



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Comparison of Photosynthetic Water use Efficiency of Sweet Sorghum at Canopy and Leaf Scales

Comparison of Photosynthetic Water use Efficiency of Sweet Sorghum at
Canopy and Leaf Scales

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Abstract: Little is known about the response of sweet sorghum to water stress. Therefore, the aim of this study was to characterize sweet sorghum physiological water use efficiency (WUE) under progressing water stress conditions, with emphasis on the canopy scale as compared with the leaf scale. Sweet sorghum (*Sorghum bicolor*(L.) Moench) was subjected to two water stress cycles. Energy, water vapor, and CO₂ fluxes were estimated at the canopy scale by means of the Bowen ratio/energy balance/CO₂ gradient method (BREB+), and at the leaf scale with a portable photosynthesis system. Predawn (y_b) and noon-time leaf water potential (y_n) were measured by pressure chamber. Canopy and leaf photosynthetic WUE showed parallel behavior. They decreased following an increase in leaf-to-air vapor pressure deficit (VPD) and a decrease in y_b. The variation in soil-water status, estimated by y_b, ranged from -0.2 to -1.1 MPa and in VPD from 2.3 to 5.8 kPa at the leaf scale, and from 1.4 to 5.5 kPa at the canopy scale, during the experimental period. Mean values of noon-time photosynthetic WUE were around 5 and 4.3 mmol CO₂ .mol⁻¹ H₂O for leaf and canopy scales, respectively.

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