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Smart Irrigation System for Applied Irrigation Management in Tomato Seedling Production

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Abstract : The seedling production stage is a critical point in the vegetable production system. Obtaining high-quality seedlings is a prerequisite for subsequent cropping to occur well and productivity optimization is required. The water management is an important step in agriculture production. The adequate water requirement in horticulture seedlings can provide higher quality and increase field production. The practice of irrigation is indispensable and requires a duly adjusted quality irrigation system, together with a specific water management plan to meet the water demand of the crop. Irrigation management in seedling management requires a great deal of specific information, especially when it involves the use of inputs such as hydrorentering polymers and automation technologies of the data acquisition and irrigation system. The experiment was conducted in a greenhouse at the Federal University of Viçosa, Viçosa - MG. Tomato seedlings (Lycopersicon esculentum Mill) were produced in plastic trays of 128 cells, suspended at 1.25 m from the ground. The seedlings were irrigated by 4 micro sprinklers of fixed jet 360º per tray, duly isolated by sideboards, following the methodology developed for this work. During Phase 1, in January / February 2017 (duration of 24 days), the cultivation coefficient (Kc) of seedlings cultured in the presence and absence of hydrogel was evaluated by weighing lysimeter. In Phase 2, September 2017 (duration of 25 days), the seedlings were submitted to 4 irrigation managements (Kc, timer, 0.50 ETo, and 1.00 ETo), in the presence and absence of hydrogel and then evaluated in relation to quality parameters. The microclimate inside the greenhouse was monitored with the use of air temperature, relative humidity and global radiation sensors connected to a microcontroller that performed hourly calculations of reference evapotranspiration by Penman-Monteith standard method FAO56 modified for the balance of long waves according to Walker, Aldrich, Short (1983), and conducted water balance and irrigation decision making for each experimental treatment. Kc of seedlings cultured on a substrate with hydrogel (1.55) was higher than Kc on a pure substrate (1.39). The use of the hydrogel was a differential for the production of earlier tomato seedlings, with higher final height, the larger diameter of the colon, greater accumulation of a dry mass of shoot, a larger area of crown projection and greater the rate of relative growth. The handling 1.00 ETo promoted higher relative growth rate.

Keywords : automatic system; efficiency of water use; precision irrigation, micro sprinkler.
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