Rainout Shelter Comparison of DroughtGard® Hybrids and AquaMAX® Corn Products

Trial Objective:

- To study the yield performance and the value of applying additional irrigation water to a DroughtGard® Hybrids corn product and an AQUAmax® corn product in water-limited to full-irrigation environments.

Research Site Details:

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Gothenburg, NE	Hord silt loam	Corn	Conventional	05/17/2018	10/09/2018	250	38K

- A 114 RM DroughtGard® Hybrids corn product and a 111 RM AQUAmax® corn product were planted in four unique irrigation environments with 4, 8, 12, and 16 inches of applied water.
- The Rainout Shelter is a highly controlled environment for researching the impact of irrigation water on crops.
  - » The shelter is a 160 ft by 80 ft building on rails that can be moved to cover the corn plots to restrict rainfall, and can be moved off the plots during dry weather so the crop gets otherwise normal conditions.
- Starting soil moisture was near field capacity, which was provided by irrigation and rainfall during spring rain events.
- Fertilizer applied was 200 lb nitrogen/acre as 32-0-0, 40 lb phosphorus/acre as 10-34-0, 25 lb sulfur/acre as 12-0-0-26S, and 0.5 lb zinc/acre as 7-0-0-9Zn.
- Weeds were controlled in the plots and no insecticide or fungicide were applied.
- Irrigation treatments were applied using surface drip irrigation targeting the growth stages when the irrigation would provide the most yield. The 4-inch irrigation treatment was targeted at the V16-R3 growth stage to help the plants pollinate and set kernels.

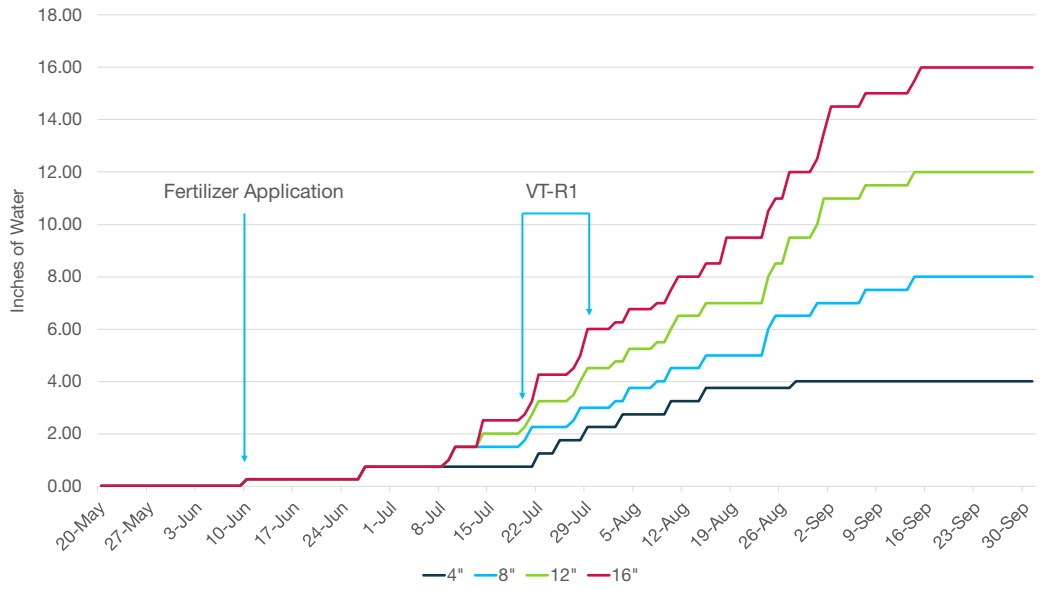

Figure 1. Irrigation distribution throughout the growing season. Rainfall did not occur in the trials so all water input came from irrigation.

