THE LEARNING CENTER

Research and Demonstration Facility
At Scott, Mississippi

2009 Demonstration Reports

Technology Development
by MONSANTO

Dear Scott Learning Center Visitor:

Thanks for visiting us this past year. In an effort to inform you of the results of our field demonstrations that you saw, we have compiled this booklet of summaries from the 2009 growing season. We are happy to supply this information in an effort to help your operation identify potential agronomic strategies that may increase your on-farm efficiency and profitability.

We faced many of the same weather based challenges in 2009, as you did. This included everything from drought to flooding and cool to hot temperatures. All of these factors led toward difficulty in plot management, crop harvest, and data interpretation. These difficulties caused particular complications in gathering meaningful cotton data. Unfortunately, this has led us to exclude the cotton summaries from this booklet.

We are looking forward to building on these results to create an exciting on–farm experience for 2010. **As manager of the Scott Learning Center Please let me take the opportunity to say *thank you* for taking time to visit this summer and invite you back for a visit during 2010.**

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.

Thanks,

Jay S. Mahaffey
Manager – Scott Learning Center

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Effect of Plant Population and Row Spacing on Corn Yield

As corn hybrids are further developed for root and stalk strength, the potential for increased planting population per acre is being realized. To maximize land use, many corn producers are increasing their planting populations and also considering twin-row configurations to help achieve desired spacing between plants. The theory behind twin-row systems is, when compared to single-row systems, twin rows allow for increased and more precise spacing between plants, which can potentially permit better water and nutrient uptake and enhanced light interception.

Study Guidelines

Testing was conducted at the Learning Centers in Leland, MS in 2007 and Scott, MS in 2008 and 2009 to evaluate if corn yield could be increased by modifying plant populations and row spacing. In 2009, four corn products with varying relative maturities (RM) were selected and planted at four different planting populations with and without irrigation. 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 Monosem® Twin-Row planter. Soil fertility, and weed control remained constant throughout all plots.

Planting Populations

Results from the three-year testing showed increased planting population resulted in an increase of the final yield for both dryland and irrigated systems. Highest yields were collected from the irrigated plots. Corn yields, when averaging irrigated plots across all three years, increased as population increased (Chart 1). The yield increase between mid/high and high planting populations was less than when compared to lower planting populations. Data from this testing shows an optimum planting population between 36,000 and 43,000 seeds/A, depending on the selected corn product and economics related to corn price and cost of production.

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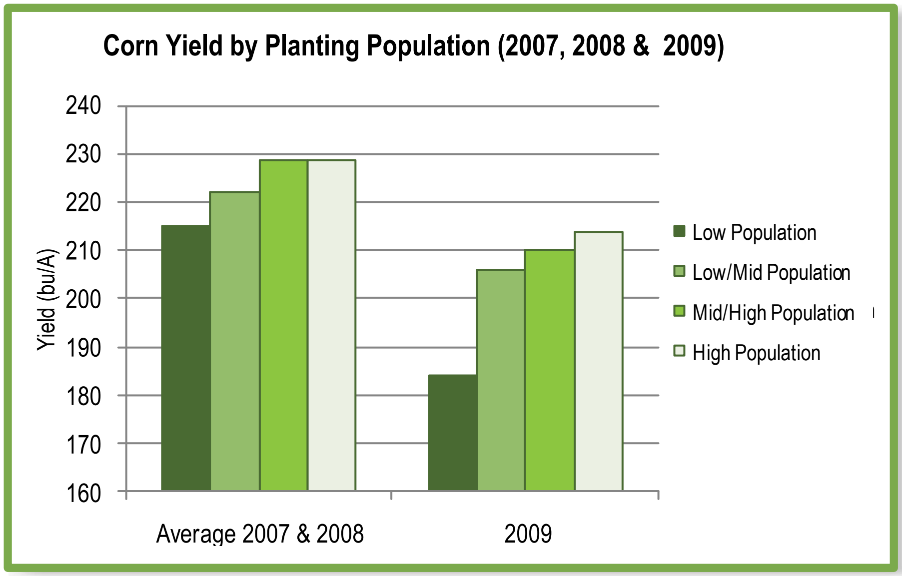

Chart 1. Corn yield by planting population, combined data from single and twin-row configurations.

