

INFLUENCE OF IRRIGATION, MULCHING AND SOIL AMENDMENTS ON SOME SOIL PROPERTIES AND PLANT GROWTH

By

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**B.Sc. Agric. Sci. (Soils), Fac. of Agric.,
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Faculty of Agriculture,**

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ABSTRACT

Soil and water agro-management techniques play an important role in grown crops for high profit, supplying available water in the root zone environment, and maintaining soil fertility. The present investigation was planned to determine the effect of deficit irrigation, mulching and soil organic amendments on sorghum grains, forage yield and water use efficiency. The field experiment was conducted during two growing seasons 2016 and 2017 at Demo farm (sandy loam texture), Fac. of Agric. Fayoum University, Egypt. The experiments were designed as split-split-plot that arranged in a randomized complete block design with three replicates. Thirty six treatments comprising of three irrigation treatments ($I_1 = 100\%$, $I_2 = 85\%$ and $I_3 = 70\%$ of crop evapotranspiration (ET_c) and two rates of rice straw as soil mulching (SM) (zero and 4 t fed^{-1}), and two organic amendments [compost (C) and poultry manure (P)] in three levels of each other (0, 10 and $15 \text{ m}^3 \text{ fed}^{-1}$) were studied each season under controlled surface irrigation system. The applied soil mulching, organic amendments and /or irrigation treatments resulted significant decrease in soil bulk density and hydraulic conductivity values, and significantly increase in total porosity, drainable pores and available water. Sorghum growth attributes (plant height, stem diameter, leaves area and weight of 100 grains), both grains and forage yields, water use efficiency (G-WUE and F-WUE) were significantly ($p < 0.05$) affected by irrigation quantity and both soil mulch and organic amendments applications. It could be considered as a suitable under environmental conditions of the study area and similar areas, the treatments ($I_1 \times C_2 \times SM_1$) or ($I_1 \times P_2 \times SM_1$) are the most suitable for producing high both grains and forage sorghum yields. The results also, showed that under limited irrigation water, application of ($I_2 \times C_2 \times SM_1$) or ($I_2 \times P_2 \times SM_1$) were found to be favorable to save 15% of the applied irrigation water, at the time in which produced the same sorghum crop yield under Fayoum conditions.

Keywords: Controlled surface irrigation, soil mulching, organic amendments, water use efficiency and sorghum.