Soybean Planting Date Study

Industry and University studies alike have heralded the benefit of planting soybeans early. Studies have shown that pushing the planting back date with the goal of having a larger leaf area to harvest more light at the point in July where they are just reaching R3 can help set additional bushels. We were curious about these findings in our environment and geographic conditions, so we set up a study to test these facts.

Project Setup

A location was selected on a dryland field north of Hamlin, KS. Four dates were selected, with the goal of planting soybeans every 2-3 weeks. The plot was set up to include four replications of each date, with two different varieties included in each stip. Figure 1 shows the plot layout. The varieties were selected (P31A22X and P40T84X) with varying maturity dates: 3.1 and 4.0. At planting, the soil temperature was measured in each main plot to determine planting conditions. Several weeks after the last planting date, stand counts were selected to determine final population. At harvest time, moisture samples, test weight, and yield were assessed with a weigh wagon. Grain quality images were also collected.

Planting Dates

The four dates that were planted on were March 22nd, April 11th, May 7th, and May 22nd. On each date, four strips were planted with P31A22X in one side of the planter, and P40T84X in the other side. A population of 150k was planted. Final emerged population for each date was counted on June 6th. Stand counts ranged from 95k for the March 22nd date to 133k for the May 7th date. When analyzing these results statistically, we find that the populations for the two May dates were statistically the same. This means that although numerically they were 4k different in population, there was too much noise or variation in the results to truly say that they were actually different. The April 11th date was lower than the two May dates, and the March date was the lowest population off all the dates.

Planting Date	March 22nd	April 11th	May 7th	May 22nd
Population	94,916 C	107,917 B	133,333 A	129,500 A

*Values with the same letter are not significantly different at a 90% confidence level.

Similarly, the soil temperature at each planting date was collected. These results show that the March 22nd date had the coldest soil conditions at 44 degrees, April 11th warmer at 47 degrees and the May 7th and May 22nd dates the warmest at 69 degrees.

WHAT DO THE LETTERS A, B, AND C DENOTE ON OUR RESULTS?

When we analyze something statistically, we are essentially trying to verify that the results we received aren't due to chance. In a study with multiple treatments, we are looking to determine that our treatment results aren't due to chance, *and* that they are reliably ***different***.

So what do the different letters by the results mean? This signifies the level of difference between treatment results. The same letter on different responses means that there is no difference between the treatment results. For instance, if all the results had a letter A, then all of the results are the same. If one result had A and another had B, that would indicate that the result with an A was statistically, significantly, higher than B. In our results, we only go as far as a C but the same is still true as we add more letters.

If they share the same letter, the results are the same from their treatments. If they have a different letter, we are confident the are different for their respective treatments.

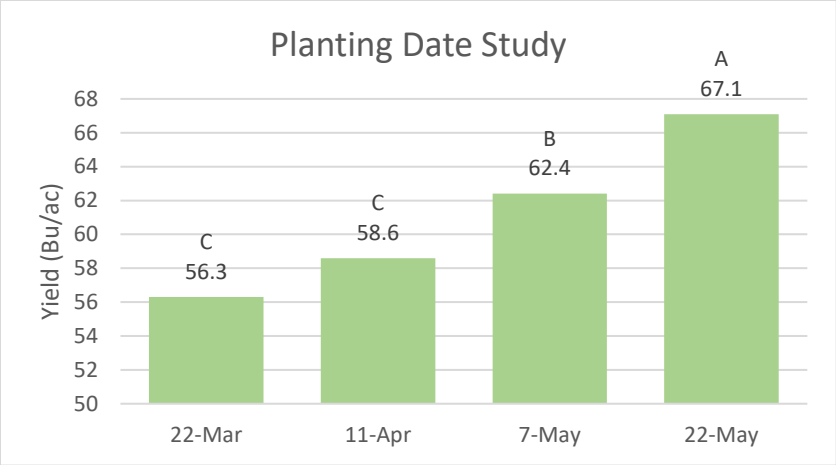
After Planting

So what factors affected these plants after planting? This really depended on planting dates. The first two dates underwent several snowfalls as well as some extended cool conditions all throughout April. The later two dates did not have the same level of coldness and in fact had an unseasonably warm May to emerge in. Throughout the growing season, the crop experienced a very dry summer with ratings as D1 (moderate drought) and D2 (severe drought). No excessive levels of disease were noticeable throughout the growing season. A foliar fungicide was applied uniformly to the plot on August 9th to treat any disease present and to help with overall crop health.

