

Water and Energy Productivity for Onion Irrigated with Sprinkler or Surface Irrigation Methods on Several Farms in Esfahan Province

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Abstract

The agricultural sector depends largely upon water and energy resources to fulfill sufficient water for producing adequate food for the rapidly growing world's population. It requires great effort to improve water and energy productivity for agricultural products to provide consumers' health as well as environmental protection. In this study, the volume of irrigated water, crop yield, water productivity, and the consumed energy for onion crops irrigated with sprinkler or surface irrigation methods under farmer management were measured and compared. The measurements were recorded from 2020 to 2021, on 17 farms across Esfahan Province where onion was a main crop in the region. The measured data from the foregoing two irrigation methods were statistically analyzed using t-test and Pearson correlation coefficients. The outcomes revealed that the volume of irrigated water as well as crop yield was greater for surface irrigation method compared to sprinkler irrigation, and the differences were statistically significant. Moreover, water productivity for onions irrigated with a sprinkler irrigation system was significantly higher ($p < 0.01$) in comparison with onions irrigated with the surface method. In addition, the results indicated a significantly direct correlation between the volume of irrigated water and onion yield, whereas a significantly indirect correlation was observed between the volume of irrigated water and water productivity. A significantly inverse correlation was found between the productivity of energy for irrigation and energy consumption; so, an increase in the energy for irrigation resulted in a decrease in energy productivity. Based on the results of this study, the sprinkler method is more effective than the surface for irrigation of onion.

Keywords: Volume of applied water, Crop yield, Water and energy productivity, Onion

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