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Effect of Irrigation Regime and Plant Density on Chickpea (Cicer arietinum L.) Yield in a Semi-Arid Environment

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Abstract : A field experiment was conducted for two consecutive winter seasons at the Demonstration Farm of the Faculty of Agriculture, University of Khartoum, Sudan, to study effects of different levels of irrigation regime and plant density on yield of introduced small seeded (desi type) chickpea cultivar (ILC 482). The experiment was laid out in a 3X3 factorial split-plot design with 4 replications. The treatments consisted of three irrigation regimes (designated as follows: I1 = optimum irrigation, I2 = moderate stress and I3 = severe stress; this corresponded with irrigation after drainage of 50%, 75% and 100% of available water based on 70%, 60% and 50% of field capacity, respectively) assigned as main plots and three plant densities (D_1=20, D_2= 40 and D_3= 60 plants/m^2) assigned as subplots. The results indicated that the yield components (number of pods per plant, number of seeds per pod, 100 seed weight), seed yield per plant, harvest index and yield per unit area of chickpea were significantly ($p < 0.05$) affected by irrigation regime. Decreasing irrigation regime significantly ($p < 0.05$) decreased all measured parameters. Alternatively, increasing plant density significantly ($p < 0.05$) decreased the number of pods and seed yield per plant and increased seed yield per unit area. While number of seeds per pod and harvest index were not significantly ($p > 0.05$) affected by plant density. Interaction between irrigation regime and plant density was also significantly ($p < 0.05$) affected all measured parameters of yield, except for harvest index. It could be concluded that the best irrigation regime was full irrigation (after drainage of 50% available water at 70% field capacity) and the optimal plant density was 20 plants/m^2 under conditions of semi-arid regions.

Keywords : irrigation regime, Cicer arietinum, chickpea, plant density
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