



# Potential Inputs for Soybean Production

## Trial Objective

- Every year farmers evaluate which inputs they may want to use in their soybean production system to increase yield and return on investment. To help farmers with this decision, different inputs such as seeding rate, planting date, fungicide use, and fertilizer applications were evaluated for their potential impact on soybean yield.

## Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rates (seeds/acre)
Gothenburg, NE	Hord silt loam	Corn	Strip tillage	5/1/2020, 5/28/2020	10/02/2020	90	160K, 220K

- The study consisted of ten treatments with five categorized as base management (BM) and five categorized as high management (HM) (Table 1). Treatments 1 and 6 were considered the base for BM and HM inputs, respectively.

**Table 1. Base management (BM) and high management (HM) treatments.**

Treatment	Seeding Rate (seeds/acre)	2020 Planting Date	Delaro® 325 SC Fungicide (Applied 8/5/2020 at R3) (fl oz/acre)	Fertilizer (Strip-Till Applied 4/22/2020)		
				Phosphorus (lbs/acre)	Sulfur (lbs/acre)	Nitrogen (lbs/acre)
1 BM	160,000	5/28				
2 BM	220,000	5/28				
3 BM	160,000	5/1				
4 BM	160,000	5/28	8			
5 BM	160,000	5/28		40	8.75	15.8
6 HM	220,000	5/1	8	40	8.75	15.8
7 HM	160,000	5/1	8	40	8.75	15.8
8 HM	220,000	5/28	8	40	8.75	15.8
9 HM	220,000	5/1		40	8.75	15.8
10 HM	220,000	5/1	8			

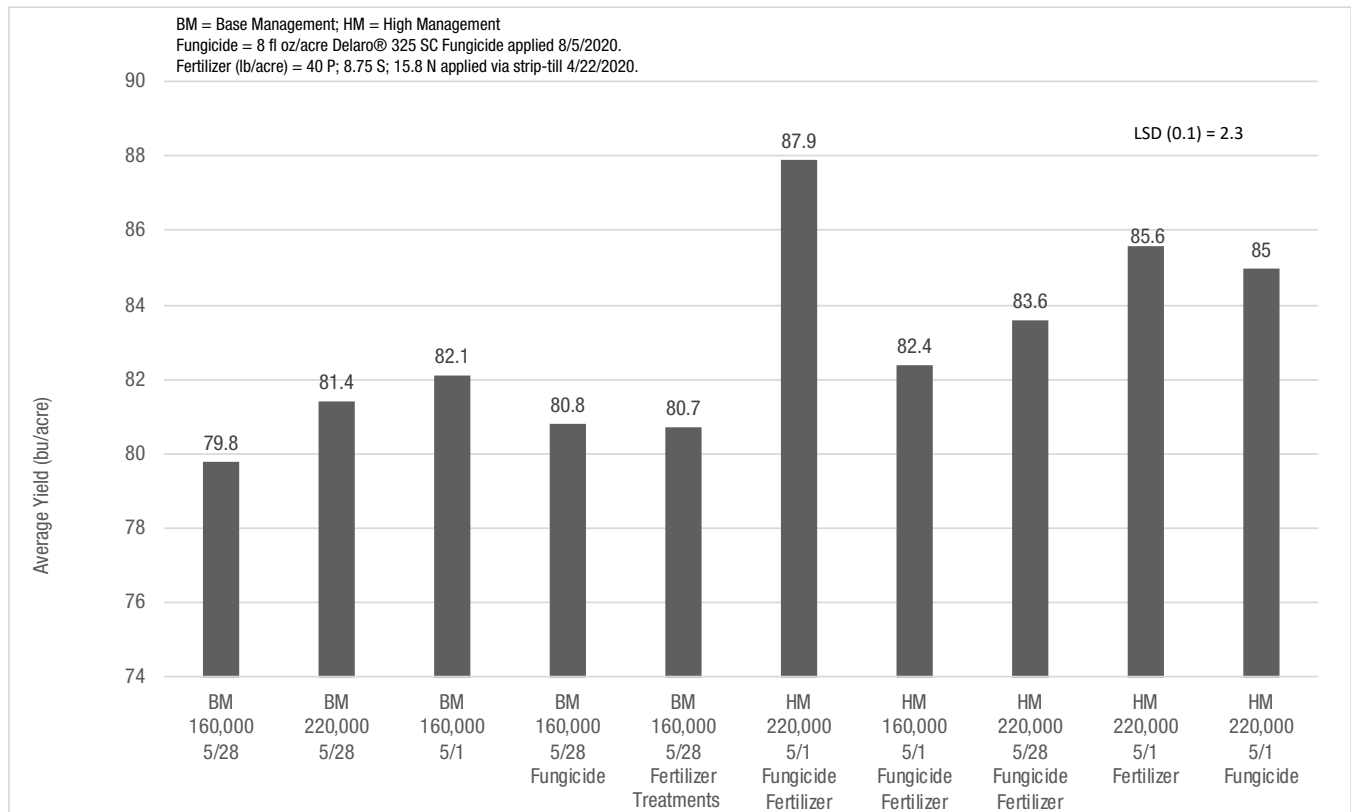
- This study was designed as a randomized complete block with four replications.
- A 2.6 maturity group soybean product was planted.
- The plots were sprinkler irrigated and weeds were controlled as needed.
- No insecticides were applied, and fungicides were applied as described in Table 1.
- Plots were combine-harvested, and a subsample of grain from each replication was taken to determine moisture content percent, test weight, and total weight.
- Statistical analysis for Fisher's LSD was performed.
- Input costs:
  - » Seed at \$50/140,000 seed unit.
  - » Fungicide and application at \$23/acre.
  - » Phosphorus/nitrogen mix at \$445/ton and sulfur at \$275/ton.
  - » These costs do not account for additional savings farmers can realize when using Bayer PLUS Rewards.\*

