EFFECT OF COMPOST ON MAIZE (Zea mays) YIELD AND SOME CLAY SOIL PHYSICAL PROPERTIES UNDER DEFICIT IRRIGATION

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ABSTRACT

Field experiments were conducted for two seasons in the clay soil located at South of Sahl El-Hosainiya Research Station, Port-Said Governorate, Egypt. Maize (Zea mays) was used as an experimental plant. The current work aims to assess effect of compost application as organic amendment at rates of zero (C₀), 5.5(C₁), 11.0(C₂), and 16.5(C₃) Mg f⁻¹ (1 Mg "megagram"= 10⁶ g i.e. metric ton); under irrigation using two water levels of full irrigation (I₁) of 3300 m³ f⁻¹, and deficit irrigation (I₂) of 2640 m³ f⁻¹ (80% of full irrigation). Grain yield in non-amended treatments was 1.788 to 2.482 Mg f⁻¹ while it was 2.757 to 6.316 Mg f⁻¹ in compost-amended treatments. Water-use efficiency (in kg grains/m³ water) was 0.542 to 0.940 for non-amended treatments and 0.835 to 2.392 for those compost-amended treatments causing, average increases of 34.1, 161, and 92.9% for the C₁, C₂, and C₃, respectively. The deficit irrigation I₂ surpassed the full one I₁ by 58.3%. Soil moisture curves at tensions of 0.01 up to 15.00 atm and available water (AW) increased due to compost. Compost had a slight effect on total porosity, but affected the distribution of pore size fractions creating more water-useful pores (i.e. the quickly drainable-, slowly-, drainable- and water-holding-pores) and decreasing the less-water-useful ones (i.e. the fine capillary pores). Aggregation and aggregate stability increased by compost; the high rate gave 6.8% large aggregates while the no compost gave 4.3% only.

Keywords: Deficit irrigation, compost application, maize aggregation, soil moisture curve, porosity.