Soybean Response to Late-Season Irrigation

Trial Objective

The objective of this trial was to evaluate the response of soybean to different late-season irrigation treatments.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Planting Rate (seeds/acre)
Gothenburg, NE	Hord silt loam	Corn	Strip	5/11/2020	9/28/2020	55	160K

- This study was designed as a randomized complete block with four replications of five treatments.
- A 2.9 maturity group soybean product was planted.
- The plots were maintained under dryland conditions with no supplemental irrigation applied until August 25. A hand probe was unable to penetrate the soil to evaluate soil moisture at that time as it was extremely dry.
- Irrigation treatments consisted of the following with three total irrigation applications with each treatment (Table 1).
- Irrigation was applied using a sub-surface drip irrigation system, and weeds were controlled as needed. No fungicides or insecticides were applied.
- After August 25, only one precipitation event of 0.5 inches occurred on September 8, 2020.
- Plots were combine-harvested, and a subsample of seed from each replication was taken to determine moisture content, test weight, and total weight. Statistical analysis for Fisher's LSD was performed.

Table 1. Irrigation treatments and total water applied.

Treatment	Total Water Applied (inches)
Dryland	0
0.5-inch/week	1.5
1.0-inch/week	3.0
1.5-inch/week	4.5
2.0-inch/week	6

Understanding the Results

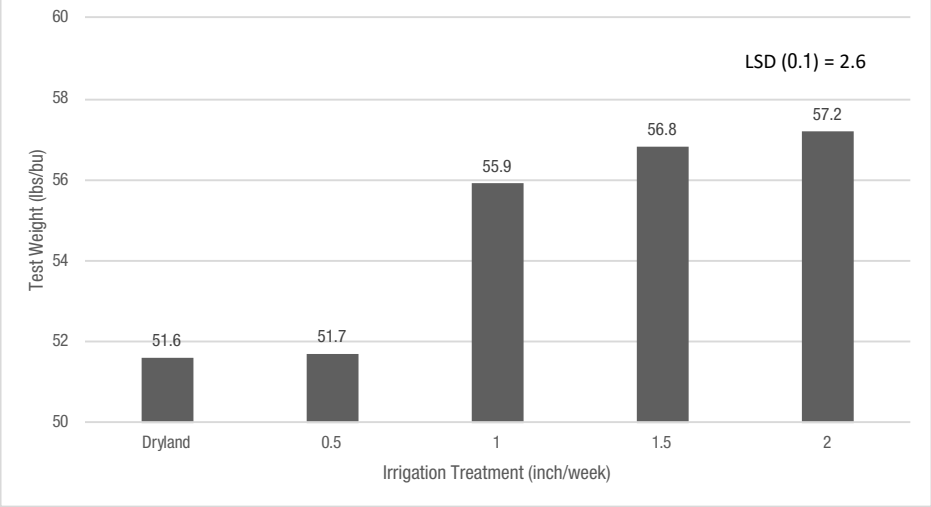

Figure 1. Impact of late-season irrigation treatments on soybean seed test weight.

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- Irrigation treatments significantly impacted test weight with seed sampled from plants receiving the dryland and 0.5-inch/week treatments having significantly lower test weights than seed from the 1.0-inch, 1.5-inch, and 2.0-inch/week treatments (Figure 1).
- The smaller soybean seed size can be seen in the dryland and 0.5-inch/week treatments compared to 1.0-inch/week treatment in Figure 2.

Figure 2. Soybean seed size of seed sampled from plants receiving the dryland, 0.5-inch, and 1.0-inch/week irrigation treatments.

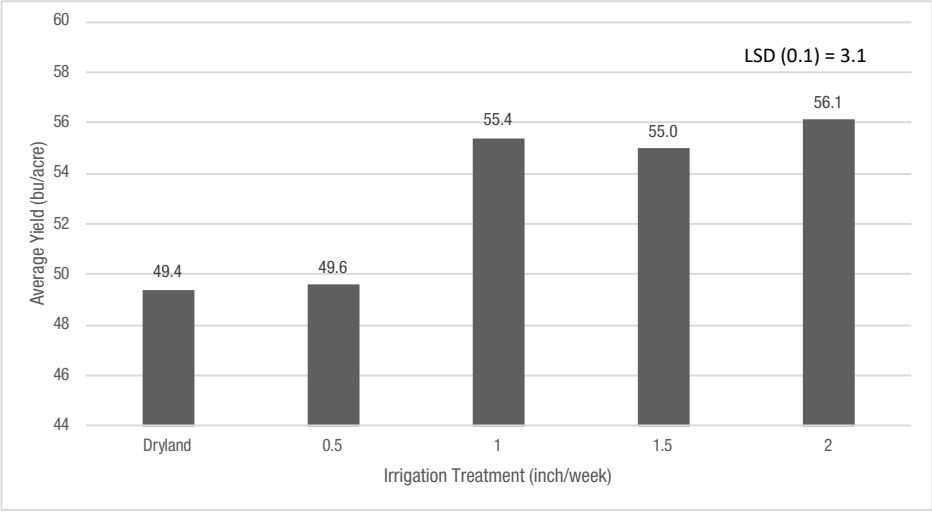

Figure 3. Impact of irrigation treatments on average soybean yield.

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- For this trial, irrigation treatments significantly impacted average soybean yield with plants receiving the dryland and 0.5-inch/week treatments having significantly lower average yields (bu/acre) than the plants receiving the 1.0-inch, 1.5-inch, and 2.0-inch/week treatments (Figure 3).
    - For this trial, the 0.5-inch/week treatment did not provide enough water to overcome the drought stress conditions of experienced by the soybean plants.
    - Soybean plants during the R5 to R6 growth stages can use on average 0.2 to 0.25 inches of water per acre per day.[1]
- Minimal soil moisture was available to the soybean plants toward the end of August. Plants appeared drought stressed before the start of the irrigation treatments on August 25 as seen in Figure 4.

Figure 4. Stressed soybean plants before irrigation on August 25, 2020.

Key Learnings

- Based on our observations for this trial, farmers could potentially improve soybean yields by applying late-season irrigations when it is available.
    - Because soybeans use more water later in the growing season, late-season irrigation can be a strategy in areas where water could be diverted from a short-season corn product if sufficient moisture is available in the soil profile to fill-out the corn kernels.
- Significant soybean yield losses could occur in years where end of season precipitation is limited and the available moisture in the soil profile is not being actively managed. Warm air temperatures at the end of August through mid-September can also negatively impact available moisture in the soil.

Source

[1] Kranz, W.L. and Specht, J.E. 2012. Irrigating soybean. University of Nebraska-Lincoln Extension. G1367.

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.