**Title: Evaluating Water Use Efficiency and Shoot-root Traits in Australian Mungbean Cultivars under Different Levels of Water Availability**

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This study investigates the impact of varying water levels on the water use efficiency (WUE) of six Australian commercial mungbean cultivars (Jade-AU, Crystal, Berken, Opal-AU, Green Dragon, and King). The cultivars were subjected to three levels of water availability (75%, 50%, and 25% of field capacity) within a glasshouse setting, involving large 550mm x 150mm lysimeters filled with 8.5 kg air dried Grey Verosol soil. The water treatments commenced at 31 days after sowing (DAS) and maintained until the harvest. Key measurements included plant shoot traits like height, leaf area, shoot biomass, seed weight, water use, stomatal conductance, and root characterstics such as tap root length, diameter, root biomass, and root system architecture (number of root tips and forks). The study also measured the harvest index and water use and calculated the WUE for both seed yield (WUEseed; ratio of seed weight to total water used) and shoot biomass (WUEshoot; ratio of total shoot biomass to total water used). Results showed a reduction in the key traits and WUE at the lower water levels (50% and 25%) compared to the 75% water level for all six cultivars. However, the reduction in WUE varied among cultivars. Berken and Crystal showed a smaller decrease in WUE under reduced water availability (25% and 50%), while Opal-AU had the largest reduction. This study also identified correlations between WUE and the other measured traits, indicating the opportunities to improve WUE through selection of these traits.