Low Population 2007, 2008 & 2009 = 28,000 seeds/A
Low/Mid Population 2007 & 2008 = 32,000 seeds/A
2009 = 33,000 seeds/A
Mid/High Population 2007 & 2008 = 36,000 seeds/A
2009 = 38,000 seeds/A
High Population 2007 & 2008 = 40,000 seeds/A
2009 = 43,000 seeds/A

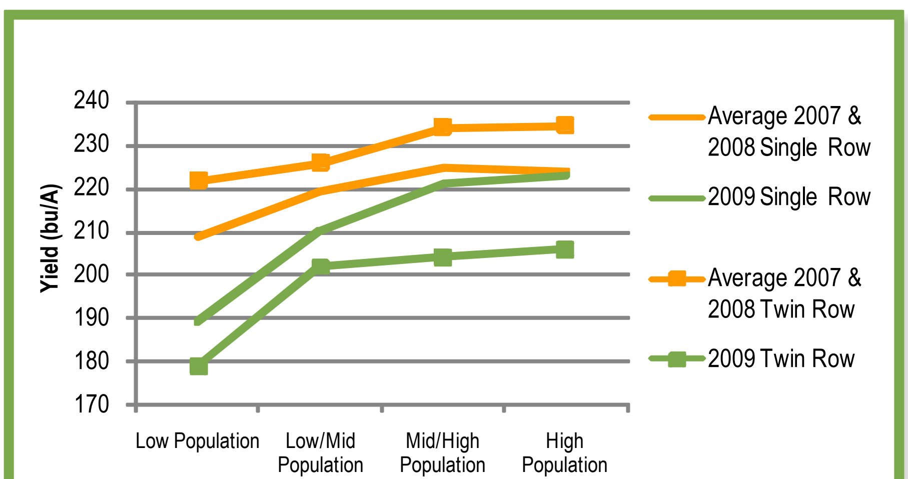

Chart 2. Corn yield by planting population and row configuration 2007, 2008 & 2009.

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Effect of Plant Population and Row Spacing on Corn Yield

Single Vs. Twin-Row Configurations

While the planting population results have remained somewhat consistent over the three years of trial testing, 2009 yield results from the single- versus twin-row configurations did not align with previous year's data. Averaging the irrigated yields in 2007 and 2008 showed corn planted in twin rows yielded more than corn planted in single rows. Yield results from 2009 presented an opposing story where single rows yielded more than twin rows (Chart 2) for both irrigated and non-irrigated plots.

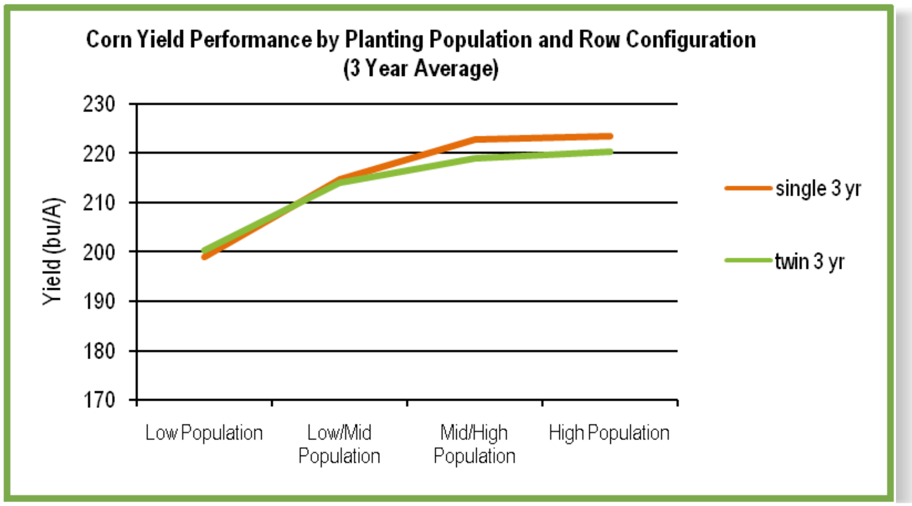

Chart 3. Three-year corn yield average by planting population and row configuration (2007, 2008 & 2009)

Conclusion

In conclusion, greater yields were observed in irrigated corn planted at higher populations. Corn yields, when averaged across all three years, increased as planting population increased. Increasing the planting population of a corn product with strong roots and stalks can provide greater yield potential than the same corn product planted at a lower population.

This three-year testing also revealed that yield potential of corn grown in single- and twin-row configurations can vary depending on the growing season and environmental conditions. In 2007 and 2008 the twin-row plots clearly out-yielded single-row plots at all planting populations, while in 2009 single rows out-yielded twin rows at all planting populations. More research will need to be conducted to further understand the ideal growing conditions for twin rows to help advise producers as to which row configuration may be best suited for their corn acres.

