Soybean Irrigation Recommendations

Interest in growing soybeans has increased dramatically in recent years. The interest is due to good yield potential, favorable economic returns, and soybean value as part of a crop rotation with corn. Soybeans are a relatively drought-tolerant crop but can respond well to irrigation. Research in Kansas has shown that yield potential of irrigated soybeans to be nearly double the dryland yield (Kansas State University, 1997). Soybeans respond well to irrigation during later growth stages where water stress may lead to a decrease in yield. Therefore, timely scheduled and proper irrigation management is essential to improve yield potential and water use efficiency.

Study Guidelines

A non-replicated soybean trial was conducted in 2010 at the Gothenburg, Nebraska Monsanto Learning Center to identify differential yield under several irrigation monitoring equipment, compare varietal response to various water regimes, and to assess efficiency of the irrigation scheduling equipment. Four soybean varieties with relative maturity range between 3.0 (AG3005, AG3030, AG3039) and 3.1 (AG3130) were planted on May 25, 2010. Plots were supplied with water by subsurface drip tape that was placed 14 inches deep in the soil. The soil moisture monitoring devices and water regimes that were evaluated in this trial are shown in Table 1. Soil moisture was monitored using John Deere (JD) Capacitance probes, which measure the water content of the soil profile. KanSched, which is a computer software program from Kansas State University also designed to help monitor soil moisture using evapotranspiration (ET) data to monitor root zone water in the soil and help a producer schedule irrigation events. UNL SoyWater, which is a new web based tool that utilizes weather and field information to determine irrigation recommendations. The Water at R2 treatment is applying a limited amount of water at the R2 (full flower) soybean growth stage, as it is to be the critical time to apply a limited amount of water to soybean.

Results and Discussions

Regardless of the irrigation scheduling technology and water regimes, there were no great differences between the varieties, thus data in the figures are presented as the average of the four varieties. It was a challenging year to evaluate irrigation options due to high rainfall during the season. A total of 23 inches of rainfall was recorded from May to October. Soybeans grown under UNL SoyWater had the most irrigation applied to them at 8.4 inches for a total of 31.4 inches. KanSched was the next highest irrigation treatment with 6.6 inches of water applied for a total of 29.6 inches. These two treatments produced 4.2 and 3.5 bu/Acre, respectively, more than the check soybeans that were not irrigated but received 23 inches water through rainfall (Figure 1). Surprisingly, soybeans grown under the JD Probe (3.6 inches applied for a total of 26.6 inches) yielded less than both the check and the Water at R2 irrigation treatment (2.4 inches applied for the total of 25.4 inches). This might be attributed to a malfunction of the subsurface drip system or some other variation. The row length in some of these treatments was reduce to navigate the planter around the flush valves on the drip system. Figure 2 shows the return ($) per acre of the five systems. The check and Water applied at R2 treatments provided the most returns compared to the other systems. The returns were based on $12 per bushel soybeans and a water cost of $10 per inch applied.

The irrigation management systems were not superior to the check treatment in soybean yield produced per inch of water (Figure 3). This is most likely because the rainfall was nearly enough to maximize soybean yields. Under these conditions the irrigation added very little to soybean yield.
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Conclusions

- In general, due to weather conditions in 2010, yields were similar between the check and irrigated treatments. Rainfall provided the check soybeans with enough water to produce a comparable yield to the irrigated systems, with minimal gains made from irrigating the soybeans.
- Due to the rainfall and full moisture profile in the spring, there was limited water application required through irrigation, and apparently a very limited response to the applied water.
- Soybeans responded to the higher amount of water provided through irrigation. UNL SoyWater and KanSched provided the most irrigation water, which did result in the highest soybean yield compared to the check soybeans, but not enough to be profitable.
- Ideally, this trial could be performed under much drier conditions, which would favor lower yields in the check treatment and a greater response to irrigation water than was shown here. A normal year would provide more relevant information that could help us determine more accurately the value of the irrigation management.


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. 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. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Technology Development by Monsanto and Design® is a servicemark of Monsanto Technology LLC. All other trademarks are the property of their respective owners. ©2010 Monsanto Company. SMK12102010