



**SOILS AND WATER MANAGEMENT OF SOME SOILS  
IN FAYOUM GOVERNORATE**

**By**

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**B. Sc. Agric. Sci. (Soils), Fayoum University, 2013**

**M. Sc. Agric. Sci. (Soils), Fayoum University, 2018**

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## ABSTRACT

The objective of this research is to evaluate the impact of deficit irrigation treatments and soil organic amendments application on some soil properties, growth, yield, yield quality, and water productivity of sugar beet crop growing under different soil salinity. Two experimental sites differed in soil salinity ( $< 4$ , and  $\approx 10$  dS/m) were selected in Demo farm, Faculty of Agriculture, Fayoum University, Fayoum, ( $29^{\circ} 17' N$  latitude,  $30^{\circ} 54' E$  longitude).

Irrigation water applied (IWA) were three different deficit irrigation, representing one of the following three treatments:  $I_1 = 100\%$ ,  $I_2 = 80\%$  and  $I_3 = 60\%$  of  $ET_c$  under controlled were added using gated pipe system. Soil management practices were two organic amendments; each of them was applied by different levels [i.e. zero,  $15 \text{ t ha}^{-1}$  of compost ( $C_1$ ),  $30 \text{ t ha}^{-1}$  of compost ( $C_2$ ),  $10 \text{ t ha}^{-1}$  of biochar ( $B_1$ ), and  $20 \text{ t ha}^{-1}$  of biochar ( $B_2$ )]. In each site using complete randomized blocks (spilt plot) design. Sugar beet seeds (*Beta vulgaris L.*, Baraca variety) were planted in two successive winter seasons along two years (2019 and 2020). Plant growth parameters, yield, yield quality, irrigation water applied (IWA),  $ET_o$ ,  $ET_c$ ,  $ET_a$ , water use efficiency and water productivity were determined of sugar beet.

The obtained results revealed that the applied treatments irrigation and/or soil organic amendments applications rates significantly improved the studied soil properties (i.e. decrease both bulk density and hydraulic conductivity, increase in total porosity, water holding pores). The applied treatments had an effect on studied plant-water relations, water use efficiency (WUE), water productivity of sugar beet had been increased. Using the three empirical equations data indicate that the  $ET_o$  values calculated by class A pan and Penman-Monteith equations were lower in all cases than the  $ET_o$  values calculated by Hargreaves equation in the growing seasons. On the meantime closest equation to the actual irrigation requirements (applied. IWA), in field was class A pan equation for sugar beet in Fayoum region.

The highest sugar beet yield resulted from full irrigation treatment ( $I_{100}$ ) with the high level of organic amendments ( $C_2$  or  $B_2$ ). As, at limited water resources, applied irrigation treatment ( $I_{80} \times C_2$  or  $B_2$ ), can be used to save the applied irrigation water by 20% and little loss of sugar beet yield ( $< 10\%$ ).

**Keywords:** biochar, compost, deficit irrigation, empirical equations, soil salinity, sugar beet crop, water use efficiency.