several factors must be assessed such as evaluating the surviving stand for plant counts and spacing, replant timing, and production potential.

Study Guidelines

In 2009 and 2010, a study on corn replant strategies was conducted at The Learning Center at Scott, MS to better assess how replant decisions can affect final harvest yield. To evaluate how relative maturity (RM) may affect yield potential in a replant situation, two corn products were selected: a 114 RM and a 119 RM. Large blocks of both corn products were planted in March at 36,000 seeds/A with fertility, irrigation, and weed control remaining consistent throughout all plots. The trial was comprised of four simulated replant scenarios and a check consisting of the original stand. Excluding the check, all other plots were treated 14 days after peak emergence, about 25 days after planting. The treatments were as follows:

1. **Check plot:** left as planted.
2. **Simulated 100% crop loss:** SelectMAX® herbicide applied across the entire plot and replanted on 4/20/09 and 4/22/10 at 36,000 seeds/A.
3. **Simulated 30% crop loss:** SelectMAX herbicide applied across a block of 30% of the plot and the block replanted on 4/20/09 and 4/22/10at 36,000 seed/A.
4. **Simulated poor stand with no replant:** Stand thinned to 18,000 seeds/A and not replanted.
5. **Simulated poor stand with interplant:** Stand thinned to 18,000 seeds/A and the entire plot interplanted on04/20/09 and 4/22/10 at 18,000 seeds/A.

Results

Yield results from the trial suggest that the corn products selected may be sensitive to optimum planting populations. Corn yields were reduced in both scenarios where corn stands were thinned to 18,000 seeds/A and either left at 18,000 seeds/A or interplanted with an additional 18,000 seeds/A (Figure 1). In the thinned and interplanted scenario, the poor plant spacing resulted in yield reductions caused by poor interception of light, nutrients, and water. In the 18,000 plant population, less competition within the row still did not make up for the fewer number of plants for grain production.

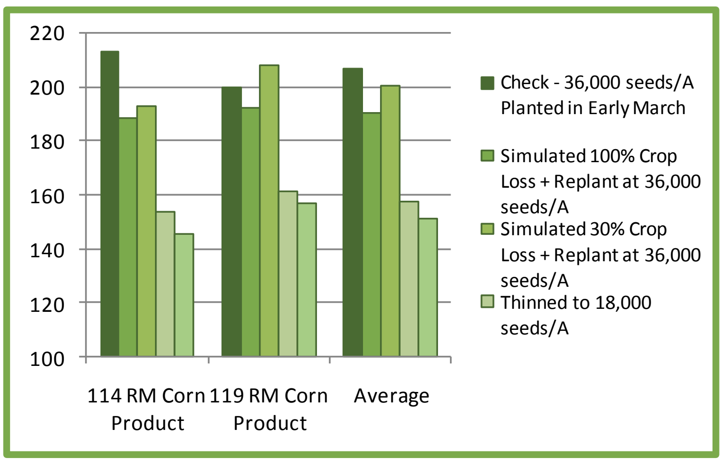

Figure 1. Average yield results from 2009 and 2010 corn replant study.

The check plot, which was planted at 36,000 seeds/A in March reported the highest yield of 206.5 bu/A when averaged across both RM products and 2009 and 2010 data (Figure 1).

In the simulated 100% crop loss scenario, SelectMAX was applied to kill all corn seedlings and the entire plot was replanted. When averaged across both years and corn products, the simulated crop loss scenario yielded 16.25 bu/A less than the check plot .

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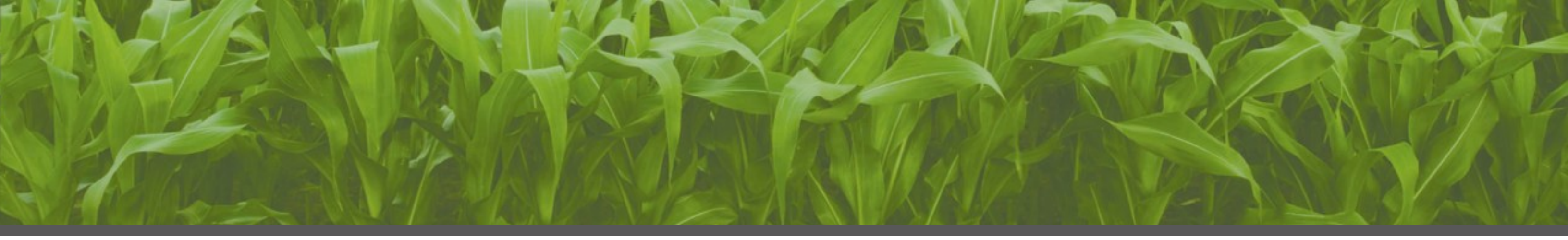


Corn Replant Strategies

For the simulated 30% crop loss scenario, SelectMAX was applied to kill all corn seedlings in a section equaling 30% of the total plot. This section was then replanted. The simulated 30% crop loss scenario yielded 6 bu/A less than the check plot when averaged across corn products and years.

Evaluation of average yield results from 2009 and 2010 data suggest highest yields are obtained when an ideal planting population is maintained throughout the growing season. The data also suggests that in situations where early-season crop loss occurs to an entire field or portion of a field, some yield may be recovered. This points out the potential for successful spot planting, which could also be applied to larger field areas such as corners, ends, and washes. While these areas may be successfully replanted, special consideration should be given to area-specific agronomic management, inputs needed, and weather influences on the ultimate outcome. The same corn hybrid should be used when replanting a portion of a field. When replanting an entire field a different hybrid may be selected; however, a shorter season hybrid may not tolerate late-season heat stress typical in the South. Remember that replanting can delay harvest, and in replant situations late-season harvest conditions may have a greater impact on yield potential. Replanted corn may need to be harvested at a higher moisture content than usual, and diligence must be taken to harvest in a timely manner.

This study also helps to demonstrate the importance of optimum stand establishment as thin stands reduced yield potential. Planting equipment should always be calibrated and checked to avoid any mechanical and/or seed placement errors. Seed treatments, adequate soil fertility, and planting into a favorable weather forecast can also help increase seedling survival. If replanting becomes necessary, to ensure proper plant spacing and uniform crop maturity, a burndown herbicide treatment should be applied to any surviving corn plants.

Replanting is time consuming and costly to producers, but it can be a viable agronomic practice given the right conditions. Careful consideration of the stand should always be taken before making the decision to replant.

Figure 2. Simulated 30% field loss and replant scenario.

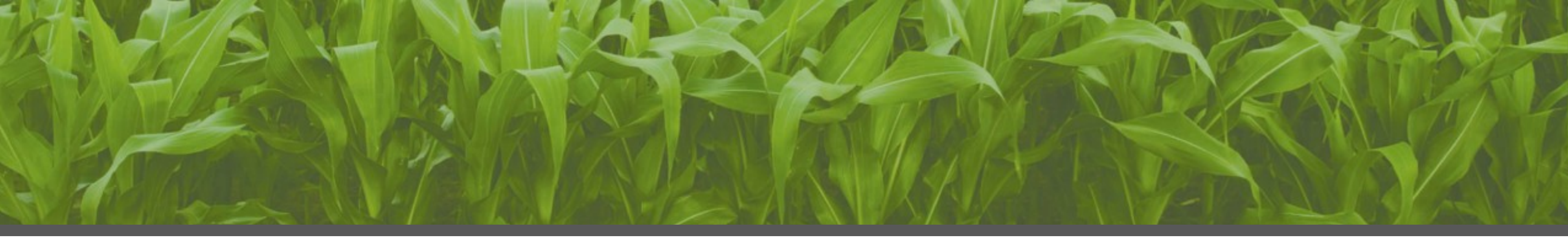
Figure 3. Simulated 100% Crop Loss + Replant at 36,000 seeds/A .

Sources:

Farnham, D.E. 1998. Making corn replant decisions. Integrated Crop Management. Iowa State University Extension. http://www.iastate.edu/

Larson, E. 2009. Corn replant/late planting suggestions. Mississippi State University. http://msucares.com (viewed 1/25/2011)

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



Effects of Plant Population and Row Spacing on Corn Yield

Each year farmers select specific hybrids to be planted in particular fields at certain planting populations, while carefully weighing the potential for increased yield with the potential for stalk lodging or lack of return on the investment for increased seeding rates. In the South, farmers have often had to limit planting populations, to help mitigate potential yield loss, which can be attributed to stalk lodging caused by Southwestern Corn Borer (SWCB) damage and frequent late season storms/hurricanes. Advancements in biotech traits have helped reduce the risk of stalk lodging due to damage from SWCB. Advancements in germplasm have helped reduce plant and ear heights, which can further help reduce the risk of stalk lodging due to conditions which cause stalks to weaken and lodge including the potential for hurricanes. Therefore, higher populations and different row spacing configurations are being evaluated in an attempt to maximize yield potential and the return on investment of seed.

Study Guidelines

Testing was conducted at the Monsanto Learning Center at Scott, Mississippi in 2010 to evaluate the effects and interaction of plant population, row spacing, and germplasm on yield potential. Planting populations were evaluated at 28,000, 33,000, 38,000 and 43,000 kernels/acre. 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. Region appropriate fertility and weed control practices were standard throughout all plots, with a final yield goal of 240 bu./acre.

Two hybrids with Genuity® VT Triple PRO™ technology were chosen for this test. Hybrid A is a 116 day hybrid with a shorter plant type and lower ear height. Hybrid B is a 117 day hybrid that is medium to tall, and has moderate to high ear placement.