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Understanding the Results

- The DroughtGard® Hybrids corn product had higher yields across all irrigation environments when compared to the AQUAmax® corn product, which provided an average yield advantage of 22 bu/acre (Figure 2).
- We also saw a yield advantage with a DroughtGard® Hybrids corn product in a 2016 trial in the Rainout Shelter with irrigation environments spanning 4, 7, and 10 inches of applied irrigation.
- Corn yield increased with each 4-inch increase in irrigation. The 16-inch treatment yielded higher on average, but this result was not significant, indicating that the 12- and 16-inch treatments were nearing the evapotranspiration needs of the crop (Figure 3).

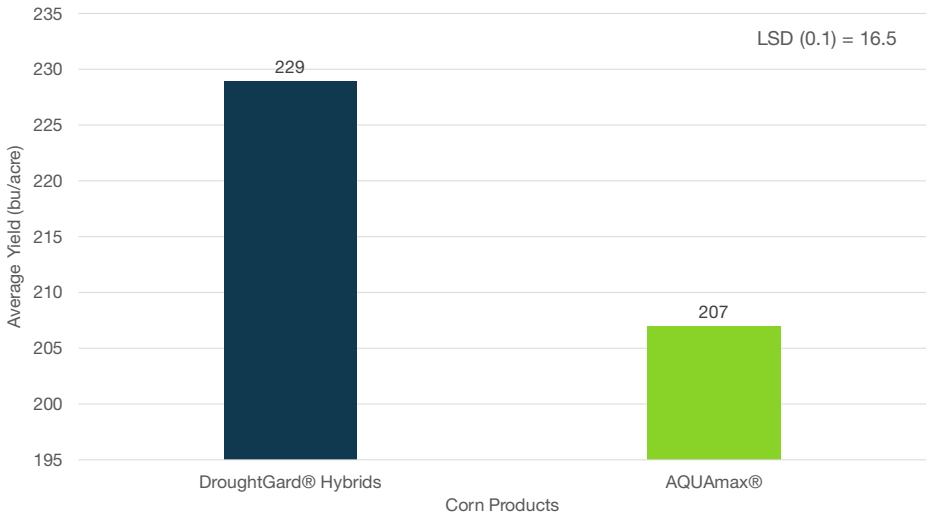

Figure 2. Average yield of a DroughtGard® Hybrids corn product compared to an AQUAmax® corn product in the 2018 trial.

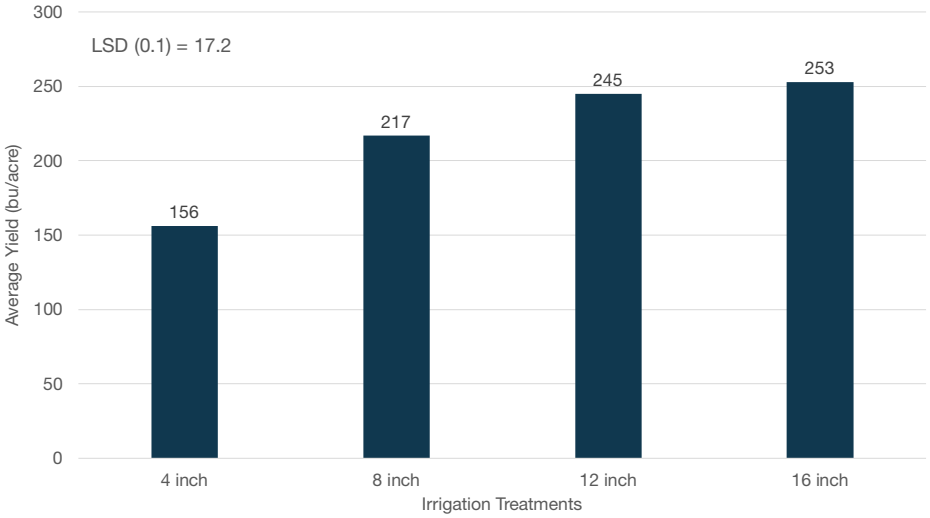

Figure 3. Average yields of DroughtGard® Hybrids and AQUAmax® products combined at all irrigation levels.

