Effect of PRD deficit-irrigation method and sodium salicylate on yield, yield components and water use efficiency of tomato

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Abstract

To alleviate water scarcity problem in arid and semiarid regions of Iran, different irrigation methods such as deficit irrigation, pressurized irrigation and partial rootzone drying (PRD) method have been suggested. In PRD method, half of the rootzone is watered and the other half is kept dry intermittently. The objective of this research was to study yield, yield components and water use efficiency (WUE) of tomato, using PRD irrigation method and a growth stabilizer in two soil textures, under greenhouse conditions. The factorial experiment, based on complete randomizal design and three replications, included three irrigation managements (T_1, full irrigation; T_2, 50% of full irrigation, with PRD method and barrier; T_3, 50% of full irrigation, with PRD method and no barrier), two levels of stabilizer (B_1, spraying sodium salicylate and B_2, without spraying sodium salicylate) and two soil textures (S_1, clay loam and S_2, sandy loam). Results showed that the highest plants (176.2 cm) were in T_1 treatment and the shortest plants (131.3 cm) were in T_3 treatment. With 50% reduction of water in T_2 compared to T_1 treatment, number of flower stems was decreased by 15.2%. The highest and the least biomass and fruit yield were measured in T_1 (506.8 and 342.5 g per plant) and T_3 (126.2 and 54.8 g per plant) treatments, respectively. WUE was increased by 9.9% (changing from T_1 to T_2) and was decreased by 71.4% (changing from T_2 to T_3). The highest and the least fruit yield (216.7 and 174.4 g per plant) were obtained in S_2 and S_1 soils, respectively. Sandy loam soil with production of 7.22 kg/m^3 had higher WUE than clay loam soil, which produced 5.38 kg/m^3. Application of stabilizer increased fruit yield by 16% and WUE by 16.86%. In general, the effect of PRD irrigation method (with barrier) and spraying sodium salicylate on reducing water use and increasing productivity in greenhouse production of tomato was positive and recommendable.

Keywords: PRD irrigation method, Water stress, Growth stabilizer, Water use efficiency.

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