

Effect of Natural Amendments and Drip Irrigation on Water Use Efficiency and the  
Distributions of Salts, Roots and Moisture in Sandy Calcareous Soils

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**Abstract:** Irrigated torripsamment have several constraints that could be alleviated using natural or artificial soil amendments. A field experiment was carried out in sandy soils to investigate the effect of natural amendments applied as a subsurface thin layer on water use efficiency (WUE) of squash and the distribution of moisture, salts and roots in the root zone. Treatments consisted of two rates (0.5% and 1%) of bentonite (B), rawdat deposits R, organic matter (OM) and 1:1 mixture of B+OM and R+OM. Squash fruit yield (ton/ha) was generally higher in the sub-surface drip irrigation treatments and the increase was 121.8% to 187.3% more than the surface drip in the different treatments. The highest squash yield was found in the mixed treatment (B+OM, 0.5%) followed by (R+OM, 1%), whereas the lowest yield was obtained in the B (1%) treatment alone. WUE was increased in the subsurface drip irrigation treatments over the surface drip and the increase varied from 119.4 to 183.5%. Results showed that salts were concentrated close to the surface layer in the subsurface drip treatments while it concentrated mostly in the wetting front and around the dripper in the surface drip treatments. Soil moisture and root distributions in the root zone were closely related to the rate and the location of the applied amendments. They increased in the treated layer particularly under subsurface drip irrigation. The study concluded that management practices which include subsurface drip irrigation and the subsurface applications of natural deposits have high potential for improving WUE and the distribution of soil moisture, salts and roots in the root zone area of the irrigated torripsamment.