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- As expected, increased irrigation produced higher yields, but the rate of the yield increase per inch of water applied decreased incrementally.
- The 4-inch treatment returned a 39 bu increase/inch of water with the assumption that yields would be 0 bu/acre with no irrigation because the corn would not pollinate with only utilizing stored soil moisture (Figure 4).
- If the bu/acre increase per inch of water were monetized using a $3.30/bu corn price, this would equate to a $128.70, $50.49, $23.10, and $6.60 return on investment for the 4-, 8-, 12-, and 16-inch treatments, respectively.
- This is a unique look at what the value of irrigation water or potential precipitation can be in water-stressed environments, and, depending on application costs, these results indicate where returns diminish to the point that it no longer pays to add extra irrigation water.

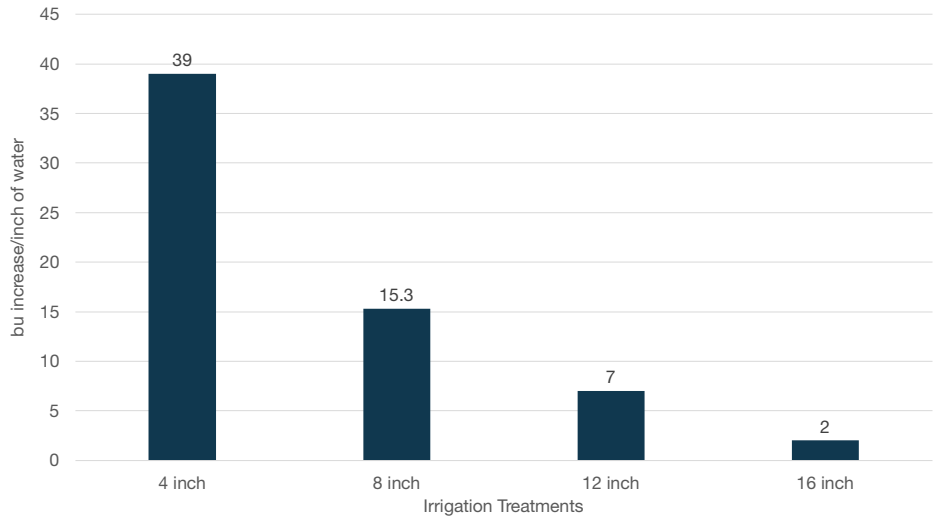

Figure 4. Bushels returned per inch of water applied. (Calculated by taking the yield gain over the yield of the previous treatment and dividing that by the amount of water needed to produce the extra bushels of corn. For example: for the 4-inch application, 156 bu/acre divided by 4 = 39; for the 16-inch application, 253-245 bu/acre = 8 bu/acre divided by 4 = 2. Calculation assumes 0 yield if no irrigation water was applied.)

Table 1. Average yields of the corn products in each irrigation treatment.

Corn Product	Irrigation Treatment	Average Yield (bu/acre)
DroughtGard® Hybrids	4 inch	172
DroughtGard® Hybrids	8 inch	225
DroughtGard® Hybrids	12 inch	258
DroughtGard® Hybrids	16 inch	260
AQUAmax®	4 inch	139
AQUAmax®	8 inch	209
AQUAmax®	12 inch	232
AQUAmax®	16 inch	247
LSD (0.1)		NS

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Figure 5. DroughtGard® Hybrids corn product in the 4-inch irrigation treatment.

Figure 6. DroughtGard® Hybrids corn product in the 16-inch irrigation treatment.

What Does This Mean For Your Farm?

- Understanding corn product responses to irrigation water is an important part of managing irrigation to limit water use while maximizing profits (see table 1).
- The Rainout Shelter provides a great tool to help understand corn products and take a detailed look at how water application rates impact yield.

Legal Statements