Table 1. Net Gain ($/acre) for each 5,000 seeds/acre increase in population.

	Hybrid A	Hybrid B
28000	na	na
33000	$93.79	$22.07
38000	$38.61	-$23.74
43000	-$33.90	-$95.24

Corn Price	$5.25
Seed Price	$250.00
Seed/Bag	80000
Price per seed	$0.003125

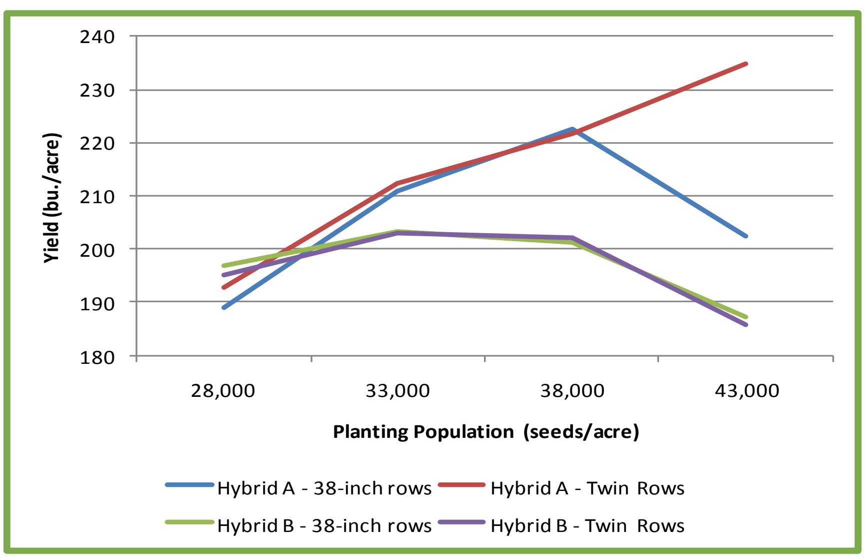


Figure 1. Yield response of two hybrids, in 38-inch rows and twin rows,

Results

The two hybrids responded differently to row configuration and population in terms of yield and return on investment (ROI) (Figure 1 and Table 1). Hybrid A showed optimal yield potential at 38,000 or 43,000 seeds/acre depending on the row spacing configuration. The best ROI for Hybrid A was with 38,000 seeds/acre when averaged across row spacing configurations. The highest yield and ROI for Hybrid B was achieved at 33,000 seeds/acre regardless of row spacing configuration.

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Effects of Plant Population and Row Spacing on Corn Yield

Conclusions

- Germplasm can significantly affect the optimum plant population in terms of yield potential and ROI.
- Hybrids with shorter plant heights and lower ear placement are more likely to withstand the wind damage from hurricanes that can cause stalk lodging. This adaptation allows for higher plant populations, near 38,000 seeds/acre, and thereby higher yield potential.
- Traits that protect against SWCB help reduce the risk of stalk lodging due to SWCB damage and associated stalk weathering, thereby making the concept of planting at higher populations to attain higher yield potentials more feasible.
- The interactions between germplasm, row spacing, and populations will continue to need to be evaluated as advancements in breeding and technology occur.

Southwestern Corn Borer

Twin Row Corn

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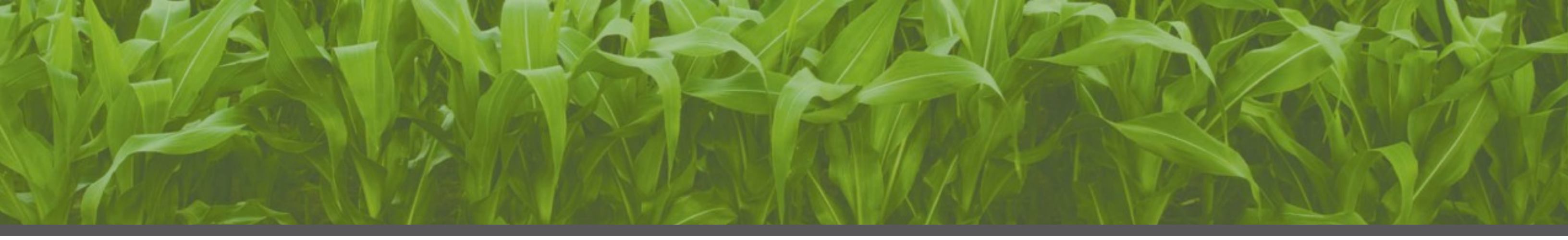

Nitrogen Source and Corn Yield

Being one of the most used and expensive crop inputs, nitrogen (N) is an important part of modern crop production. Due to the volatility of N in nature, understanding N sources and proper placement is critical. Effective strategies for N management minimize loss from volatilization, leaching, and denitrification. Denitrification is the conversion of nitrate to gaseous forms of nitrous oxides in the soil. The N found in urea fertilizers can be lost by volatilization if it remains on the soil surface for extended periods of time. The key to the most efficient use of urea fertilizer is to incorporate it into the soil surface by tillage or a minimum of ½ inch of rain within a 36 hour period. Using the right N source and application method may be more important to corn yield potential, than how much N is applied.

Use of urea fertilizer is gaining consideration from Midsouth growers because it is more economical; however, there is risk associated with its use on corn. Urea (46-0-0 or 41-0-0) or urea-containing N sources, including UAN-solution (N-sol, 32%, or 28%), are subject to volatilization loss when applied to the soil surface (either broadcast or dribbled in a band). With increased corn production in the Midsouth, growers faced with additional time constraints due to large acreage are utilizing urea fertilizer as part of their management plan. Due to the increased use of urea in the Midsouth region, a study was conducted at the Monsanto Company Learning Center at Scott, MS to compare the use of urea fertilizer versus UAN solution on corn growth and yield potential.

Study Guidelines

In 2010, a preliminary study was conducted at the Learning Center at Scott, MS to evaluate how different sources of N effect harvestable corn yield potential. In the trials, two corn hybrids with different relative maturities (117 and 118 RM) were used. In each plot, a corn hybrid was planted at a depth of 2 inches. Irrigation and weed control remained constant for all plots. The N source and application timing were the only variables in this study. In Plot 1, granular urea was used as a single preplant application (Table 1). In Plot 2, urea was used as a 50% preplant application followed by a 50% layby application. Plot 3 utilized UAN 28% solution as a single preplant application. Plot 4 was the traditional UAN 28% solution as a 50% preplant application followed by a 50% layby application. The 5th plot included 50% of the total N as urea applied preplant followed by 50% applied as UAN 28% solution at layby. It is important to recognize that all applications of N fertilizers were properly incorporated into the soil. For all urea application applied preplant, urea was applied prior to bed construction and the raised beds were flattened utilizing a do-all (Figure 2). For all layby applications, urea was applied prior to cultivation. UAN 28% solution was applied with a coulter/knife applicator with two

N Source and Application Timing	
Plot 1	Urea 100% Preplant
Plot 2	Urea 50% Preplant, 50% Layby
Plot 3	UAN Solution 100% Preplant
Plot 4	UAN Solution 50% Preplant, 50% Layby
Plot 5	Urea 50% Preplant, UAN Solution 50% Layby

Table 1. N sources and timings.

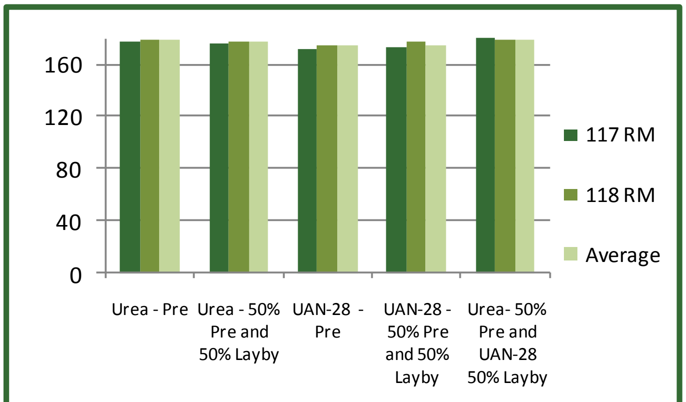

Figure 1. Effect of N source and application timing on corn yield.

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coulter/knives set at a minimum of 5 inches. Applications of the UAN 28% solution were made at planting and at layby.

Results

All N treatments evaluated in the study reported similar yield results (Figure 1). Results also demonstrate that under ideal management practices, urea can serve as an excellent N source for Midsouth corn production. Proper N application and incorporation are critical to reduce N losses. Surface application of urea without timely incorporation into the soil can lead to a substantial decrease in N efficiency due to the potential loss via ammonia volatilization.

Next year, the Learning Center at Scott, MS will expand this study to include additional combinations and timing for N applications.

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Figure 2. Do-all used to flatten beds for proper incorporation of

Figure 3. Utilizing cultivation to properly incorporate layby N application.

Sources:

Corn: Nutritional Requirements. Penn State University. Agronomic Guide 2009-2010. http://www.psu.edu/ (verified 12/2/2010).

Larson, E. and L. Oldham. 2010. Grain Crops Update: Corn Nitrogen Suggestions. Mississippi State University Extension Service. http://msucares.com (verified 12/2/2010).

