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Effects of Water-Saving Irrigation and Nitrogen Fertilization on Yield and Yield Components of Rice (*Oryza sativa* L.)

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Abstract: The effects of nitrogen (N) application (32, 72 and 112 kg N ha^{-1} in 2000, and 32, 92 and 152 kg N ha^{-1} in 2001) and water-saving irrigation and their interaction on grain yield and yield components of the rice cultivar Champa-Kamphiroozi, which is a local cultivar in a semi-arid area in the south of Islamic Republic (I.R.) of Iran, were investigated. The plants were cultivated under sprinkler irrigation (1.0 ET_p and 1.5 ET_p), intermittent flooding (1-day and 2-day intervals) and continuous flooding (control). The experiments were conducted on a clay loam-clay soil under a semi-arid environment using four replications in a split plot design with irrigation method as main plots and N levels as subplots. The results indicated that intermittent flooding irrigation at 2-day intervals was as effective as continuous flooding for grain yield, showing high water-use efficiency (WUE). The soil moisture tension in the root zone before each irrigation under this condition was -300 to -400 cm. Sprinkler irrigation and intermittent flooding increased WUE by 20 to 60%, compared with continuous flooding, and the increase in N application rate to 112-152 kg ha^{-1} increased grain yield under any irrigation condition. Under sprinkler irrigation, grain yield was low and percentage of unfilled grain was high, although WUE was high. However, by adopting sprinkler irrigation, the amount of nitrogen fertilizer application necessary for cultivation was reduced. Furthermore, when nitrogen application must be limited due to groundwater pollution, the amount of nitrogen fertilizer necessary for cultivation can be reduced.

Keywords: Nitrogen application, Rice, Sprinkler and intermittent irrigation, Water use efficiency

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