

## Effect of Irrigation Management and Planting Density on Yield and Water Productivity of Rice (Hashemi Cultivar)

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### Abstract

It is necessary to optimize productivity and usage of available water resources due to shortage of these resources and low irrigation efficiency in rice fields. In order to study the effect of different irrigation managements and planting densities on rice, cv. Hashemi, an experiment was conducted in a randomized complete block design (RCBD) with three replications at Koshal-Lahijan, in north of Iran, during cropping seasons of 2014 and 2015. There were 5 levels of irrigation treatments in this research including: I<sub>1</sub> = Submerged irrigation, I<sub>2</sub> = Saturation, I<sub>3</sub> = Irrigation with 8 days interval before anthesis, I<sub>4</sub> = Irrigation with 8 days interval after anthesis, I<sub>5</sub> = Irrigation with 8 days interval throughout the growing season). Also, there were 3 levels of planting density including, D<sub>1</sub>=15×15, D<sub>2</sub>=20×20, and D<sub>3</sub>=25×25 cm. Combined variance analysis showed that the effect of water stress and plant density on measured traits were significantly different (p<0.01). I<sub>1</sub> had the highest yield in all treatments during the growth season, which was equal to 4151kg. Yields of I<sub>2</sub>, I<sub>3</sub>, I<sub>4</sub>, and I<sub>5</sub> were equal to 4054, 3949, 3244, and 2787, respectively. Water productivity values of I<sub>3</sub> and I<sub>5</sub> were equal to 1.90 and 1.45 kg.m<sup>-3</sup>, which were the maximum and minimum (irrigation + rain) water productivity based on biomass. The results also showed that irrigation with 8 days interval before anthesis decreased water use by 16%, but it caused only 4% yield reduction. Analyzing different crop densities showed that yield components increased in high density (D<sub>1</sub>), while yield per unit area and water productivity decreased when plant densities decreased (D<sub>3</sub>). So, (D<sub>2</sub>) is the optimum spacing and is recommended.

**Keywords:** Drought stress, Water use efficiency, Irrigation interval, Hashemi cultivar.

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\* - Received: April 2017, and Accepted: September 2017