

Physiological responses of mycorrhizal and uninoculated seedlings of mangosteen (*Garcinia mangostana* L.) to water depletion and subsequent rewatering

ABSTRACT

Earlier reports have shown that mycorrhizal inoculation enhanced growth and overall quality of mangosteen seedlings. It is therefore imperative to evaluate the performance of these seedlings under the rigours of transplanting conditions. A glasshouse experiment was conducted by subjecting 15-month-old pre-inoculated mangosteen seedlings to non-irrigated conditions for 10 days followed by recovery irrigation from the 11th day onwards. Response of these seedlings to both water stress and recovery conditions was evaluated by comparing changes in leaf water potential (Ψ), stomatal conductance (g_s) and photosynthesis (P_n) with those of uninoculated seedlings. Results showed that as Ψ of irrigated seedlings remained between 0.2 and 0.4 MPa, the Ψ of stressed plants decreased progressively and reached 0.15 MPa after 10 days of withholding water. These Ψ values were significantly different from those of irrigated treatments as early as the fourth day. Mycorrhizal seedlings were able to maintain a relatively higher Ψ than the uninoculated ones. For every unit drop in Ψ , g_s in mycorrhizal seedlings decreased by 1.38 to 1.44 cm/s while P_n by 1.64 to 1.89 mol/m²/s. The corresponding decreases for g_s and P_n of uninoculated seedlings were 1.94 cm/s and 2.08 mol/m²/s respectively. On any given day, g_s and P_n of mycorrhizal seedlings were consistently higher than that of uninoculated seedlings. Upon rewatering, Ψ , g_s and P_n of mycorrhizal seedlings recovered to values not significantly different from irrigated plants within a shorter time period. The recovery rate of these processes was relatively faster than in uninoculated seedlings. As per unit increase in Ψ , physiological processes of mycorrhizal seedlings recovered at 0.34 to 0.42 cm/s (g_s) and 1.78 to 2.50 mol/m²/s (P_n) as compared with 0.18 cm/s and 1.45 mol/m²/s respectively by uninoculated seedlings. In conclusion, arbuscular mycorrhizal inoculation improved water relations of mangosteen seedlings both during stress and recovery period that could be important for their survival after field planting.

Keyword: Mycorrhiza; Physiological processes; Water stress; Recovery; Mangosteen