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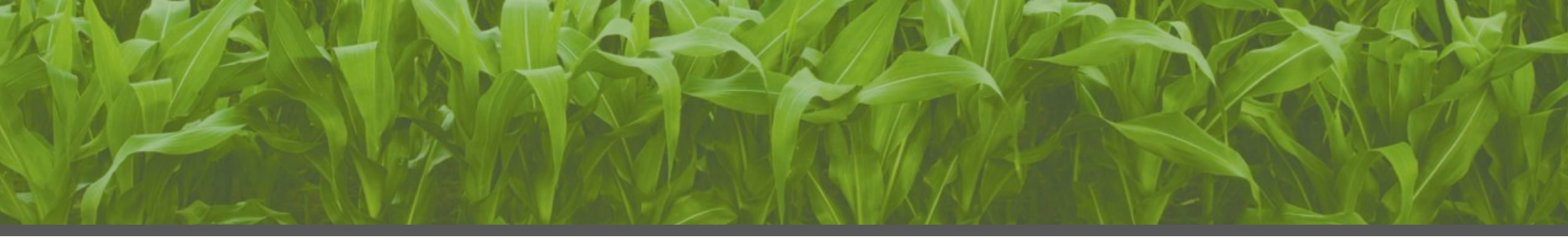
Overdahl, C. J., G. W. Rehm and H. L. Meredith. 1991. Fertilizer Urea. University of Minnesota Extension. College of Agriculture, Food and Environmental Sciences. WW-00638-GO. http://www.extension.umn.edu/ (verified 12/2/2010).



Effect of Frost and Hail Damage to Early Season Corn

Corn farmers in the Midsouth are occasionally faced with the issue of what to do after an early season frost or hail event. After damage occurs, management strategies will depend on the severity of the damage and the growth stage of the plants. The growing point of the corn plant remains below the soil surface until approximately the V5 growth stage. Generally, if the growing point is below the soil surface the young corn plant can recover from severe frost or hail damage, but damage such as withered or blackened leaves may occur to the aboveground plant parts.

Midsouth farmers rarely face severe frost damage when compared to their Midwest counterparts; however, it is still important to understand the risks and recommendations associated with cold spring temperatures. The colder the temperatures, the higher the potential for severe damage. Frost damage can occur at temperatures greater than 28^0 F, but air temperatures can become lethal when they fall below 28^0 F for more than a few hours.

Most of the Midwest data suggests that doing nothing after a frost may be the best option. As part of the Scott Learning Center's continued efforts to address agronomic issues for Southern farmers, a study was conducted to evaluate the impact of early-season frost and hail damage to corn yield potential in the southern cropping system.

Study Guidelines

In 2010, a study was conducted at the Learning Center at Scott, MS to evaluate the effect frost and hail damage may have on corn yield potential. In the trials, two corn products with different relative maturities (117 and 118 RM) were selected. Prior to the V4 growth stage, a simulated frost event was performed by removing all above ground plant material with a string trimmer. To simulate hail damage, the string trimmer was used to strip foliage from the corn plants at V4 growth stage. Soil fertility, irrigation, and weed control remained constant throughout all plots.

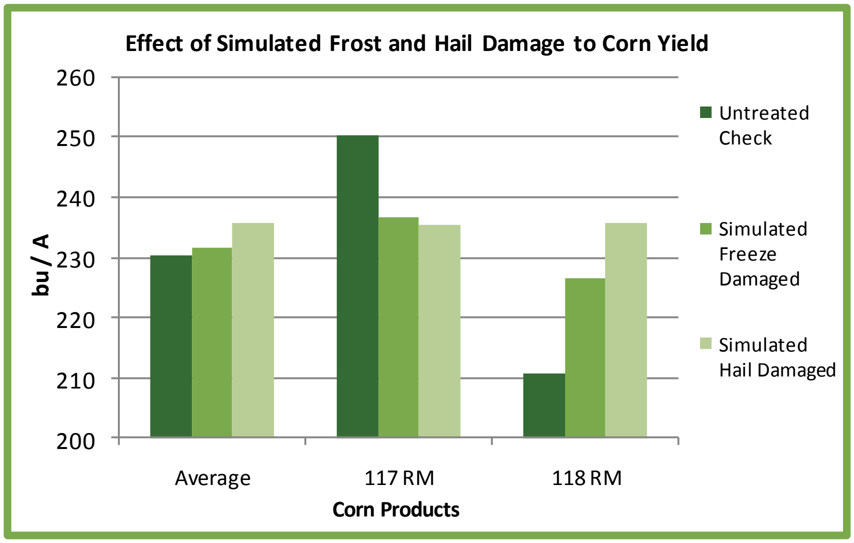


Figure 1. Effect of simulated frost and hail damage to corn yield.

Results

Results from the study showed different relative maturity corn products responded similar to frost and hail damage. When compared to the untreated check, both the simulated frost and hail damage treatments yielded equal to or slightly higher. When the corn products yields were averaged, the corn with simulated hail damage yielded the highest at 235.6 bu/acre. These data show that for the Southern corn grower patience and thorough scouting is needed prior to making a replant decision. After severe weather damage, it is important for growers to take a stand count of the young plants that show evidence of recovery. To inspect the condition and height of the growing point, split the young stalk or stem vertically. A white or cream-colored growing point, that is still firm, means that the plant is recovering. Growing points that are darkening and soft are beginning to die.

Due to the typically longer growing season in Southern regions, growers may want to wait 7 to 10 days after a frost or hail event before evaluating the health of their corn stand. Frost damaged plants that recover may reach maturity a few days later than normal.

Summary continued on next page

Effect of Frost and Hail Damage to Early Season Corn

Figure 2. Corn with blackened leaves, a symptom of frost damage.

Figure 3. Frost damaged corn plants.

Sources:

Bremer, J. E., C. D. Coffman, and S. D. Livingston. Assessing hail and freeze damage to field corn and sorghum. Texas Agricultural Extension Service. B-6014. http:// lubbock.tamu.edu (verified 11/09/2010).

Elmore, R. and B. Doupnik Jr. Impact of early season frost (before V4) Iowa State University Agronomy Extension. http:/www.iastate.edu/ (verified 11/09/2010).

Nielsen, R. L. and C. Ellsworth. 2002. Early season frost and low temperature damage to corn and soybean. Purdue University. http://www.agry.purdue.edu.(verified 11/09/2010).

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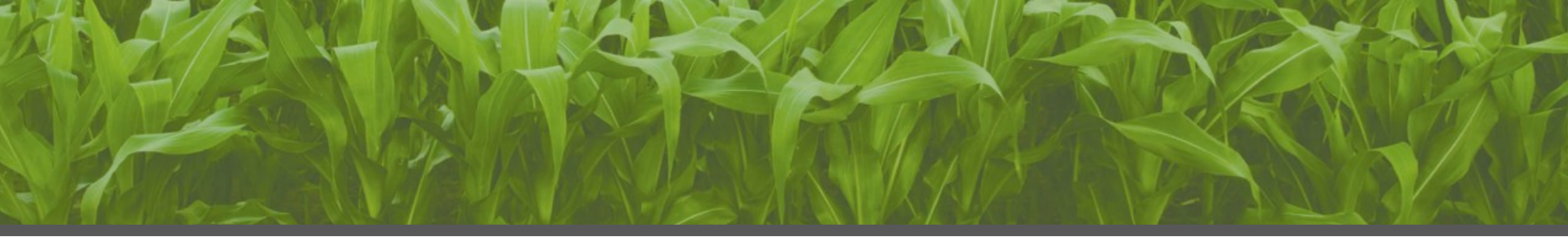

Evaluation of Genuity® VT Triple PRO™ Corn at Different Planting Dates

In the Southern United States, multiple generations of lepidopteran insects result in annual, problematic damage in corn. Corn earworm (CEW), fall armyworm (FAW) and Southwestern and/or European corn borers can cause economic loss from stalk and ear feeding and increase the risk of mycotoxins. The date when corn is planted may also influence the amount of insect damage the crop receives. Typically, insect pressure is higher in later planted crops. Corn products that contain insect protection traits, such as Genuity® VT Triple PRO™, can help control insect damage and protect yield potential.

Study Guidelines

A demonstration trial was conducted in 2010 at the Monsanto Learning Center at Scott, MS to assess corn yield response of Genuity® VT Triple PRO™ corn to different planting dates. The planting dates were; March 17th, March 30th, April 16th, May 6th and May 20th. Two hybrid families were used and each family included Genuity® VT Triple PRO™ corn and Round Ready® Corn 2. The corn products had a 116-117 day relative maturity (RM) and the agronomic practices were those common for the region. The trials were irrigated and planted on two contrasting soil types; a silty clay loam and a sandy loam. Planting rates for each soil type and hybrid were 38,000 kernels/acre. Soil fertility was managed for each soil type based on a 240 bu/A yield potential. Insect scouting was conducted during the season.

Results

Insect infestations were high throughout the season. Overall the trial with clay soils had higher yields compared to the sand soils. However, the yield trends were similar for both soil types and families therefore, the summary data has been combined.

Compared to Roundup Ready® Corn 2, Genuity® VT Triple PRO™ corn had a yield advantage of at least 10 bu/acre at all five planting dates (Figure 1). Overall the two later plantings, May 6th and May 20th, had lower yields in contrast to the earlier plantings. In addition, the Genuity® VT Triple PRO™ corn planted on May 6th had a yield advantage of 19.1 bu/acre and the Genuity® VT Triple PRO™ corn planted on May 20th had a yield advantage of 17.7 bu/acre.

