Response of sweet pepper plants to various water quantity and quality - Zohar Station, 2005/6

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The available water inventory of the Arava Valley does not increase as fast as the agricultural demands and water becomes a major restriction to farm expansion in the recent years. A large portion of the irrigation water is used for salt leaching from the root zone. The use of desalination technologies enables salt removal, including sodium and chloride ions that comprise most of the salt buildup in the rhizosphere, already at the water source. Our working hypothesis is that in the future, the inclusion of desalinated water will enable significant reduction in water quantities for irrigation. Thus, the objectives of the present study were: 1) Examining the possibility to save water and fertilizers through the use of desalinated water with small salt content, by reducing daily water quantity; 2) Constructing an irrigation regime suitable for the use of desalinated water for sweet pepper. The present work took place during the 2006/7 season at the Arava R&D Zohar Experimental Station, Sodom Valley. Two water quality levels, 3.5 dS/m and 0.3 dS/m (desalinated water) were tested. The local water quality (3.5 dS/m) was tested at one quantity level - 100% of the daily quantity as recommended and practiced by the common farmer. The desalinated water was tested at 4 quantity levels: 100, 75, 50, 25% and 25% with double fertilizer content. Fertilizer levels in all treatments were set by concentration rather than daily quantity, therefore the smaller the water quantity the smaller the fertilizer. The additional treatment of low water quantity with double fertilizer concentration was aimed to reveal whether growth limitation results from too small fertilizer level. The highest yield was obtained by the 50% desalinated water treatment, similar to, and more significant than the previous season's results. The higher yield was due to a larger number of fruits - more fruits materialized and ripened – but not due to differences in

fruit size (which was quite equal for most treatments but the least 25%). The lowest water quantity level (25% desalinated water) was the most efficient in water use efficiency: 41 m^3 of water were required to produce 1 ton of fruit at exportable yield level of 7.6 Kg/m^2 (total water amount of 438 mm/season). Although the saline water treatment yielded 8.6 Kg/m^2, its water use efficiency was much lower – about one third of that of the 25% desalinated water treatment. Water, not fertilizer, was the limiting factor of yield as the quantity declined below 50%. Thus, the use of desalinated water can save water as well as fertilizer, when the latter is given by concentration. Further investigation is required for the adjustment of desalinated water use to a commercial manner, probably through its mixture with the local saline water.