Results

Yield

Results for the planting date study indicated that the highest yielding planting date was the May 22nd date. The May 7th date was the next highest yielding. The April 11th and March 22nd dates both yielded similarly and the lowest of all the dates.



*Values with the same letter are not significantly different at a 90% confidence level.

Moisture and Test Weight

Overall, the moisture amongst planting dates was the same, ranging from 11.2-11.4%. The test weight however varied between dates. The May 22nd date had the heaviest test weight, and the March and April dates the lightest test weights. This is likely affected by the differences we saw between varieties and dates for amount of purple seed stain. The early planted soybeans had more purple seed stain which did affect their test weight and overall quality. Additionally, P31A22X also appeared to have more purple seed stain than P40T84X.

Date	March 22nd	April 11th	May 7th	May 22nd
Test Weight	53.1 C	53.6 BC	54.6 AB	55.5A

*Values with the same letter are not significantly different at a 90% confidence level.

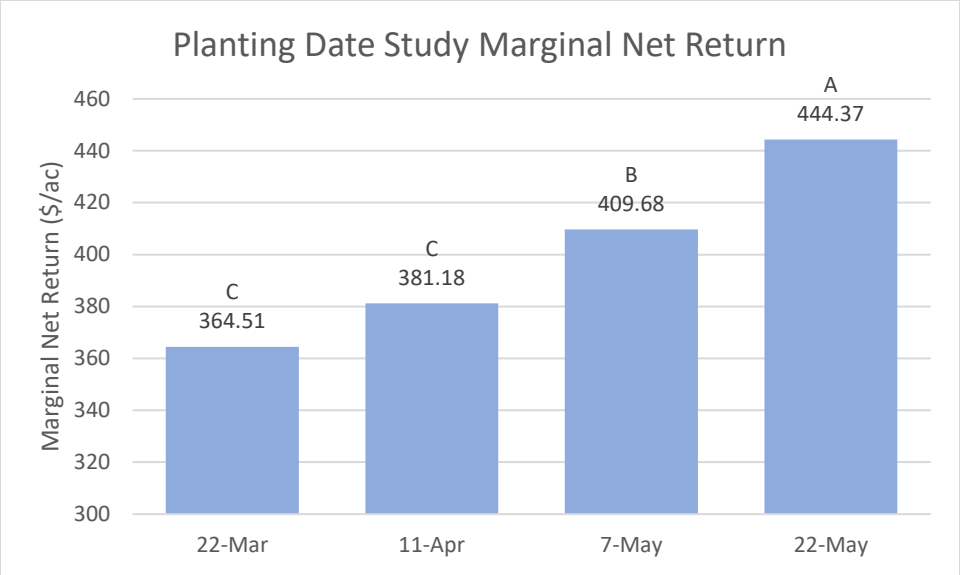
Images showing seed quality at harvest for P31A22 (top) and P40T84 (bottom) for each planting date evaluated.

Varieties

There was a yield difference between the two varieties. The P31A22X yielded 4.4 bushels less than the P40T84X at 58.9 bushels per acre. The P40T84X yielded 63.3 bushels per acre. This was independent of planting date.

