



## **Long term irrigation with treated wastewater and soil structure stability – the Israeli experience**

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With the increased necessity to use treated waste water (TWW) for irrigation, especially in arid and semi-arid regions, farmers are faced with unique and unfamiliar problems among which is the possible degradation in soil structure and stability. Probable risks for adverse changes in the structural stability of soils and its hydraulic properties, following irrigation with TWW, may stem from the higher levels of organic matter, suspended solids, sodium adsorption ratio (SAR) and salinity in the TWW compared with its fresh water of origin. Laboratory studies with specimen clays have indicated that irrigation with TWW can lead to conditions in the soil that enhance clay swelling and dispersion. These phenomena can, in turn, initiate and/or increase clay depletion from the upper soil layer, deterioration in aggregate stability, a decrease in soil hydraulic conductivity and an increase in soil susceptibility to seal formation and soil erosion. These possible scenarios are expected to take place mostly during winter when the soil is exposed to rain water (i.e., water without electrolytes), which thus increase the sensitivity of the soil clays to swelling and dispersion. The current presentation has limited itself to Israeli studies from the past ten years because in studies prior to that period most of the TWW used for irrigation were of extremely poor quality. The impact of irrigation with TWW on clay movement and illuviation at deeper soil layers, aggregate stability, saturated hydraulic conductivity, and runoff and soil loss production, is presented. Results from the examined studies suggested that the effects of irrigation with TWW were inconsistent and complex. The results seemed to depend, beyond variation in the quality of the TWW, on soil properties (e.g., texture, lime content) and conditions prevailing in the field (e.g., type of tillage, rate of wetting, etc). It is therefore recommended that caution is exercised when TWW is used for irrigation and that changes in soil structural stability should be closely monitored to ensure sustainability of soil structure.