Figures 2 and 3 each show linear a regression of the Genuity® VT Triple PRO™ corn and Roundup Ready® Corn 2 yields verses the number of days after the first planting (March 17th). The average Genuity® VT Triple PRO™ corn yield at the first planting date was 219.54 bu/acre (y-intercept) with an average .6477 bu/day loss for the Genuity® VT Triple PRO™ corn planted after March 17th (Figure 2). The average Roundup Ready® Corn 2 yield at the first planting date was 210.08 bu/acre (y-intercept) with an average .8082 bu/day loss for the Roundup Ready® Corn 2 planted after March 17th (Figure 3).

The difference in y-intercepts (219.54 - 210.09 = 9.45) denotes the initial net advantage of Genuity® VT Triple PRO™ corn which was 9.54 bu/acre. If corn is sold at $5.25, this advantage totals $49.61 per acre. Results from this study show that for every day that planting is delayed, Genuity® VT Triple PRO™ corn can provide a 0.1605 bu/acre per day or $0.843 per acre per day advantage.

Conclusions

- The data reinforces the recommendation that the optimal planting time for corn in Mississippi is before mid April.
- Genuity® VT Triple PRO™ showed a yield advantage of at least 10 bu/acre, even at the early planting dates.
- Genuity® VT Triple PRO™ shows an increasing yield advantage as planting dates get later.
- The data demonstrates the value growers receive from planting Genuity® VT Triple PRO™ in both direct yield savings and risk management potential.
- Not all corn hybrids perform the same. To achieve the highest yield potential one must select well adapted hybrids and manage them well.
- Based on the data and corn priced at $5.25, for each day planting is delayed Genuity® VT Triple PRO™ corn loses $3.40 worth of corn production per acre.
- Based on the data and corn priced at $5.25, for each day planting is delayed Roundup Ready® Corn 2 loses $4.24 worth of corn production per acre.
- In this trial for every day of delayed planting, Genuity® VT Triple PRO™ corn had a $0.843 per acre per day advantage compared to Roundup Ready® Corn 2.

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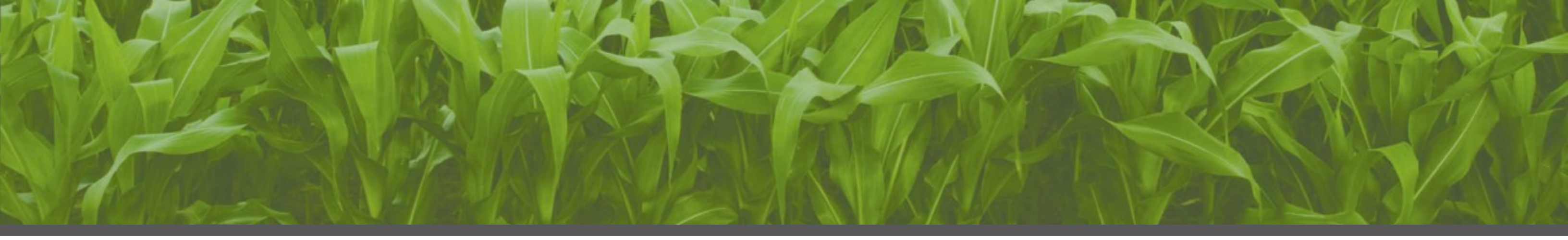
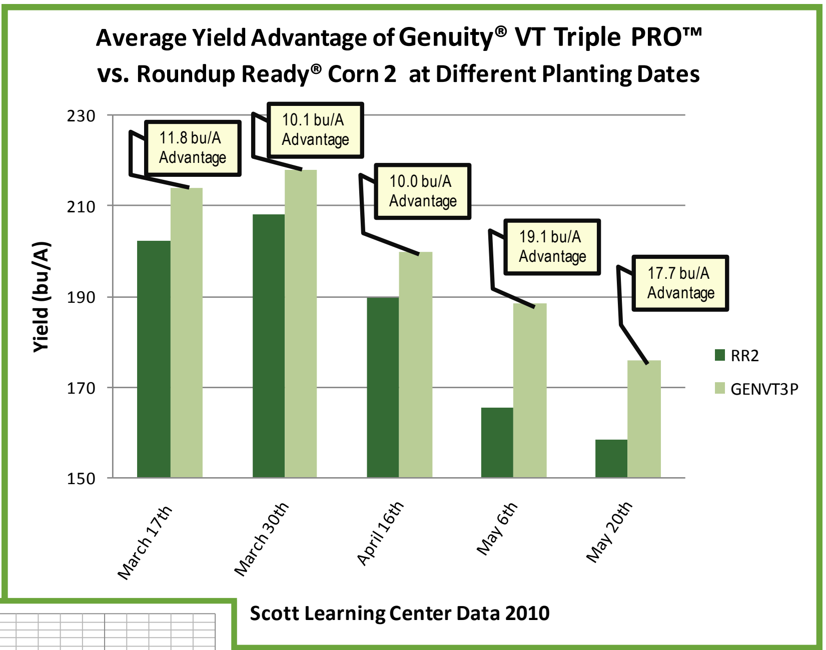


Evaluation of Genuity® VT Triple PRO™ Corn at Different Planting Dates

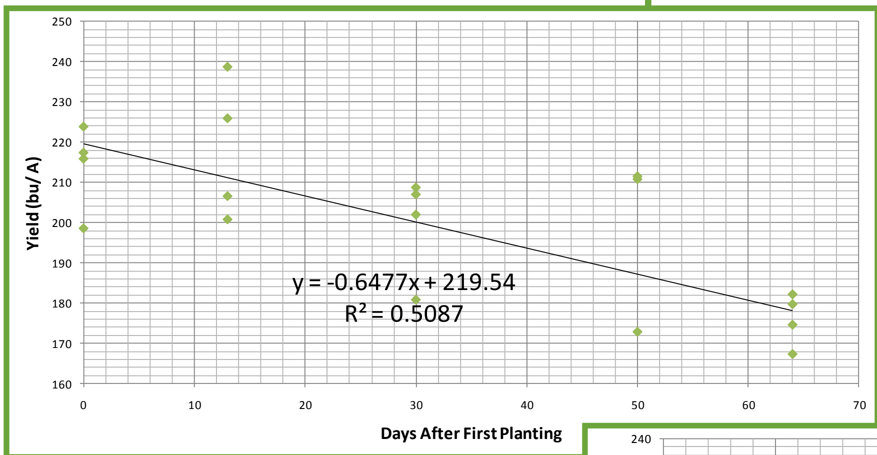
Figure 1.►

Effect of planting date and trait on corn yield with both soil types and hybrid families combined. Monsanto Learning Center at Scott, MS 2010. Roundup Ready® Corn 2 = RR2 and GENVT3P = Genuity® VT Triple PRO™



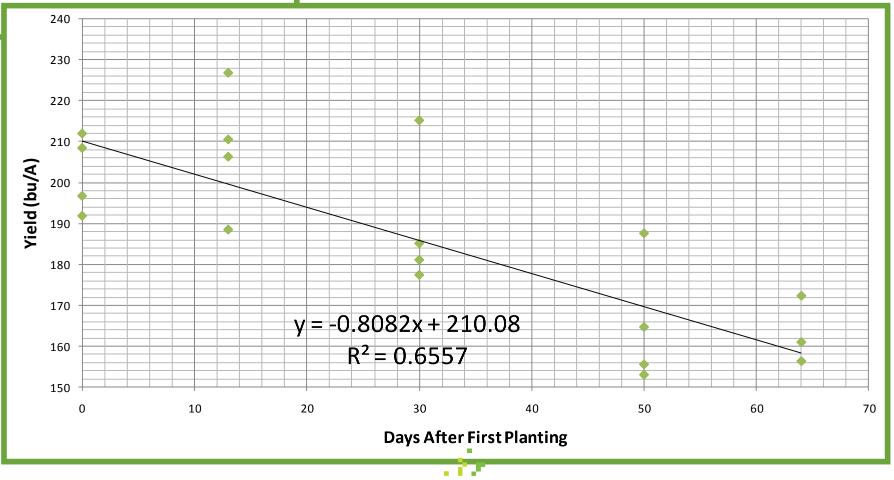
▼ Figure 2.

Genuity® VT Triple PRO™ corn yield verses days after first planting. Yield was calculated based on 15% moisture content. Y-intercept and average yield of first planting date is 219.54 bu/A with an 0.6477 bu/day when planted after the first planting date (March 17th). Monsanto Learning Center at Scott, MS 2010.



▼ Figure 3.

Roundup Ready® Corn 2 yield verses days after first planting. Yield was calculated based on 15% moisture content. Y-intercept and average yield of first planting date is 210.08 bu/A with an 0.8082 bu/day when planted after the first planting date (March 17th). Monsanto Learning Center at Scott, MS 2010.



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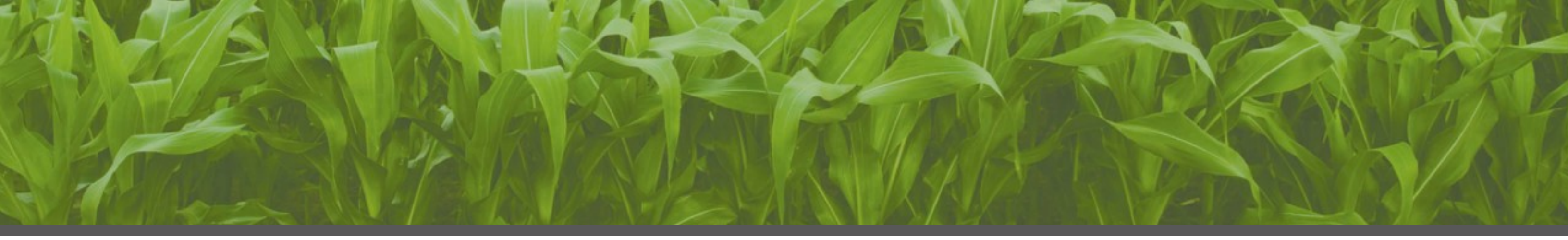

Sustainable Yield Initiative

Monsanto Company has a world-wide commitment to the Sustainable Yield Initiative (SYI). As a component of the SYI, Monsanto is committed to doubling yield in its three core crops of corn, soybeans and cotton by 2030 as compared to a base year of 2000 in countries where farmers have access to current and anticipated new seed choices offered by the company. Several variables work together as part of an agronomic system to help increase and/or protect yield potential. The amount that each variable contributes to the final yield varies depending on the year and environment. A comparison of agronomic practices from 2000 and 2010 indicates that advancements in germplasm, traits, seed treatments, and planting populations can help increase final yield through increasing and/or protecting yield potential.

