CARRBON ISOTOPE DISCRIMINATION AND WATER USE EFFICIENCY IN SOME PLANTS GROWN UNDER DIFFERENT WATER CONDITIONS

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ABSTRACT

Kallar grass, Sporobolus and Camaldulensis were grown in lysimeters (1m X 1m X 1m) and plants were subjected to well watered treatment (100% of TAW (total available water), medium watered treatment (75% of TAW) and low watered treatment (50% of TAW). The moisture levels were maintained by irrigating the plots with required amount of water estimated with the reading from preinstalled soil tensiometers and neutron moisture meter readings. The plant parameters studied includes fresh and dry biomass, water use efficiency (WUE) and transpiration efficiency (W). Plant leaf samples were also analysed for carbon isotope discrimination (^{13}C) with an isotope ratio ($^{13}C/^{12}C$) mass spectrometer. Generally the Sporobolus grass showed highest WUE followed by kallar grass and Camaldulensis at different moisture regimes. The W also followed trend similar to WUE. Carbon isotope discrimination indicated that Sporobolus grass with mean ^{13}C value -12.8‰ and Kallar grass with mean ^{13}C of -14.6 ‰ are C-4 plant types and Camaldulensis with mean -28.1‰ ^{13}C is C-3 plant type. The ^{13}C of the plants was positively and significantly correlated with both WUE ($r = 0.98^{**}$) and W ($r = 0.977^{**}$) with high R^2 (0.96) in a combined regression. Highly significant and positive linear correlations were observed between ^{13}C and WUE and W in all the plants included in this study. The results suggest that WUE and W can be predicted from the ^{13}C of plant leaves.