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Management strategies for water use efficiency in sugarcane seedlings production

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The PSSS (pre-sprouted sugarcane seedlings) system is based on seedlings cultivation in small containers filled with substrate. Irrigation is used during all production period, hence the importance of efficient water management. Understanding water dynamic in plant production and its responses to different management strategies can improve water management. In this context, the objective of this study was to evaluate the water consumption (WC) under different irrigation managements, as well as to verify the suitability of monitoring substrate water matric potential (SWMP) using gas tensiometers. The experiment was carried out in Ribeirão Preto (São Paulo State, Brazil), in a greenhouse, in randomized blocks design. Irrigation depths applied were 96%(T1), 80%(T2), 64%(T3) and 48%(T4) of reference evapotranspiration (ETo) estimated by Penman-Monteith method. The climatic data were obtained from a meteorological station outside the greenhouse. Each experimental plot consisted of one plastic tray with 63 seedling containers (180 ml), each one with one seedling of IAC91-1099 sugarcane cultivar. Irrigation was applied three times a day using a mobile sprinkler irrigation bar. The gas tensiometers were installed at half of container height, using 6 replications in each treatment. WC was estimated by the difference between applied water (AW) and percolated water (PW). PW was collected using collectors installed below the plastic trays, with three replications. Seedling dry mass (SDM) was obtained by the sum of roots, stem and leaves dry mass, with four replications. Water use efficiency (WUE) was obtained by the ratio of SDM by WC and expressed in g mm^{-1}. Data were subjected to analysis of variance and the means were compared by t-test (LSD) at 0.05 probability level. T1 and T2 presented higher WC and there was no difference between them. T4 resulted in lowest water consumption, T3 presented intermediate WC value among treatments. There was no difference in SDM among T1, T2 and T3 treatments. T4 seedlings presented the lowest SDM values. WUE observed in T3 was 1.19 g mm^{-1}. The gas tensiometer system allowed the continuous monitoring of SWMP and it was sensitive enough to differentiate SWMP among treatments up to -12 kPa.

KEYWORDS: Pre-sprouted seedlings, greenhouse, substrate, soilless cultivation system.