Effect of Planting Pattern and Alternate Furrow Irrigation on Productivity of Water and Land under Wheat and Persian Clover Intercropping

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Abstract

A field experiment was conducted in Selseleh County, Lorestan Province, during 2015-16 growing season to evaluate the effects of planting pattern and partial root zone irrigation (alternate furrow irrigation) on water and land productivity under wheat and Persian clover intercropping system. The experiment was carried out as a two-factor factorial with three replications. The first factor was irrigation management at two levels of conventional (I₁) and partial root-zone irrigation (I₂) based on root depth, and the second was planting pattern including sole wheat (W), sole Persian clover (C), wheat-Persian clover alternate-row intercropping (WC₁) and wheat-Persian clover within-row intercropping (WC₂) systems. Water consumption, leaf relative water content, grain yield, water productivity and land equivalent ratio were used to evaluate the treatments. Water consumption of all planting patterns in partial root-zone irrigation system was significantly (P≤0.01) lower than that of conventional irrigation. Grain yield of wheat and Persian clover in partial root-zone irrigation was lower than that of conventional irrigation, where wheat and Persian clover yield decreased by 27% and 36%, respectively. However, grain yield and water consumption reductions resulted in higher water productivity (23%, 92%, 51%, and 44% in sole wheat, sole Persian clover, wheat-Persian clover alternate-row intercropping, and within-row intercropping, respectively). Land equivalent ratio of intercropping in partial root-zone irrigation was 19% more than that of conventional irrigation, suggesting that intercropping reduced the negative effect of lower water supply, because relative water content of wheat and Persian clover was higher in intercropping compared to sole cropping. Therefore, partial root-zone irrigation can be suggested as an effective method for increasing water productivity in grain production of wheat and Persian clover.

Keywords: Grain yield, Land equivalent ratio, Partial root-zone irrigation, Relative water content, Water consumption

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\* - Received: November 2017 and Accepted: May 2018