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THE LEARNING CENTER

at Scott, Mississippi

Corn Replant Strategies

Unfortunately Mother Nature does not always cooperate, and sometimes after a crop is planted problems can occur and producers are faced with the decision of whether or not to replant. When deciding to replant corn, several factors must be assessed such as evaluating the surviving stand for plant numbers and spacing, replant timing, and production potential.

Study Guidelines

A corn replant strategy study was conducted in 2009 at The Learning Center at Scott, MS to better assess how replant decisions can affect final harvest yield. To evaluate potential relative maturity effects on grain yield in a replant situation, two corn products were selected: a 114 relative maturity (RM) and a 119 RM. Large blocks of both corn products were planted in early 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. 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 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 April 20, 2009 at 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 on April 20, 2009 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/A or interplanted with an additional 18,000 seeds/A. 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 number of fewer plants for grain production.

The check plot, which was planted at 36,000 seeds/A in early March, averaged a yield of 183 bu/A. Both simulated crop loss followed by a replant scenario yielded similar to the check plot. In the simulated 100% crop loss scenario, SelectMAX was applied to kill all corn seedlings and the entire plot was replanted on April 20th. When averaged across both corn products in the trial, the simulated 100% crop loss plot yielded the same as the check plot at 183 bu/A. 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 was then replanted on April 20th. The simulated 30% crop loss scenario yielded 189 bu/A when averaged across both corn products; 6 bu/A more than the check plot and the simulated 100% crop loss scenario.

Due to good late season finish and harvest conditions, both crop loss simulation scenarios were able to produce similar yields. 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 the area-specific agronomic management, inputs needed, and weather influences on the ultimate outcome.

Overall, this one-year study showed corn yield may be more sensitive to the initial correct planting population and plant

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Corn Replant Strategies

spacing than it is to variability in planting date. This study helps to demonstrate the importance of optimum stand establishment. 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.

