

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 randomized design and three replications, included three irrigation managements (T₁, full irrigation; T₂, 50% of full irrigation, with PRD method and barrier; T₃, 50% of full irrigation, with PRD method and no barrier), two levels of stabilizer (B₁, spraying sodium salicylate and B₂, without spraying sodium salicylate) and two soil textures (S₁, clay loam and S₂, sandy loam). Results showed that the highest plants (176.2 cm) were in T₁ treatment and the shortest plants (131.3 cm) were in T₃ treatment. With 50% reduction of water in T₂ compared to T₁ treatment, number of flower stems was decreased by 15.2%. The highest and the least biomass and fruit yield were measured in T₁ (506.8 and 342.5 g per plant) and T₃ (126.2 and 54.8 g per plant) treatments, respectively. WUE was increased by 9.9% (changing from T₁ to T₂) and was decreased by 71.4% (changing from T₂ to T₃). The highest and the least fruit yield (216.7 and 174.4 g per plant) were obtained in S₂ and S₁ soils, respectively. Sandy loam soil with production of 7.22 kg/m³ had higher WUE than clay loam soil, which produced 5.38 kg/m³. 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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