Study Guidelines

A replicated trial was conducted at the Monsanto Learning Center at Scott, Mississippi in 2010 to compare agronomic systems from 2000 with those of 2010. Four systems representing various advancements in agronomic management options for germplasm, traits, seed treatments, and planting populations, were evaluated for their effect on yield potential (Table 1). The most basic system, Year 2000, used dated germplasm common in 2000, conventional or YieldGard® Corn Borer corn, the basic seed treatment of Poncho® 250, and planting populations of 29,000 seeds/acre. Each system added advancements in one or more of these areas. Region appropriate fertility and weed control practices were standard throughout all plots, with a final yield goal of 240 bu./acre.

Results

The Year 2010—Early Adopter system, which implemented new germplasm, Genuity® VT Triple PRO™ technology, Poncho® 1250 seed treatment, and a planting population of 38,000 kernels/acre yielded 66 bu./acre more than the system representing practices from 2000 (Table 1). Comparing the Year 2010-Early Adopter system to the Year 2010– Innovator system showed a 22 bu./acre increase that could likely be attributed to increasing the planting population by 4,000 kernels/acre, and possibly the use of Poncho® 1250 seed treatment versus Poncho® 250. Comparing the Year 2010-Innovator to Year 2010-Status Quo systems, a 6 bu./acre increase was observed, which is likely due to advancements in germplasm and increased insect protection traits. A comparison of the Year 2010-Status Quo to the Year 2000 systems revealed an

System Name	Germplasm	Traits	Seed Treatment	Planting Population (kernels/acre)	Yield (bu./acre)
Year 2000	Typical for 2000	Conventional or YGCB	Poncho® 250	29,000	154
Year 2010—Status Quo	Available for a few years	RR2/YGCB or VT3	Poncho® 250	34,000	192
Year 2010—Innovator	Available for 1 or 2 years	GENVT3P	Poncho® 250	34,000	198
Year 2010—Early Adopter	Available for 1 or 2 years	GENVT3P	Poncho® 1250	38,000	220

YGCB = YieldGard® Corn Borer; RR2/YGCB = YieldGard® Corn Borer with Roundup Ready® Corn 2; VT3 = YieldGard VT Triple®; GENVT3P = Genuity® VT Triple PRO™. Monsanto data 2010.

Table 1. Characteristics of various agronomic systems evaluated.

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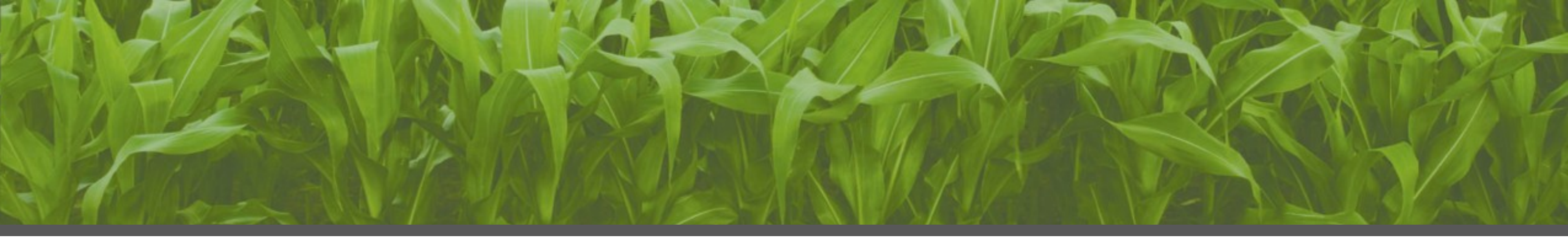
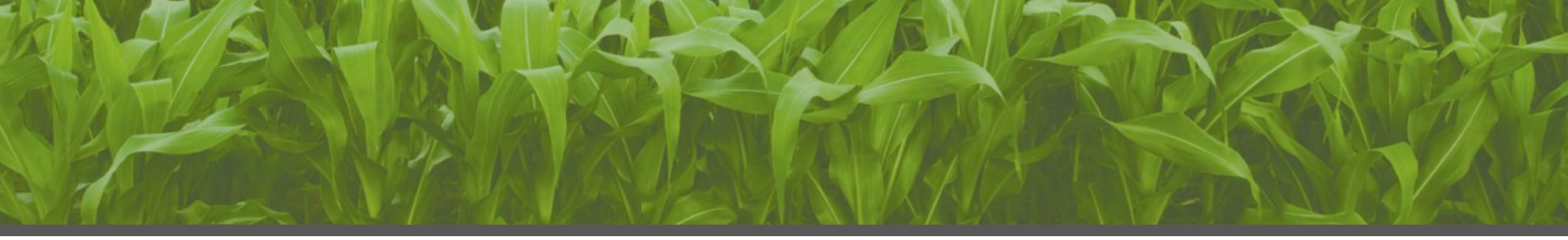


impressive yield increase of 38 bu./acre that can be attributed to improved germplasm, increased population, and increased trait protection.

Conclusions

- Higher yields are a result of improvements of several agronomic aspects, that result in more kernels harvested per acre.
- Harvesting more kernels per acre is possible due to a combination of being able to produce more kernels per acre as well as protect them once they develop.
- Improvements in germplasm have made considerable contributions to producing more kernels per acre. The number of kernels per ear has not changed greatly, however the number of ears per acre, or planting population, has. Germplasm advancements allow for better plant health, stalk quality, stability across environments, and much more. These germplasm advancements made it feasible to increase planting populations to help realize higher yield potentials.
- Development of biotech traits has allowed for unprecedented protection of yield potential. Herbicide safety, stalk protection from southwestern corn borer, and kernel protection from corn earworm are only some of the benefits of Genuity® VT Triple PRO™ technology.
- In addition to yield protection, the traits often contribute to yield stability across environments, which can allow for consideration of higher planting populations to help maximize yield potential.
- The advancements made in germplasm, traits, and seed treatments have allowed for adaptation of other agronomic practices, such as planting populations, to help maximize yield potential.
- Monsanto is continually striving to improve germplasm, traits, and agronomic practices to help fulfill its commitment to the SYI to double yields in its core crops, including corn, by 2030.

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.



Cotton, Corn and Soybean Row Width and Planting Configuration Comparison

Increased production of grain crops in Southern regions has encouraged the evaluation of row patterns and spacing systems compatible with cotton, corn and soybean production. Row crops have traditionally been raised in 38– to 40-inch row spacings to accommodate for farm animal use and hand harvesting. The Midsouthern grower also faces the complication of requiring a bedded production system to facilitate drainage and irrigation. This requirement is one major difference between Midwestern and Midsouth cropping systems. In the Cotton Belt, many producers continue to raise their crops in either 38– or 40-inch rows due to compatibility issues with cotton equipment, drainage and irrigation practices.

Narrow row spacings have been found to increase yield potential in many crops due to better sunlight capture and more uniform spacing of the plants across the field. Cotton or other crops planted in narrow rows will typically canopy earlier in the season, which should increase overall photosynthesis and decrease weed competition. Narrow row crop production may also have the potential to reduce production costs. In most regions, corn and soybean production has transitioned from 40- to 30-inch row widths, which required the development of new varieties/hybrids that are more adapted to the closer row spacing. As with corn and soybeans, certain cotton varieties may be better suited for production in narrow rows.

Utilizing the same row width for cotton, corn and soybeans could reduce the amount of equipment needed and simplify planting and in-season management practices. Some cotton producers in the Midsouth have attempted to raise cotton in narrow rows to promote earliness; however, problems with the system were encountered including, boll rot in wet years, difficulty with equipment, and reduced harvest efficiency.

Study Guidelines

A study was conducted at the Learning Center at Scott, MS to compare the effect of row width and planting configuration on cotton, corn and soybean yield potential. Planting populations were set to accommodate the different row widths and planting patterns in order to achieve a constant planting population in seeds/acre across the different planting/row width configurations.

Cotton—In the study, cotton was planted in 30-inch and 38-inch rows in a 2:1 skip row configuration and in 38-inch rows with no skip (Figure 1). Cotton was planted at 44,000 seeds/acre in all row patterns. Plant growth regulators (PGRs) were carefully evaluated in attempt to maximize cotton production.

Corn—Corn was planted in both 30-inch single rows and 38-inch twin rows utilizing a Monosem® planter at 36,000 seeds/acre for both row widths evaluated.

Soybean—Soybeans were planted in both 30-inch single rows and 38-inch twin rows utilizing a Monosem planter at 140,000 seeds/acre.