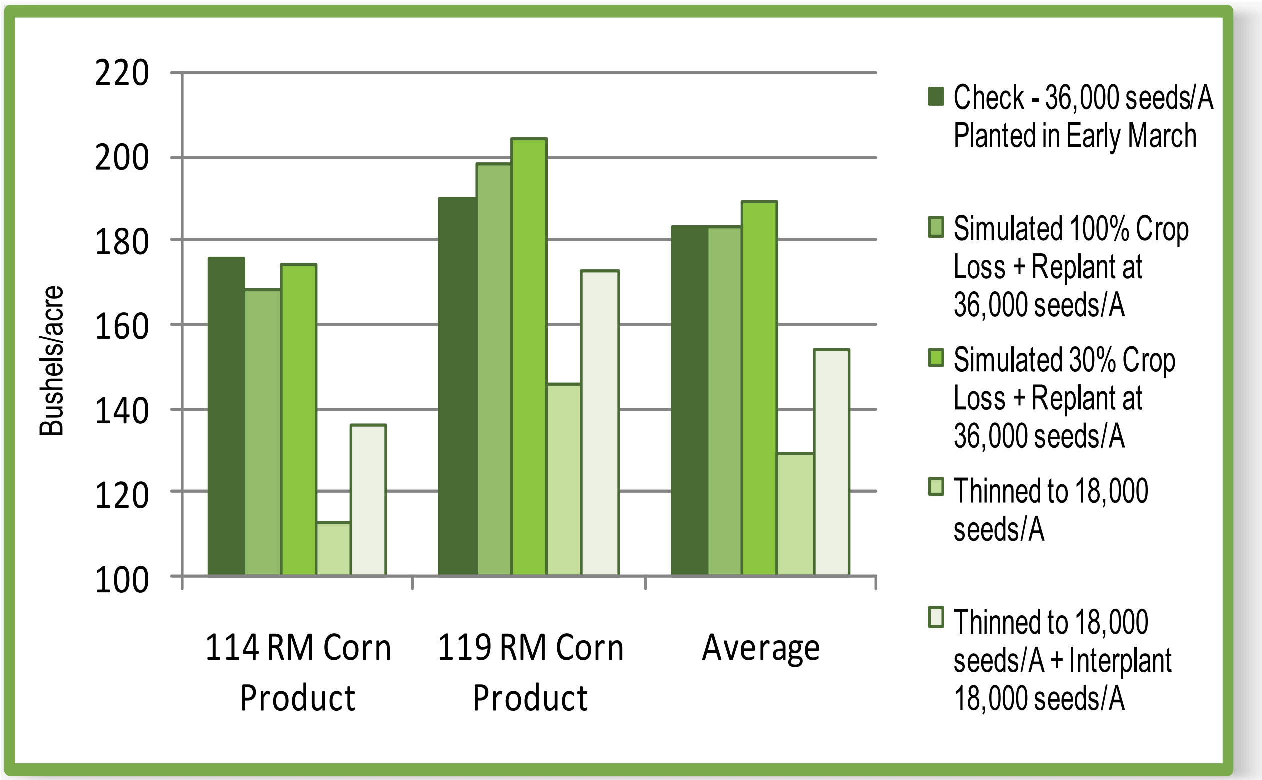

Chart 1. Yield Results from 2009 Corn Replant Study

Effects of Multiple Stresses on Corn Yields

Farming is full of stress, both for the producer and the crops in the field. To investigate how MidSouthern corn yields can be affected by various stresses and combinations of stresses a study was conducted at the Monsanto Learning Center in Scott, MS during 2009.

Study Guidelines

The objective of this study was to evaluate the effect late fertility, late irrigation, late herbicide application, and/or low plant population stress has on corn yield in the MidSouth. For the trial, a 119 RM corn product was selected and planted on April 8, 2009. In each plot a single stress or a combination of multiple stresses were introduced. (Table 1). A check plot with no stress was also established for comparison. Table 1 explains how the stresses were applied to the corn plots in the trial and Table 2 presents the different combinations of stresses applied to each plot.

Crop Stress	Application Method
Late Fertilizer Application	Nitrogen fertilizer applied one week late
Late Irrigation	Irrigation initiated one week late
Late Herbicide Application	Steadfast® applied at V8 stage (V6 is labeled application timing)
Low Plant Population	Planted at 28,000 seeds/A (Remaining plots were planted at 36,000 seeds/A)

Table 1. Method used to apply stress(es) to the corn plot.

	Yield @15% (bu/A)	Single or Multiple Stress Combination
1	171	Low Population
2	164	Late Fertilizer Application
3	192	Late Herbicide Application
4	170	Low Population + Late Fertilizer Application
5	169	Low Population + Late Fertilizer Application + Late Herbicide Application
6	188	Low Population + Late Herbicide Application
7	193	Late Fertilizer Application + Late Herbicide Application
8	210	No Stress (Check Plot)
9	155	Late Irrigation
10	150	Low Population + Late Irrigation
11	148	Low Population + Late Irrigation + Late Fertilizer Application
12	139	Low Population + Late Fertilizer Application + Late Herbicide Application + Late Irrigation
13	178	Late Irrigation + Late Fertilizer Application
14	177	Late Irrigation + Late Fertilizer Application + Late Herbicide Application
15	169	Late Irrigation + Late Herbicide Application

Table 2. Field map of stresses applied to each plot.

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Effects of Multiple Stresses on Corn Yields

Results

The check plot with no stress out-yielded all other plots in the trial which received either a single or multiple stresses. Averaging across all stress factors, a single stress reduced yield by an average of 39 bu/A when compared to the no-stress check plot. The plot receiving all four stresses, low population, late irrigation, late fertilizer and late herbicide applications produced the lowest yield with a 71 bu/A reduction when compared to the no stress check plot (Chart 1).

When comparing the stress factors against each other, late irrigation resulted in the highest yield loss with a 51 bu/A reduction compared to the no stress check plot. A late herbicide application resulted in the smallest loss with a still considerable loss of 35 bu/A when compared to the no-stress check (Chart 2).

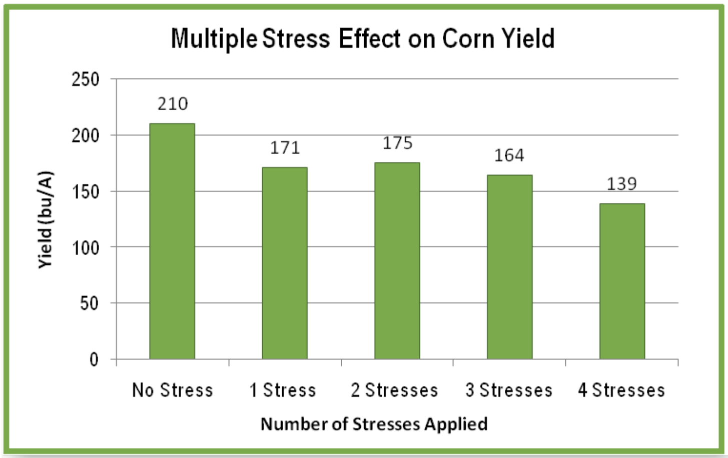

Chart 1. Average corn yield based on the number of stresses introduced per plot.

