

Improving Water Efficiency and Productivity using a Condensation Irrigation Technique

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In arid to sub humid region water has always been the main factor limiting crop production. The need for water is increasing and water availability is a major factor in development and sustainability of ecosystems. The call to improve the efficiency and productivity of water use, development of new technologies for improving water use efficiency and availability to ensure future food security, has never been more urgent. Condensation irrigation is a new method that has the potential of increasing water efficiency and productivity. In this method, the steam transfers directly to the root zone and sustain the moisture content of the soil. The purpose of this study was to investigate the performance of CI system in increasing water productivity and evaluating potential of this technology to provide moisture in various soils improved with adding organic matters. After selecting the proper temperature and soil texture, lettuce was planted in selected soil and condensation irrigation applied during growing period. Then the water consumed was measured and compared with water use of lettuce planted in green house and traditional practice. Selected medium texture soil (in combination with 35% organic matter) was designated for cultivating lettuce under controlled conditions, CI application, using coated conducting tube, GH and TP. The results of this study showed that after harvesting and full growth of lettuce in all three conditions, production per 1 m³ water to grow lettuce in CI, GH and TP was 1250, 333 and 75.5 kg, respectively. Water use efficiency was investigated in all treatments and the results showed that with a probability of 99% there is a significant difference between different irrigation methods, and the highest water use efficiency resulted from CI. The consumed water during the growth period in the GH was about four times the CI and in TP it was 21 times of CI, which indicates a significant reduction in water use in CI. By examining the weight of dry lettuce in all three methods, the results showed that in all samples taken from all methods, the biomass was 12.5%.