

The Effect of Irrigation Water Quality on Safflower Yield in Esfahan Rudasht Region

Abstract:

The salinity of soil and water resources is a major factor reducing agricultural production and gradually decreasing the agricultural land uses. One effective method to reduce soil salinity is to use leaching and applying appropriate irrigation management. To determine the effects of irrigation water salinity and leaching on safflower yield and change in chemical properties of soil, a field experiment was conducted at Rudasht, east of Isfahan, on a silty clay soil, a typical soil of central part of Iran from April to August 2009, with three irrigation water salinity of 3.35, 8.77 and 11.21 dS/m with two irrigation water management method (irrigation with uniform water with above quality and irrigation by non saline water ($EC=3.35$ dS/m) until germination and independent stage, then using above saline water and use saline water all season crops) without leaching and with leaching using split split plot design (Completely Randomized Blocks) with four replications for each treatment. The results showed as the irrigation water salinity increases the number of plants per hectare, total plant weight, seed weight, main stem height, number of nodes per main stem, distance first lateral branch until ground, number of capitula per plant, capitula weight per plant, main capitula diameter, main stem diameter, number of lateral branches and safflower seed oil decreases. Further, it caused to increasing percentage of sodium leaf. Also 1000 seed weight and harvest index increase until salinity 8.77 dS/m and decrease of the higher salinity. Management of fresh water applied until germination increase all parameters except leaf relative humidity. Using of leaching management increase number of plant per hectare, total plant weight, seed weight, main stem height, number of capitula per plant, capitula weight and number of lateral branches and reduced distance first lateral branch until ground. In this region, safflower was found to be semi tolerant crop in response to salinity. The coefficients A and B of the relative yield equation were obtained as 6.36 dS/m and 11.84 for the study area. As the irrigation water salinity increases the EC , CO_3^{2-} , Cl^- , SO_4^{2-} , Ca^{2+} , Mg^{2+} , Na^+ and SAR in soil increases. Soil salinity at the end of planting period in salinity treatments of 3.35, 8.77 and 11.21 dS/m in depth from 0 to 90 cm soil was 6.95, 11.16 and 13.22 dS/m, respectively. With increasing of soil depth, the slope of soil salinity increasing line against irrigation water, decreased. Irrigation management decreases salinity and soil ions and SAR of soil and leaching decreases the amount of Cl^- and Na^+ in soil and SAR of soil. Effect of irrigation management on change ions values was more effective than leaching. Salinity and management and leaching, had no effect on soil acidity. Results showed that the interactive effect of irrigation water salinity against leaching management is a good instrument for soil management to decrease soil salinity and increase safflower in this arid region.

Keywords: Water quality, Irrigation Management, Leaching, Safflower, Rudasht



University of zabol
Graduate school
Faculty of Agriculture
Department of Irrigation & Drainage

**The Thesis Submitted for the Degree of Master of Science
(in the field of Irrigation & Drainage)**

Title:

**The Effect of Irrigation Water Quality
on Safflower Yield in Esfahan Rudasht
Region**

Supervisor:

Dr. Z. Shamohamadi heidari

Advisors:

M. Feizi

Dr.M.Heidari

By:

E.Kamali

November 2009