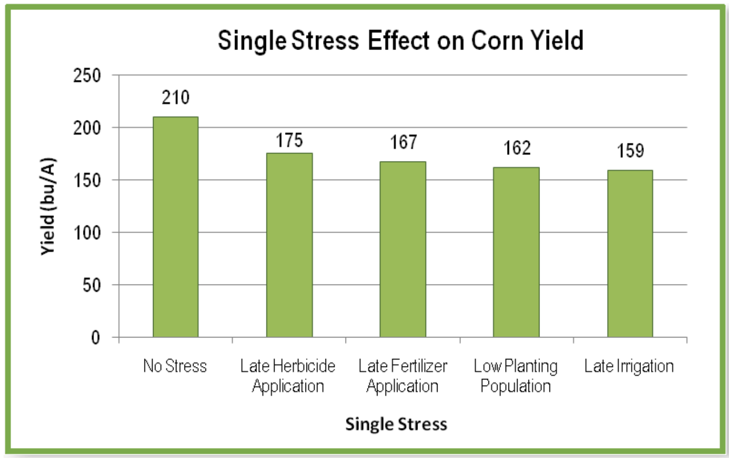

Chart 2. Corn yield results from the introduction of a single stress.

Conclusion

This study looking at the effects of stress on corn yield reinforces the fact that corn is susceptible to various types of stress with an end result of reduced yield potential. Due to the location and environmental condition of this trial, late irrigation impacted the final harvest yield the most; however, stress related to low plant population, late fertilizer and herbicide application also resulted in a large reduction in yield. The introduction of just one stress will reduce yield, and each additional stress will typically compound yield reduction even further. The key to a successful corn crop in the MidSouth is to eliminate as much stress as possible to attain a uniform productive corn crop.

Technology Development by MONSANTO

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 has already been conducted in the Midwest on corn planting depth, but due to very different environmental conditions it is important that seed depth studies are also conducted for corn producers in the Midsouth.

Study Guidelines

In 2009, a study was conducted at the Learning Center at Scott, MS to evaluate how different planting depths effect corn stand establishment and final harvest yield. For the trial, two corn products with different relative maturities (114 and 119 RM) were selected. In each plot, a corn product was planted at ½, 1, 2 or 3 inch depth. Soil fertility, irrigation, and weed control remained constant throughout all plots.

Results

Results from the study showed the 114 and 119 RM corn product recorded similar response to planting depth. The shallowest planting depth, ½ inch, resulted in an extremely low final population and total crop failure as measured in yield. Planting the corn seed at ½ inch left most seeds just under the soil surface, easily exposing the seed to predators or limiting the seed-to-soil contact needed for germination.

Corn seed planted at 1 inch resulted in non-uniform, below target final plant populations and lower yields when compared to plots planted at more ideal planting depths. When compared to the ½ inch planting depth, the 1 inch depth did allow for the establishment of many more plants; however, shallow planting still resulted in poor nodal and brace root development. Corn planted at 1 inch resulted in a final plant population reduction of 51% when compared to plots planted at 2 or 3 inches.

The 2 inch and 3 inch planting depth had the highest final plant population and highest yield. At both 2- and 3-inch planting depth, good seed-to-soil contact was achieved, which resulted in a more uniform plant stand. 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.

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.

Corn Product by Relative Maturity (RM)	Planting Depth (inches)	Population Stand Count at Harvest (plants/acre)	Yield (bushels/acre at 15% moisture)
114 RM	½ inch	2,000	0
	1 inch	15,000	153
	2 inches	36,000	245
	3 inches	36,000	253
119 RM	½ inch	2,000	0
	1 inch	20,500	188
	2 inches	33,000	241
	3 inches	35,000	238

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

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Bedded Soybeans and Irrigation

In the Midsouth, precipitation can become scarce during summer months, therefore maintaining adequate moisture throughout the growing season is key to optimizing soybean yields. During dry weather conditions, many Midsouth soybean farmers irrigate their fields with flood irrigation utilizing either flat or raised beds. Flood irrigation with raised beds places the soybean plant in soil hipped in a row and the spaces between the rows are flooded with water. In a flood irrigation with flat rows the soybean is planted in the ground with no special preparation to the soil elevation. For both flat and raised beds levees are used to keep water on the field. Improper flood irrigation management can cause the soil to become water logged. Waterlogging is the anaerobic (absence of free oxygen) condition, which can reduce plant growth due to the lack of oxygen available at the plant roots. Waterlogged soil is less common when beds are raised, but can still occur in areas where it is difficult to remove irrigated water in a timely fashion.