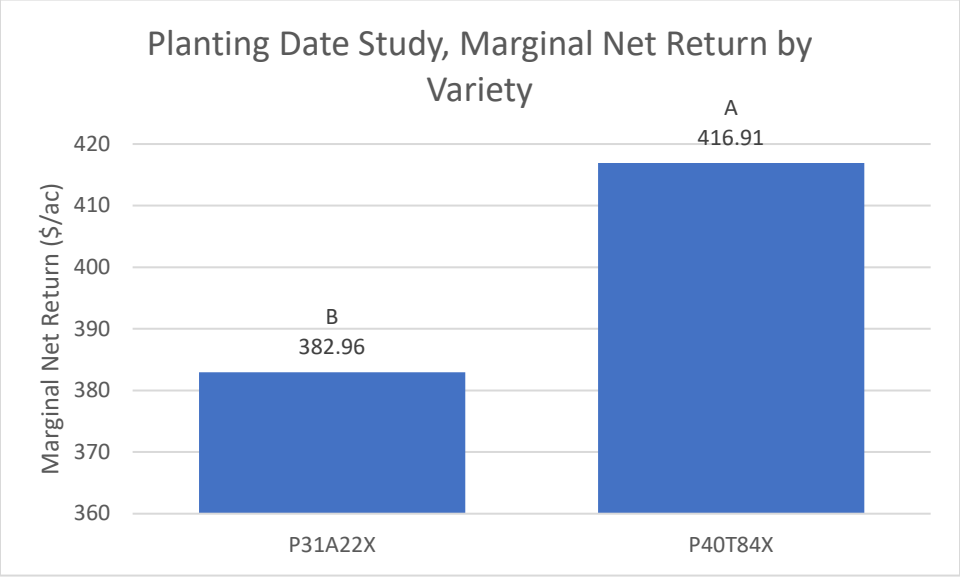
Marginal Net Return

The marginal net was by far the greatest for the May 22nd planting date, and lowest for the March 22nd and April 11th planting dates. The marginal net return of the last planting date was nearly $80 higher than the first planting date. Among hybrids across all dates, the P40T84X had the highest marginal net return.



*Values with the same letter are not significantly different at a 90% confidence level.

‡Marginal net return based on $7.40/bu soybeans, $49.50/unit of 140,000 seeds for 31A22, and $48.15/unit of 140,000 seeds for 40T84.



*Values with the same letter are not significantly different at a 90% confidence level.

‡Marginal net return based on $7.40/bu soybeans, $49.50/unit of 140,000 seeds for 31A22, and $48.15/unit of 140,000 seeds for 40T84.

Discussion

So, what do we have to say about these results? Recent research has shown that early planted soybeans have a yield advantage to soybeans planted in our more traditional timeframe. In fact, several sources say that for each day past May 1, we lose between a quarter to a half a bushel. Why is early planting

such an advantage? With earlier planting, the soybeans are able to harvest more sunlight. You may think, okay, more GDU's = earlier maturity = more time for pod fill, similar to what we would see with corn. The accumulation of light and heat results in maturity progression. This is not true for soybeans however. But remember, soybeans are day length sensitive. Their maturity mainly depends on the ratio of dark to light. So why does earlier planting help if we are not pushing maturity up? With earlier planting, the soybeans spend more time in the vegetative phase. During this phase, the plants are putting on critical nodes where pods will form and seeds will fill. More nodes generally suggests a higher potential for yield. Nodes accrue at 3.7 days per node up until R5. This means the early planted soybeans simply have more time to add additional nodes. And hopefully more nodes = more pods = higher yield.

Additionally, early planted soybeans also will offer quicker canopy closure. This means more overall light interception, and an increased surface area for photosynthesis when reaching critical stages of pod set and seed fill. Because of this canopy closure, less evaporation occurs from the soil and results in more available water for transpiration. Finally, a quicker canopy closure will reduce weed populations and competition that may result from the weeds.

So why the difference in this study vs what all of the recent research and publications have told us? I have several theories to present, and would welcome other opinions on the matter.

1. **The abnormal, unseasonal, temperatures.** An exceptionally cool April, one of the coolest on record, delayed plant emergence significantly. While the time from planting to emergence was not recorded, anecdotally, the first two dates took much longer to emerge and spent a lot more time in the ground. This coupled with several late snowfalls was very challenging on emerging seedlings. This was followed by one of the hottest May's on record. This above average temperature May resulted in optimum temperature soils for quick emergence and establishment of the May 7th and May 22nd planting dates. More uniform emergence has been shown to increase yield. Check out our soybean emergence data study for more information.
2. **Summer/Season long drought conditions.** Nothing is normal in a drought year. How did the lack of reliable moisture change crop development? Was it possible that the May planted soybeans caught some early August rains to help propel them through pod fill? Did this make the difference in yield?

Do any of these theories have any merit? Are they possible explanations for our results? What other factors would have impacted our results? Would repeating this study in a year with more adequate rainfall, or under irrigation allow for more possible benefit from the early planted soybeans? This study in particular should be repeated across multiple growing seasons to get a representative look across a variety of growing season conditions. We'd love to hear your thoughts. Leave a comment sharing your theory.

Interested in testing this on your own acres? Do you know what planting date is optimum for your soils and field conditions? We can help you set up a study to test this on one of your own farms. Contact a member of the Pederson Seed Team for more info.