Growing Grain Sorghum in Clumps to Improve Microclimate and Grain Yield

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ABSTRACT

The Texas High Plains is characterized by limited precipitation, low ambient humidity and high evaporative demand due to high temperature, wind speed, solar radiation and vapor pressure deficit (VPD). When crops are grown under such environments, cultivar selection, planting geometry and plant population are key factors determining grain yields. A two-year grain sorghum (*Sorghum bicolor* L. Moench) greenhouse study was conducted to compare VPD, grain yield, yield components, transpiration efficiency (TE), and water use efficiency (WUE) values for clump and evenly spaced planting (ESP) geometries with the same plant populations. Plants were grown at high and low water levels with lid covered, straw-mulched, and bare surfaces. EL-USB-2^{+} sensors were used to measure air temperature and relative humidity (RH) within the plant canopy. Mean VPDs within the clumps were consistently lower than those for ESPs indicating that clumps improved the microclimate. Though the grain yields were similar for clumps and ESPs, clumps had significantly higher harvest index (HI) compared with ESPs (0.48 vs. 0.43). This was largely due to clumps having only 0.4 tillers/plant compared with 1.2 tillers/plant for ESPs. Grain transpiration efficiency (TEg) was significantly higher for clumps (2.48 g L^{-1}) than for ESPs (2.30 g L^{-1}). Our results suggest that while potential yield increases from growing plants in clumps are limited, they can be beneficial because no additional inputs are required.