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Abstract Title: Optimal Water and Nutrient Needs for Elephantgrass Production as a Bio-Fuel Feedstock

Abstract (250 words or less): Elephantgrass (*Pennisetum purpureum* Schumacher) is a tall tropical bunch grass native to Africa and used as forage in much of the world. It produces very high biomass yields and is considered an excellent bio-energy feedstock for southern US. However, previous studies have shown that production is not sustainable without fertilizer application and adequate soil moisture. The objective of this study was to determine the effects of N (three levels) and K (two levels) fertilizer and irrigation (0, 1.1, or 2.2 cm wk⁻¹) on 'Merkeron' elephantgrass at Shellman, GA. The yield one year after establishment did not vary among fertilizer treatments but was significantly greater for plots receiving 1.1 cm irrigation wk⁻¹ (29 Mg ha⁻¹) versus rainfed (21.7 Mg ha⁻¹). Year 2 yields again did not vary among fertilizer applications but were higher for 2.2 cm irrigation (35.4 Mg ha⁻¹) and 1.1 cm irrigation (33.4 Mg ha⁻¹) irrigation wk⁻¹ versus rainfed (26.4 Mg ha⁻¹). The C/N uptake ratios were higher for irrigated plots in both years and highest under moderate levels of N and higher K fertilizer rates in year 2. Excessive rainfall in year three caused significant lodging in August requiring early harvest without reliable data. In year 4 (2014) there were significant yield responses to N fertilization with highest yields being under the highest irrigation and highest fertilizer rates (36.1 Mg ha⁻¹) versus rainfed low fertilizer rates (19.2 Mg ha⁻¹).