

Variable Rate Irrigation on Corn

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Methodology: Three water rates included the Base Rate (BR), BR+20%, and BR-20%. The potential evapotranspiration (PET) was calculated daily, 75% of PET was applied as needed at the BR, and BR + or - 20% was applied as the additional treatments. Soil management units (SMU) were identified according to elevation and Veris 3100® Electrical Conductivity measurements (Fig. 1). The BR+20% SMU represents the more heavy textured soil with little slope, the BR SMU represents the transition between the heavy textured soil and the sandy sloping area, and the BR-20% SMU represents the low yielding sandy sloping areas of the field. The theory is that by decreasing irrigation water on the sandy less productive soils and increasing irrigation water on the heavier textured soils, the use of water will be more efficient. In order to test this theory, water was applied in strips across each SMU to provide comparisons within the SMU for yield and WUE (Fig. 1). Pioneer-3223 was planted April 20, 2005 at 69,000 seed ha⁻¹. Grain yield samples were taken by hand, locations were measured for insect infestation, and lodging counts were obtained prior to harvesting the field with the John Deere Greenstar® Yield Monitor Combine.

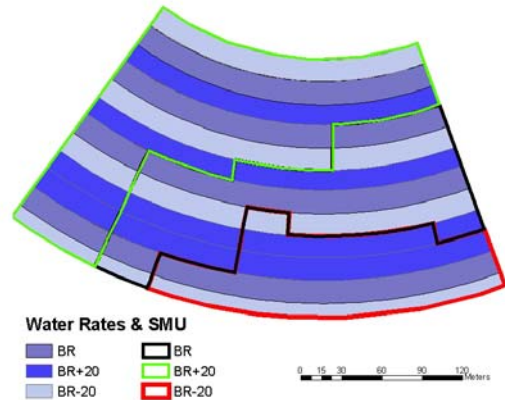


Figure 1 Field 5D irrigation rates applied in strips across SMU (outlined).

Results: When the yield and WUE were evaluated for the entire field without regard for SMU's, BR+20% and BR yielded significantly more than BR-20%, however, the BR-20% rate showed the most efficient use of water yielding 18.1 kg ha⁻¹ grain mm⁻¹ H₂O while the BR+20% yielded only 15.8 kg ha⁻¹ grain mm⁻¹ H₂O). When grain yield and WUE were evaluated according to soil management units (SMU) the trend became less clear. Within every SMU, BR+20% yielded significantly more than BR-20%, but only provided significantly greater yields over BR in the BR SMU. WUE was only significant in the BR+20% SMU which represented the heavier textured soil area. In this SMU the BR-20% irrigation application was more efficient than BR or BR+20%, however it still yielded less overall than did the higher water applications. The BR+20% irrigation application was the least efficient use of water in this study.

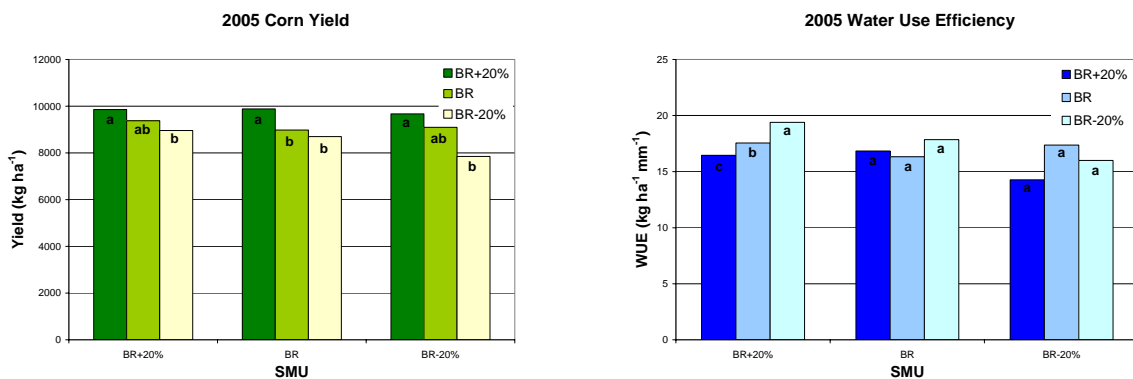


Figure 2. Grain yield and WUE of corn grown in a site-specific irrigation study, Helms Farm, 2005. Severe hail in late June likely influenced the yield results in 2005.