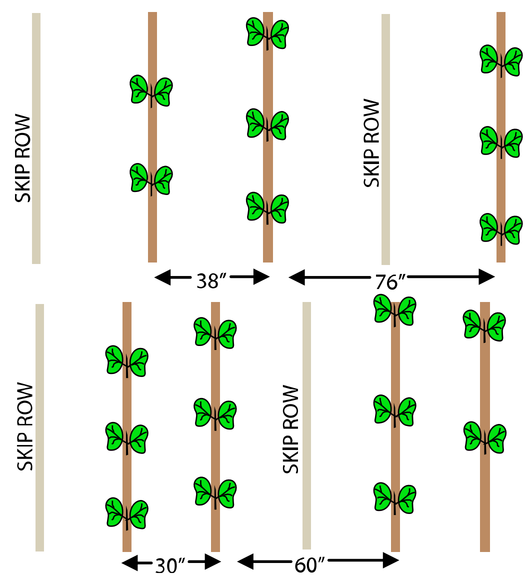


Figure 1. Diagram of planting in 38-inch rows (top) and 30-inch rows (bottom) with 2:1 skip configuration.

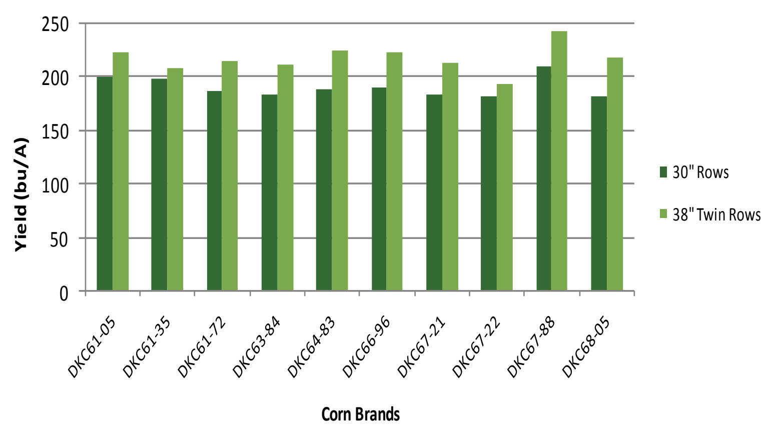


Figure 2. Effect of row width on corn product yield (bu/A).

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Cotton, Corn and Soybean Row Width and Planting Configuration Comparison

Multiple cotton and soybean varieties and corn hybrids were selected and planted into both the row widths and planting configurations to evaluate the suitability of the systems. The trial was furrow irrigated as needed and fertility and weed control remained consistent for each crop.

Results

Corn - In the corn portion of this trial, all hybrids planted in 38-inch twin rows reported higher yields than the 30-inch single rows (Figure 2). These results contradict much of the earlier row width comparison studies conducted in Northern regions. Evaluation at the Learning Center at Scott, MS will continue to further investigate several possible factors contributing to the lower reported yields during the 2010 growing season. The Learning Center at Scott, MS plans to conduct additional studies on corn population, hybrid adaption, fertility, and irrigation with a concentration on 30-inch row comparisons.

Soybean - A consistent yield response was not seen when comparing between the 30-inch single rows and 38-inch twin rows (Figure 3). Variation in yield response may be partially due to soybean variety adaptation to different row spacings. Certain soybean plant types, such as bushy or narrow, may be better suited for wide or narrow row configurations.

Cotton—Cotton grown in 30-inch 2:1 skip configuration yielded higher than cotton grown in 38-inch 2:1 skip and similar to cotton grown in 38-inch solid row systems (Figure 4). On average across the six varieties, the 30-inch 2:1 skip row system yielded 6 lbs lint/acre more than the 38-inch solid rows and 646 lbs lint/acre more than the 38-inch 2:1 skip row configuration. The 38-inch 2:1 skip row configuration yielded lower than the other planting configurations. One theory behind the lower yield is that the cotton had an unusually high number of fruit set early in the season and plants in the 38-inch 2:1 skip row may have lost the balance between vegetative and reproductive

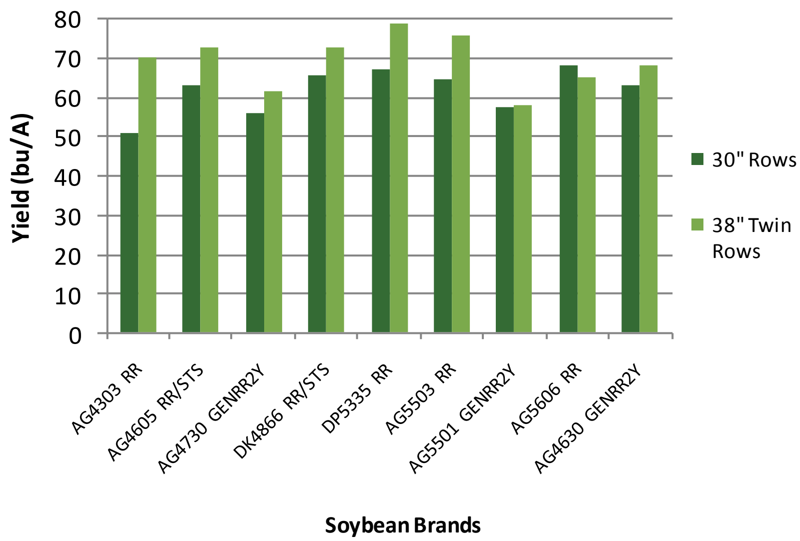

Figure 3. Effect of row width on soybean product yield (bu/A).

RR—Roundup Ready® RR/STS—Roundup Ready®/STS®
GENRR2Y—Genuity® Roundup Ready 2 Yield®

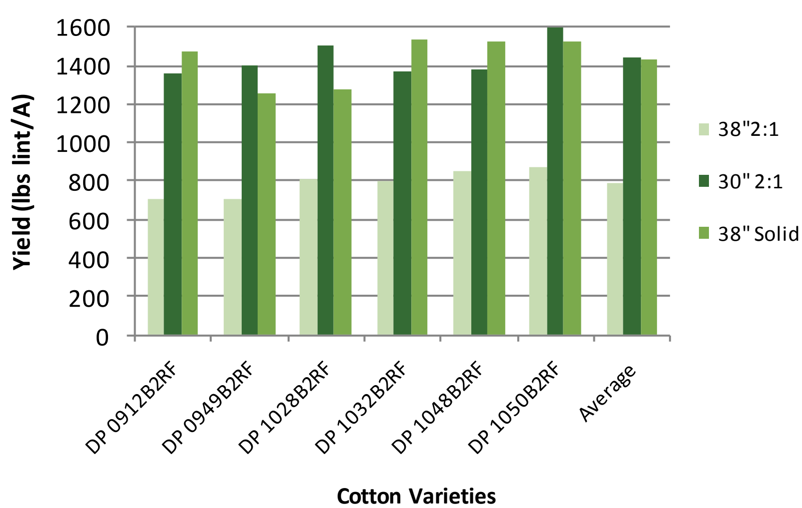

Figure 4. Effect of row width and planting configuration on cotton variety yield (lbs lint/A).

Technology Development by MONSANTO ®

Cotton, Corn and Soybean Row Width and Planting Configuration Comparison

growth resulting in the plant not able to fill the skip spacing, reducing yield potential. The cotton in the 38-inch 2:1 skip rows also matured later than the cotton planted in the other row configurations.

While all cotton varieties selected for the trial appear to yield better in 30-inch 2:1 skip, selection of varieties based on characteristics ideal for narrow row configurations is still very important. Varieties best suited for narrow rows are somewhat unique plant types, which are able to fill the skipped row and still not have unmanageable vegetative growth patterns. In typical skip row systems, PGR use will decrease on average due to the need for this additional vegetative development. More research will be necessary to evaluate reduced PGR rates and timings for narrow row configurations.

Figure 5. Planting twin rows with Monosem® planter.

Conclusions

Cotton producers may benefit from several advantages of the 30-inch 2:1 skip configuration. Narrow row widths may allow for lower planting rates (per field acre, not per planted acre), reducing seed and other input costs. Having a crop planted in a skipped row pattern may improve air flow to plants. Improved air flow in and around the plants may moderate plant temperatures and increase photosynthesis levels. Finally and most importantly, planting cotton utilizing 30-inch rows would make the crop more compatible with grain crop production.

Numerous studies have reported increased yield for corn and soybeans when grown in narrow row widths; however, many of these studies have been conducted in the Midwest where shorter day corn products and more indeterminate soybean products are planted. The effect of sunlight interception, drainage/irrigation, temperature, nitrogen management and planting populations in Southern regions could alter the yield potential of crops planted in 30-inch rows. More research may be necessary to determine if it is possible to increase corn and soybean yields in 30-inch rows in Southern regions. Many Southern farmers who have made the switch to 30-inch rows have reported yield variability from year-to-year.

During 2011, the Learning Center at Scott, MS plans to continue research to help determine the ideal row width configurations compatible with cotton, corn and soybean production.

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.

