Utilization of Saline and Other Impaired Waters for Turfgrass Irrigation

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PROBLEM AND RESEARCH OBJECTIVES

Due to rapid population growth and urban development in the U.S., current water allocations coupled with expected future demands might soon exceed the supply required to satisfy present per-capita water-use rates. In addition, urban development has also led to the proliferation of recreational areas such as golf courses and athletic fields and irrigation of these areas accounts for a large percentage of total urban water use. This study will assess information on the feasibility of using saline water for the irrigation of cool and warm season grasses in the desert southwest (USDA climate zone 8a). The study will also determine if adequate quality turfgrass can be achieved using subsurface drip irrigation. The combination of 1) irrigation through microsystems, 2) the use of turfgrasses that are adapted to the climatic and soil conditions in the desert southwest, and 3) the use of saline water could reduce the amount of potable water used for turf irrigation and increase the efficiency of irrigation systems in turf areas. The study's objectives are study the long-term effects of 1) water quality and type of irrigation on turf quality of several warm and cool season grasses in the arid southwest, and 2) three salinity levels and two irrigation systems on changes in soil chemical properties at several depths in the turfgrass root zone.

METHODOLOGY

The study is being conducted at the NMSU University Golf Course. The area includes two irrigation types (sprinkler and subsurface drip) as the main block factor; three water quality levels (potable, effluent, 50/50 mix) as the split-block factor and cool and warm season grasses (alkaligrass, perennial ryegrass, tall fescue, bermudagrass, inland saltgrass, seashore paspalum, and zoysiagrass) as the split-split factor. All treatment factors are replicated three times. Plots are 6' by 6' in size and are evaluated for overall turfgrass color and quality, drought stress, and soil chemical properties.

Casey Johnson, NMSU graduate student examines a blade of grass at the NMSU golf course. He and others are trying to produce recreational lawns using low-quality groundwater, brackish water and wastewater effluent. Photo by J. Victor Espinoza

PRINCIPAL FINDINGS

1) All cool season grasses under saline irrigation, including tall fescue cultivar Southeast, deteriorated by the fall of 2007 to such a degree that complete stand loss was observed. In contrast, warm season grasses such as bermudagrass, seashore paspalum, and inland saltgrass remained unaffected by salt accumulation in the rootzone and plots showed excellent turfgrass quality during the summer of 2007.
2) Salinity levels in the rootzones at depths of 10 to 20 cm and 40 to 50 cm were determined at 0.5 dS/m for potable irrigation. Under saline sprinkler irrigation electrical conductivity reached 2.3 dS/m and 3.4 dS/m at depths of 10 to 20 cm and 40 to 50 cm respectively. Plots under saline drip irrigation showed salinity levels of 2.7 and 1.8 dS/m at depths of 10 to 20 cm and 40 to 50 cm respectively. Preliminary results suggest that downward salt movement in drip irrigated plots is less pronounced than in sprinkler irrigated plots. Sodium Adsorption Ratio (SAR) averaged at 10 at both depths for saline drip irrigation and at 14 for saline sprinkler irrigation. SAR values remain constant at 1.3 in both depths in soils irrigated with potable water.
3) Turf plots under will be treated with saline water until the end of 2009. Grasses will be evaluated for quality and soil chemical changes in the rootzone will be recorded and documented.