\*See program terms & conditions for full details.



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## Understanding the Results



**Figure 1. Average soybean yield (bu/acre) comparisons for base (BM) and high management (HM) inputs at the Gothenburg Water Utilization Learning Center in Gothenburg, Nebraska.**

- The highest average yield (87.9 bu/acre) occurred with the high management treatment that had a fertilizer application via strip-till on April 22, an early planting date of May 1, and a Delaro® 325 SC Fungicide application on August 5. In this study, the higher seeding rate of 220K seeds/acre appeared to have a positive influence on yield. In previous studies at the Bayer Crop Science, Gothenburg Water Utilization Learning Center, there has been minimal yield difference between a 220K and 160K seeds/acre seeding rate as seen in an irrigated study in 2017<sup>1</sup> and a dryland study in 2018.<sup>2</sup>
- For the base management treatments in this study, an earlier planting date of May 1 had a significant positive impact on yield of a few bushels per acre although the positive impact on yield can be higher as seen in 2017.<sup>1</sup> The May 1 planted soybeans matured earlier (Figure 2).



**Figure 2. Planting date impact on soybean maturity. May 28 planting on left (plot 103) is just starting to turn yellow while May 1 planting on right (plot 102) is about 50% podded.**



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**Table 2. Return of extra inputs over costs compared across different soybean commodity prices.**

Treatment	Treatment Inputs	Total Extra Cost*	\$8/bu	\$10/bu	\$12/bu
1 BM	160K, 5/28	\$0.00	\$638.40	\$798.00	\$957.60
2 BM	220K, 5/28	\$21.43	\$629.77	\$792.57	\$955.37
3 BM	<b>160K, 5/1</b>	<b>\$0.00</b>	<b>\$656.80</b>	<b>\$821.00</b>	<b>\$985.20</b>
4 BM	160K, 5/28, Fungicide**	\$23.00	\$623.40	\$785.00	\$946.60
5 BM	160K, 5/28, Fertilizer***	\$30.80	\$614.80	\$776.20	\$937.60
<b>6 HM</b>	<b>220K, 5/1, Fungicide, Fertilizer</b>	<b>\$75.23</b>	<b>\$627.97</b>	<b>\$803.77</b>	<b>\$979.57</b>
7 HM	160K, 5/1, Fungicide, Fertilizer	\$53.80	\$605.40	\$770.20	\$935.00
8 HM	220K, 5/28, Fungicide, Fertilizer	\$75.23	\$593.57	\$760.77	\$927.97
9 HM	220K, 5/1, Fertilizer	\$52.23	\$632.57	\$803.77	\$974.97
10 HM	220K, 5/1, Fungicide	\$44.43	\$635.57	\$805.57	\$975.57

\*These costs do not account for additional savings farmers can realize when using Bayer PLUS Rewards.

\*\*Fungicide = Delaro® 325 SC Fungicide, \*\*\*Fertilizer (lb/acre) = 40 P; 8.75 S; 15.8 N applied via strip-till 4/22/2020.

- Economic observations for this study (Table 2):
  - Planting a soybean crop earlier doesn't have traditional input costs such as fertilizer or pesticide applications. However, depending on the growing season, there may be a cost to the entire operation associated with moving to an earlier planting because some corn may be planted later than optimum. For this scenario, there are no associated costs for the May 1 planting date as it is an easy way to potentially increase soybean yield.
  - The high management treatment in this study had high yields, but also had the highest cost except for the HM – Early Planting treatment which had similar costs. The HM treatment becomes more profitable as the value of soybeans increase from \$8 to \$12/bu.

## Key Learnings

- Moving the planting date from the end of May to the end of April through the first week in May is an easy no cost input that typically increases soybean yield.
- When evaluating crop inputs for high management systems, the whole system should be considered. At the Learning Center, there has been a consistent trend of putting multiple crop inputs together providing increased yield potential. This was observed this year with the high management treatment. However, determining the value of each individual input can be difficult. Year to year variations occur but understanding that inputs build on each other in the system is an important point as farmers build-out their future soybean production plans.

## Sources

<sup>1</sup> Gothenburg Learning Center. 2017. Interaction of soybean planting date on seeding rate. Field Research Book.

<sup>2</sup> Gothenburg Learning Center. 2018. Influence of row width on soybean yield. Field Research Book.

## Legal Statements

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

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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