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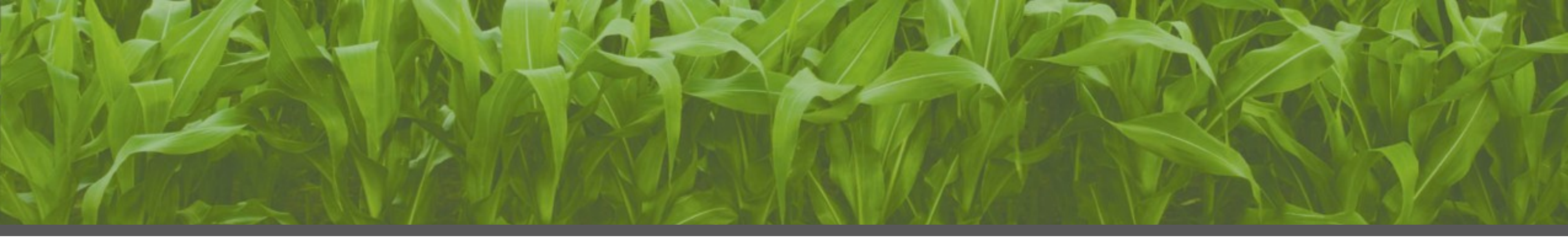

Corn Planting Depth Effect on Final Population and Yield

Many factors go into raising a successful corn crop, and one easy way to start a crop off right is by planting seed at the optimum depth. Much research on corn planting depth has been conducted in the Midwest, but as a result of very different environmental conditions it is important that seed depth studies are also conducted for corn producers in the Midsouth.

Study Guidelines

In 2009 and 2010, studies were conducted at the Learning Center at Scott, MS to evaluate how different planting depths affect corn stand establishment and final harvest yield. In the trials, two corn products with different relative maturities (RM) (114 and 119 RM) were selected. In each plot, a corn product was planted at 1-, 2- or 3-inch depth. Soil fertility, irrigation, and weed control remained constant across all plots.

Results

Results from the study showed different relative maturity corn products responded similarly to different planting depths. Preliminary results suggest that seed planted at the 2- and 3-inch planting depth resulted in the highest final plant population and highest yield (Table 1). At both the 2- and 3-inch planting depth a more uniform plant stand was established. Planting at these depths also allowed for proper nodal and brace root development, which is vital for maintaining good stands during the season and at harvest.

Corn seed planted at 1-inch depth resulted in non-uniform, below-target final plant populations and lower yields when compared to plots planted at more ideal planting depths. Even though the 1-inch depth did allow for stand establishments, shallow planting still resulted in poor nodal and brace root development (Figure 1). Corn planted at 1-inch depth resulted in an average final plant population reduction of 34% and an average yield reduction of 23% when compared to plots with planting depths of 2 or 3 inches (Table 1).

Determining the ideal plant depth can vary depending on the soil type and available moisture, but in general, planting approximately 2 inches deep will help the seed to germinate and allow the plant to establish an adequate root system. Corn producers should set their planter at these depths, double checking seed depth after planting a short distance into a field and rechecking planting depth after changing fields. Shallow planting of less than 2 inches can result in an uneven plant stand and poor root formation. Results from this study indicate that there is a very good chance yield will be lost if corn is planted at a depth of 1 inch or less.

Effect of Planting Depth on Harvest Population and Yield

Planting Depth (inches)	Plant Population at Harvest (plants/acre)	Yield (bu/acre at 15% moisture)
1	22,166	192
2	33,666	247
3	34,333	252

Table 1. Effect of planting depth on plant population and yield at harvest.

Figure 1. Effect of planting depth on root growth. Corn planted at 1-inch depth (left), 2-inch depth (middle) and 3-inch depth (right).

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

Evaluating Suboptimal Soybean Stands

Soybean replanting is a challenging decision that is typically faced by growers every year in the Mid South. The soybean plant is very resilient and can adjust to the final stand remaining in the field by adding branches, more pods per plant, seeds per pod, and an increase in seed size. It is this ability of the soybean plant to compensate that makes the replant decision difficult. Careful evaluation of plant stands can assist in the decision to replant suboptimal soybean stands.

Study Guidelines

A demonstration trial was conducted at the Monsanto Learning Center in Scott, MS in 2010 to evaluate the effects of reduced plant population on soybean yield. A twin-row Monosem® planter was used to plant the trial. The target plant populations evaluated were 130,000; 100,000; 85,000; and 65,000 plants/acre. The check population of 130,000 plants/acre was planted without skips for data comparison. Special modifications were made to three sets of the planter plates to make the planter plant "skippy" stands. One-foot skips were inserted across the plots (Figure 1). 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.

Two Asgrow® Brand soybean varieties and three planting dates were selected for this trial. All other agronomic practices were kept constant among plots.

Results and Discussion

Figure 1. Example of multiple one-foot skips within a soybean plot. Skips were created to establish a target plant population.

In most situations, stand reduction occurs in two patterns: not uniform across the field, or gaps within the row. Gaps of less than 2 feet in diameter can be compensated for by adjacent soybean plants, which fill in the gaps by developing branches. These branches develop pods and seed that compensate for seed production lost by the reduced stand. In soybean, it is important to remember that unless very wide skips in rows are observed, plants have a tremendous ability to compensate for missing plants. Skips of less than 2 feet generally have little effect on yield potential.[1] Areas where skips from 2 to 3 feet are observed may result in 6 to 13% yield reduction (Table 1).

Table 1. Effect of reduced stand on soybean yield.

Plant Spacing	Yield as a % of Normal
2-ft skips—50% of row	94
3-ft skips—50% of row	87
4-ft skips—50% of row	85

Source: Purdue University Pest & Crop Newsletter: Issue 11 May 28, 2004.

Results from this trial show the average yield across varieties and planting dates differed by only 7 bushels/acre (Figure 2). Soybeans compensate for low stands and are able to produce yields that differ only slightly across a wide range of populations. A soybean stand with the potential to yield 90 percent or more of optimum should be saved and not replanted because the costs associated with replanting are likely greater than the return from replanting.[2]

Summary continued on next page

Evaluating Suboptimal Soybean Stands

A uniform stand of 100,000 to 130,000 plants/acre is recommended.[3] However, Mississippi State University has observed little to no yield reduction for plant populations as low as 75,000 plants/acre.[3] Seeding rates which allow a plant population this low to be obtained are not recommended, but this information is helpful when making the decision to replant or keep a soybean stand in question.

Sources:

[1] *Purdue University Pest & Crop Newsletter. Issue 11. May 28, 2004. Online at http://extension.entm.purdue.edu*

[2] *Whigham, K. et al. Soybean replant decisions. PM 1851. June 2000. Iowa State University Extension. Online at http://www.extension.iastate.edu*

[3] *Koger, T. Soybean agronomics. Mississippi Crop Situation 2010. May 7, 2010. Number 5. Mississippi State University Extension. Online at http://agfax.com*

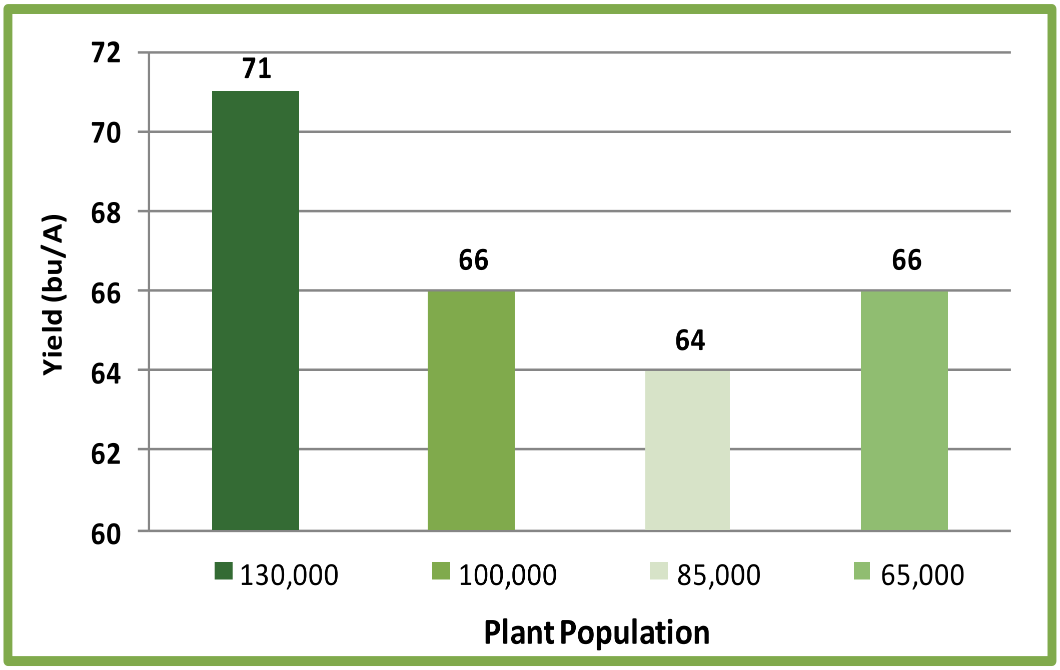

Figure 2. Soybean yield results by final plant population (plants/acre). Results averaged across soybean varieties and planting dates.

