

Use of Reclaimed Effluent and Salty Groundwater for Cotton Production

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BACKGROUND

Reclaimed water, salty ground water and waste water by-products are used on cotton fields in West Texas to supplement river water supplies and to dispose of biosolids as a soil amendment. Concentrations of total salinity and sodium of typical reclaimed water are often double compared with potable water. Salinity of shallow groundwater is often double that of reclaimed water and agricultural drainage water. Reclaimed and ground water are important alternative supplies, but unmanaged long-term use may be detrimental to the productivity of irrigated soils. Cotton production will be significantly reduced if high salinity irrigation water is not managed and/or curtailed. Inadequate leaching of soils inevitably causes buildup of salts in the soil. Excess leaching to move salts beyond the crop's effective root zone increases water demand and the potential of groundwater contamination.



Cotton irrigated with graywater at Rogelio Sanchez Texas State Prison.

PROJECT OBJECTIVES

- Investigate reclaimed and salty ground water use and management to minimize salinity impacts and maximize the use of these supplies.
- Evaluate effectiveness of using biosolids with marginal water for conditioning soils to buffer salinity, maintain soil tilth and prevent aggregate instability.
- Develop low cost, pre-irrigation water purification strategies to decrease salinity and sodicity.



Bench-scale soil column tests

RESEARCH AND RESULTS

Bench-scale experiments were conducted at the Texas AgriLife Research Center at El Paso. For soil conditioning, the main variables evaluated include: types of irrigation water: saline and effluent; biosolids type (including a limed sludge); and soil type for replicated soil columns. Leaching fraction (with a crop) was maintained at approximately 30% and leachate will be monitored regularly. Field experiments were conducted in the 2nd and 3rd year of this program to assess effects of soil conditioning and irrigation water on cotton production. Results show positive impacts of soil conditioning on cotton production. Soil salinity was also evaluated during and after the irrigation season. No significant impacts of salinity were observed for both brackish water and gray water irrigation. However long-term impacts should be further evaluated.

BENEFITS

The results of this research are contributing to:

- Improving water conservation and extending existing water supplies through reuse of reclaimed and salty ground water.
- Developing sustainable strategies for cotton production irrigated with elevated salinity water sources.
- Providing effective waste management and enhancing production by disposing of biosolids as a soil amendment.