



Improving irrigation efficiency and conservation using modern irrigation programs in Saudi Arabia

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The continued expansion of agriculture and urban development in the GCC countries, which is located within the arid regions, accompanied with growing demand for water supply in different sectors calls for agricultural sector to look for practices that increase the irrigation efficiency and water conservation thereby increasing water productivity of crops.

In this presentation, we will explore some of the efforts in the determination of the actual water requirements as an introduction to water conservation with deficit irrigation (DI) programs and partial root drying (PRD) system using different soil conditioners such as polymers, compost and biochar. The crop water requirement is the core to establish water conservation program. The crop evapotranspiration (ETc) was assessed through pan evaporation (PE) method and estimation based upon Penman–Monteith (PM) equation. The results revealed good agreement between PE and PM ETc. The irrigation treatments consisted of four levels of ETc (40%, 60%, 80%, and 100% of ETc) in addition to the traditional one as practiced by local farmers. At the 60% and 80% ETc treatments, the DI was tested at different growth stages (initial, developmental, middle, and late stages of

crop growth). Each of the treatments was carried out in three replicates. The results showed that soil salinity in general increased with decreasing level of applied water. The crop cucumber could tolerate shortage of water during the middle season growth stage, when the Ky values ranged between 0.57 and 0.76. The level of water used up in 100% ETc treatment was much lower than that in the traditional drip irrigation as practiced by farmers. In other words, the CWP values increased with water consumption being decreased. The results also indicated that the highest values for CWP were found for the most stressed treatment of 40% ETc, while on the other hand the overall crop productivity had decreased.

On studies of water conservation using DI and PRD of various crops, including tomatoes, cucumbers, potatoes. All of these studies have shown that reducing water use by 20% did not significantly affect productivity, and water productivity rose much with deficit when compared with traditional irrigation on farms as well as the provision of water, there was also significant savings in fertilizers and pesticides used.