Optimizing productivity and irrigation water use efficiency of pearl millet as a forage crop in arid regions under different irrigation methods and stress.

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Abstract:

A field experiment was carried-out at the Agriculture Experimental Station of King Abdulaziz University located at Hada Alsham, 110 km north east of Jeddah, to optimize the productivity and irrigation water use efficiency of pearl millets (Pennisetum glaucum L.), as green fodder under different irrigation methods and stress. Five treatments were investigated in this study: three with full irrigation requirements including sprinkler irrigation (SPI), drip irrigation (DI) and sub-surface drip irrigation (SDI), the remaining two treatments were stress treatment namely: sub-surface drip kept at 85% of field capacity (SDI 1) and sub-surface drip kept at 70% of field capacity (SDI 2). Irrigation water for all treatments was precisely supplied using water electronics module (WEM). Results indicated that SDI treatment gave the highest fresh and dry biomass, followed by SDI 1 compared to other treatments. Increasing number of cuts sharply decreased biomass production. Increasing water stress decreased biomass production but SDI with water stress increased biomass production compared to SPI with full irrigation requirement. Irrigation water use efficiency (IWUE) was decreased by increasing water stress and number of cuts. Results also proved that WEM is a practical tool to precisely supply irrigation water when needed, and can be effectively used to precisely control water stress.

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