

Effects of deficit irrigation on water productivity and maize yields in arid regions of Iran

Abstract

Deficit irrigation in the Gavkhuni River Basin (GRB), Iran, is an effective method for alleviation of drought impacts on crop yields. Whilst it saves considerable amounts of water, it has little effect on crop yields. The effects of deficit irrigation on grain yield and yield components of maize were studied using two factors [namely, the variety at two levels (704 maize variety with 9354 kg ha⁻¹ yield, and 647 maize variety with 8822 kg ha⁻¹ yield) and irrigation at four levels (control, 100, 80, and 60% of water level use)] for three consecutive years. Significant differences ($P \leq 0.05$) were noticeable in grain yield, as well as depth and column of kernel among the irrigation treatments. In addition, the effects of cultivars on grain yield, 1000 kernel weight, number of kernel per ear row, number of kernel per column, and depth of kernels were insignificant. Nevertheless, the effects of irrigation treatments on 1000 kernel weight and number of kernel per ear row were not significant. Based on the results and considering the quantitative characteristics of the crop, it was established that for the deficit irrigating of maize, the 80% irrigation level (i.e. 80% of crop evapotranspiration) is the most advantageous treatment when water is not limited. However, when higher water productivity and the possibility of using the water saved are taken into consideration during severe drought conditions, 60% irrigation level treatment is recommended.

Keyword: Deficit irrigation; Maize; Yield components; Water productivity