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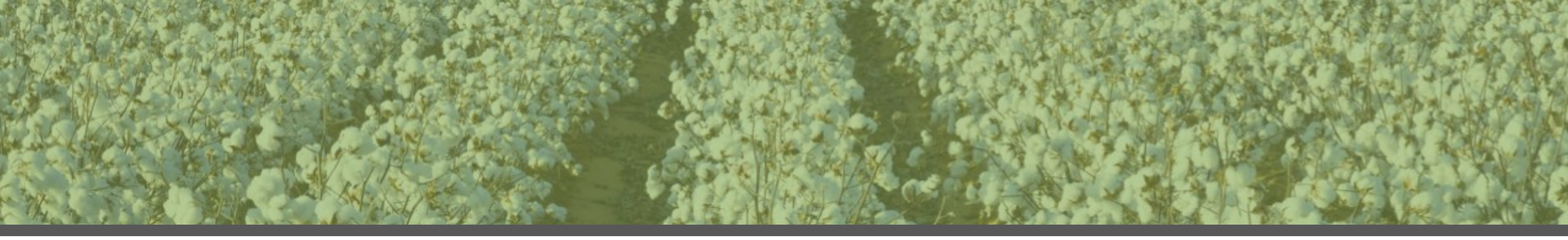

Effect of PGR Strategies on Cotton Yield

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 yields. When determining the proper application timing of PGRs, several factors such as soil type, soil fertility, irrigation and field history should be taken into account. 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 plant growth management strategies. Plant response to PGRs can vary depending on the cotton variety, plant genetics and the environment during and after application. This makes a blanket recommendation very difficult and often impractical.

Study Guidelines

In In order to better understand the growth habits and response of the Deltapine® Class of 09 and 10 cotton varieties, a study was conducted at the Learning Center at Scott, MS to investigate the effects of low (passive) and high (aggressive) PGR management strategies. Eleven total cotton varieties were planted, four Deltapine Class of 09 varieties, five Class of 10 varieties and an experimental (Table 1) . Seeds were planted at 42,000 seeds/ acre and the trial was irrigated.

Cotton varieties were planted in 8 row plots with 4 rows receiving the high or aggressive PGR management strategy and 4 rows receiving the low or passive PGR management strategy. The aggressive treatment consisted of 8 oz/acre of a 4.2% mepiquat chloride at matchhead square, 16 oz/acre at early bloom and 20 oz/acre at mid-late bloom. The intent of the passive treatment was to reduce the rates by approximately 20 percent and delay the timing of application by 7-10 days past the aggressive treatment timing. The passive treatment consisted of 8 oz/acre of mepiquat chloride application pre bloom, 12 oz/acre application 10 days after first bloom, and 16 oz/acre 7-10 days past peak bloom. The early rates appear to be similar, but are effectively lower due to the delay in application timing and the growth that occurs in that time .

Plots were harvested with a commercial cotton picker adapted to harvest individual plots. Seed cotton was ginned and weighed in Scott, MS to determine lint yield per acre.

Deltapine® Cotton Varieties

Class of 09	Class of 10	Experimental
DP 0912B2RF	DP 1028B2RF	09R555B2R2
DP 0920B2RF	DP 1032B2RF	
DP 0924B2RF	DP 1034B2RF	
DP 0949B2RF	DP 1048B2RF	
	DP 1050B2RF	

Table 1. Deltapine cotton varieties in PGR management strategy trial.

Results

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 seven of the ten selected varieties, while three cotton varieties produced higher yields with the more aggressive PGR management strategy.

The largest differences seen when comparing the same variety across the two PGR regimes were 158 lbs/acre for 09R555B2R2 which yielded higher for the aggressive PGR strategy and DP 0912B2RF at 116 lbs/acre which yielded higher for the passive PGR strategy.

Conclusions

As expected, not all cotton varieties responded the same to PGR applications. In eight out of ten comparisons between the high and low PGR strategies, yield differences were less than 100 lbs/acre. The largest yield differences among the cotton varieties in favor of the passive PGR strategy was DP 0912B2RF, which suggests that this variety may have less vegetative growth and that lower total amounts of PGRs may be needed to maximize yield potential. Of the tested varieties, 09R555B2R2 produced the highest overall yield at 1626 lbs lint/acre under the aggressive PGR strategy. This suggests that 09R555B2R2 may have increased vegetative growth in need of control with higher PGR rates and more applications.

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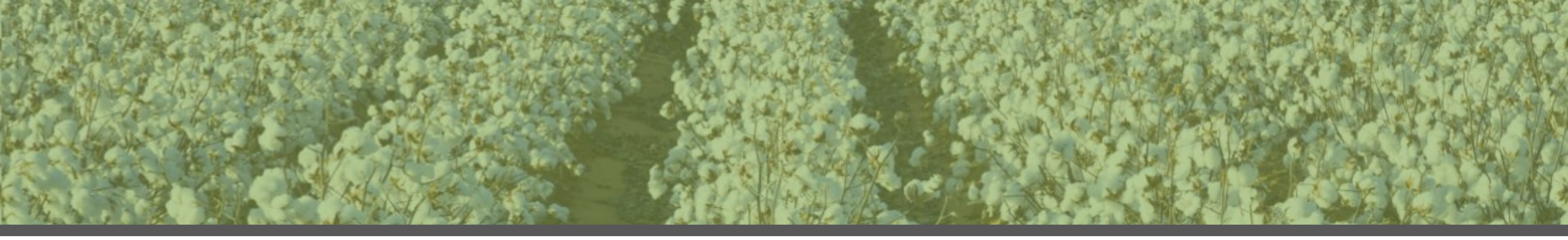

Effect of PGR Strategies on Cotton Yield

With the exception of DP 0920B2RF, 09R555B2R2 and DP 1034B2RF varieties, aggressive PGR management reduced yield potential. The 2010 environmental conditions at Scott, MS generated an early cotton crop with high fruit retention. High fruit retention caused the cotton plants to provide their own vegetative growth control, reducing the need for aggressive PGR management for many of the cotton varieties. Also, the mid to late season was completely free from excessive rainfall which is the factor that often makes aggressive PGR applications needed for control of vegetative growth. This points out the need for field, variety, and season specific monitoring and PGR management.

Care should be taken to monitor all varieties with respect to their growth patterns; looking at 4th and 5th internode distances, soil moisture, agronomic practices and weather patterns to make PGR application decisions on these and all cotton varieties. This study gives a snapshot of only one growth environment, of location and year, but may provide insight into general recommendations of what to look for in the Deltapine® Class of 09 and 10 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.

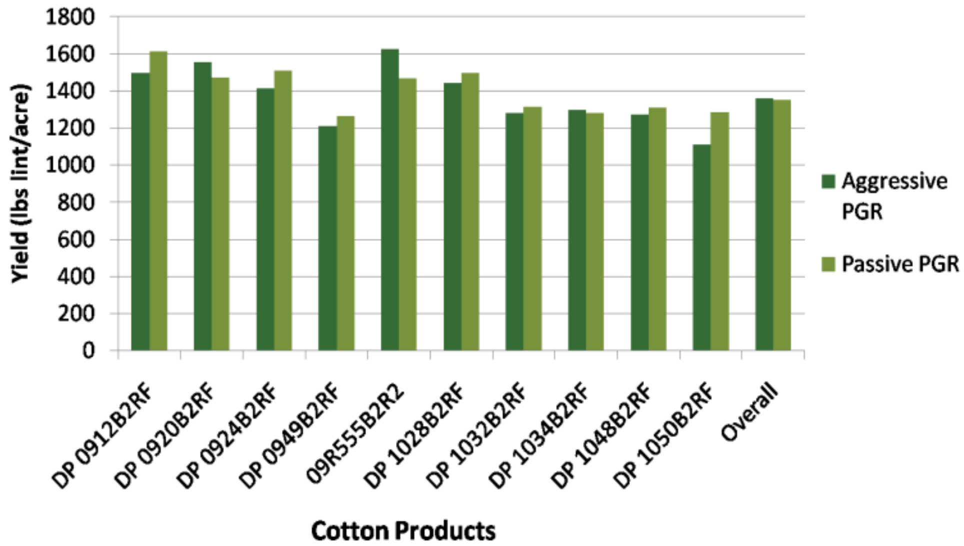

Figure 1. Effect of PGR strategies on yield (lbs lint/acre) of Deltapine® Class of 09 and 10 cotton varieties.

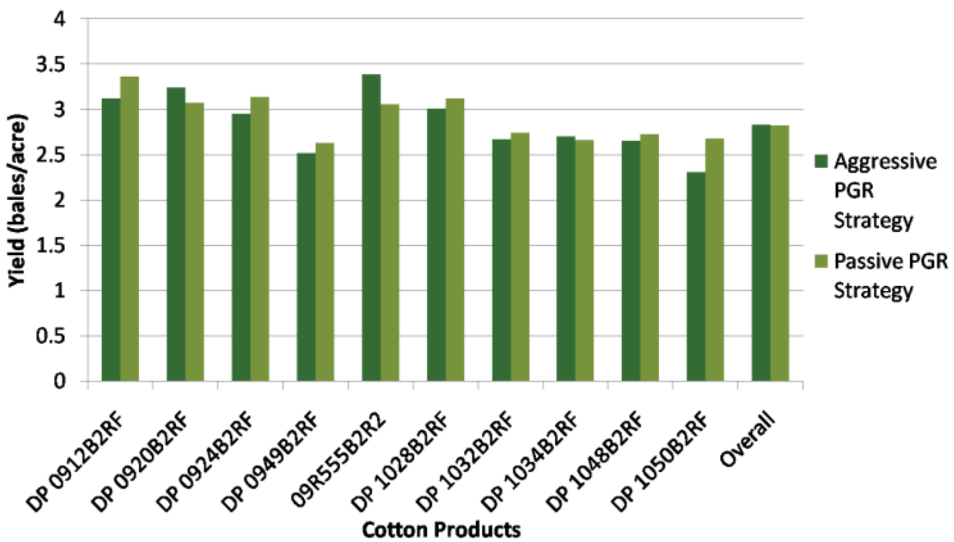

Figure 2. Effect of PGR strategies on yield (bales/acre) of Deltapine® Class of 09 and 10 cotton varieties.

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.

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