Study Guidelines

In 2008 and 2009, a study was conducted at the Learning Center at Scott, MS to evaluate the effect of raised bed versus flat bed flood irrigation on soybean yield potential. Soybean products with different relative maturities (RM) were selected for the study and planted in a 38-inch twin-row configuration at 150,000 seeds per acre in both raised bed and flat rows. Other than planting configuration, all other management factors were kept consistent. Flood irrigation was applied to the plots as needed and was allowed to stand on the plots for 24 to 30 hours before draining.

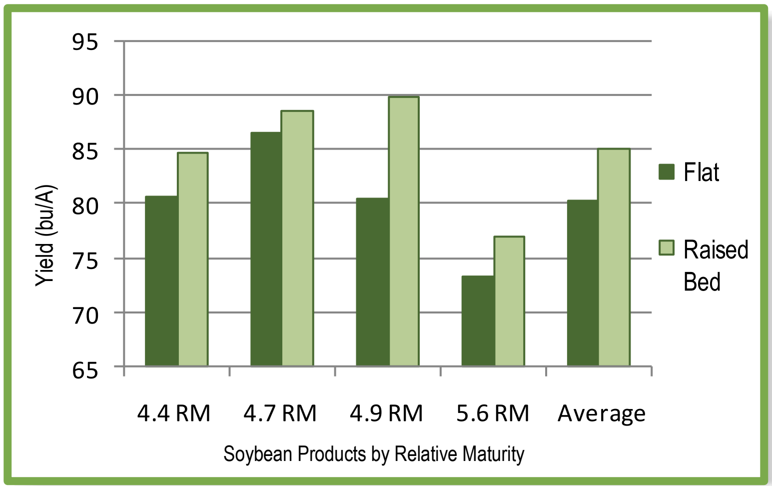

Chart 1. Yield results from 2008 Flat Versus Raised Bed Soybean Trial.

Results

Yield results from the two-year study showed soybeans planted in a raised bed consistently out-yielded those planted on flat rows. Observations from the two years of data showed soybeans planted on raised beds yielded an average of 5 percent more than those planted flat. The wicking action of a raised bed system allows the soil surface to dry quicker and overcome the saturated and anaerobic conditions that occur during periods of excessive standing water. It also allows for quicker reentry of machinery into the field for more timely herbicide, fungicide or insecticide applications. The data also suggests that soybean products vary in their tolerance to excessive moisture, which may be taken into consideration when planting decisions are being made.

Flood irrigation with raised beds requires additional ground preparation and planting can be more difficult; however, yield benefits from raised beds could make the additional work worthwhile for soybean producers in the Midsouth.

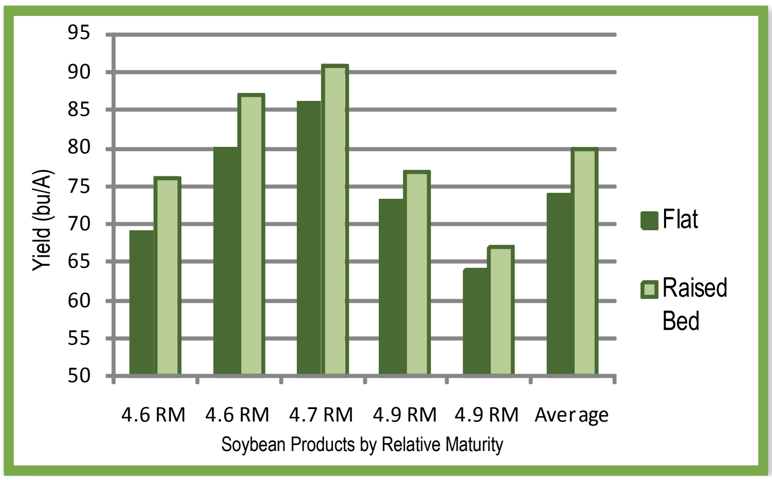

Chart 2. Yield results from 2009 Flat Versus Raised Bed Soybean Trial.

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Scott, MS, 2009. Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.