

Variable Rate Irrigation of Corn (Field 5B)

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Objectives: A comparison of conventional and site-specific irrigation on corn was evaluated for three years in Halfway, TX. We tested the hypothesis of allocating more water to potentially more productive areas of the field and we measured crop water use and yield.

Methodology:

- Spring soil samples analyzed for NO₃-N and P at 0-15, 15-30, 30-60, and 60-90 cm depths.
- In 1999 and 2002, the Veris® 3100 Electrical Conductivity Mapping System was utilized to create EC maps. Texture was inferred from this technique.
- SMU were based on soil texture, slope, and soil NO₃-N. Variable rate irrigation treatments were Base Rate (BR) or control, BR+20%, and BR-20%. Base rate was calculated as 75% of average ET due to limited well capacity to replace 100% ET throughout the growing season.
- Water Use Efficiency (WUE) was calculated as grain per unit of crop water use, in kg ha⁻¹ mm⁻¹.
- Corn variety Pioneer 3223 was planted each year at 69,000 seed ha⁻¹. Neutron probe readings every 2 weeks throughout the growing season beginning prior to the start of irrigation were used to calculate crop water use.
- Corn grain yield was harvested using a John Deere Greenstar® Yield Mapping Combine.

Results: Year 2004 was characterized by above average rainfall, (~ 5 mm d⁻¹) for most of the growing season Table 1), and normal cumulative HU's (Fig. 1a). This year, due to frequent rains, irrigation treatment effects on yield were masked (Fig. 1b). However, the WUE for some of the SMU's were affected (Fig. 1c). For example, WUE for the BR+20 irrigation treatment was lower than for the BR and the BR-20 rates.

Table 1. Planting and harvest dates with rain and irrigation amounts for corn.

Site-Specific-Corn						
Year	Planting Date	Harvest Date	Rainfall Total (mm)	Irrigation (mm)		
				Base Rate (BR)	BR + 20%	BR - 20%
2004	20 April	14 Oct.	290	502	549	456

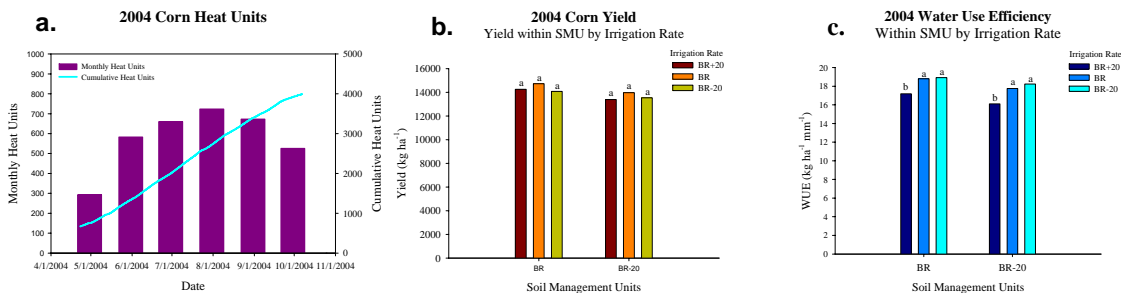


Fig. 1 a-c. Heat units, grain yield and WUE for corn in 2004.