

Mitigation of Water Stress on Apple Trees under Rotational Irrigation Conditions by Increasing the Application Rate of Organic Fertilizers to Sandy Soils

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Egypt, as part of Mediterranean regions, is characterized by irregular and low rainfall amount which varies between (30–150 mm.year⁻¹), and characterized also by high temperature which increase the rate of evapotranspiration from the cultivated soil. On the other hand, New reclaimed soils are mostly occupies around 84 % of total area of Egypt, which is mainly sandy soils. These soils generally characterized by low water capacity holding, soil organic matter, and weak in nutrients retention. Under these conditions which have a great influence on crop production, there is a great needing to increase the crop water use efficiency and increasing of nutrient retention in sandy soils. In this context, two field experiments were carried out on sand soil located in north Cairo–Egypt at the experimental farm of National Research Center, El-NUBARIA, (latitude 30° 30' N, and longitude 30° 19' E). The effect of compost rates on soil hydraulic characteristics, fruit yields, quality traits, and water use efficiency and productivity of apple tree (Apple Anna Cultivar), was studied under deficit irrigation conditions. Four rates of compost [I₁: control, I₂: 12 ton.ha⁻¹, I₃: 24 ton.ha⁻¹, I₄: 36 ton.ha⁻¹. and I₅:48 ton.ha⁻¹.] were applied under irrigation frequencies of (IF₁ :once per week; IF₂ :twice per week, IF₃ :three times per week).

The obtained results indicated that by increasing the application rate of compost, the available water capacity and saturated water content of sandy soil have been enhanced. In the same time, the fruit yield, quality traits and water productivity were increased by increasing the application rate of compost. It is worthy to mention that the I₅IF₃ treatment gave the highest values of fruit yield, quality traits and water productivity, whereas I₁IF₁ treatment gave the lowest values of all the above mentioned variables. As result, for apple cultivation in El-NUBARIA region, the recommended rate of compost is 48 ton.ha⁻¹ and irrigation frequency must be three times per week (IF₃) under drip irrigation system to mitigate the negative effect of water stress on apple trees.