# USDA-ARS U.S. Salinity Laboratory Turf Research

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The Salinity Laboratory is a national research laboratory of the Agricultural Research Service located on the University of California Riverside campus. The mission of the laboratory is to conduct research dedicated to the solution of problems of crop production of lands, water reuse for irrigation and of degradation of associated surface and ground water resources with salts, pesticides or pathogens. The Water Reuse Unit has as its objective to develop management practices and technologies to sustain irrigation with saline and recycled waters. The following two programs relate to turfgrass:

1) Determination of plant response to salinity including ,salt tolerance, physiological response (growth and biochemical indicators). Current research includes examination of the salt tolerance of six cultivars of Kentucky bluegrass (*Poa pratensis L*), selections previously screened for drought tolerance at Rutgers University. Based on both absolute biomass production and relative production as related to salinity (indicative of overall plant health) the salt tolerance ranking was Baron>Brilliant>Eagleton>Cabernet=Midnight>A01-856, a reversal of the established drought tolerance. Shown in Figure 1 is plant response when irrigated with EC=14 dS/m water in our sand tank facility. Additional research has been conducted on ion relations, nutrient ion concentrations, and remote sensing (hyperspectral scanning).

2) Development of salinity sensing technology and management practices for irrigation with saline and recycled water. The Salinity Laboratory has developed remote sensing instrumentation technology currently used by large irrigation districts (Imperial Irrigation District, Coachella Water District, Yuma etc.) for rapid field scale mapping of salinity. Shown in Figure 2 is one of our remote sensing units, consisting of two electromagnetic sensors (enabling collection of depth as well as spatial information, coupled with an on board computer, GPS unit, soil drilling unit all mounted on a modified spray tractor.

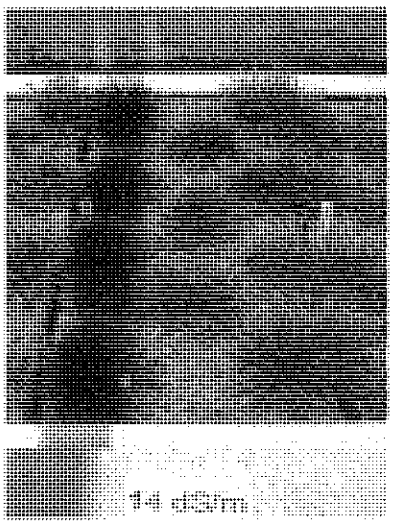


Figure 1. Kentucky bluegrass (Brilliant) irrigated with EC=14 dS/m.

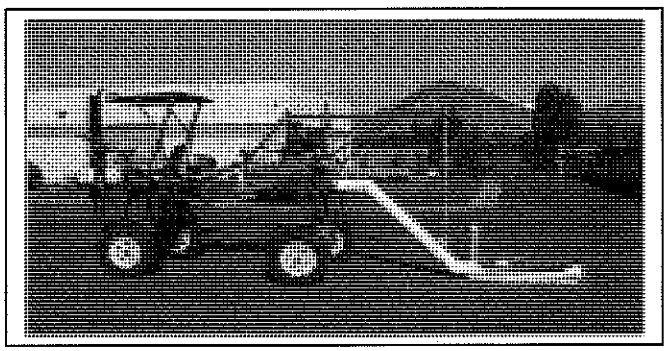
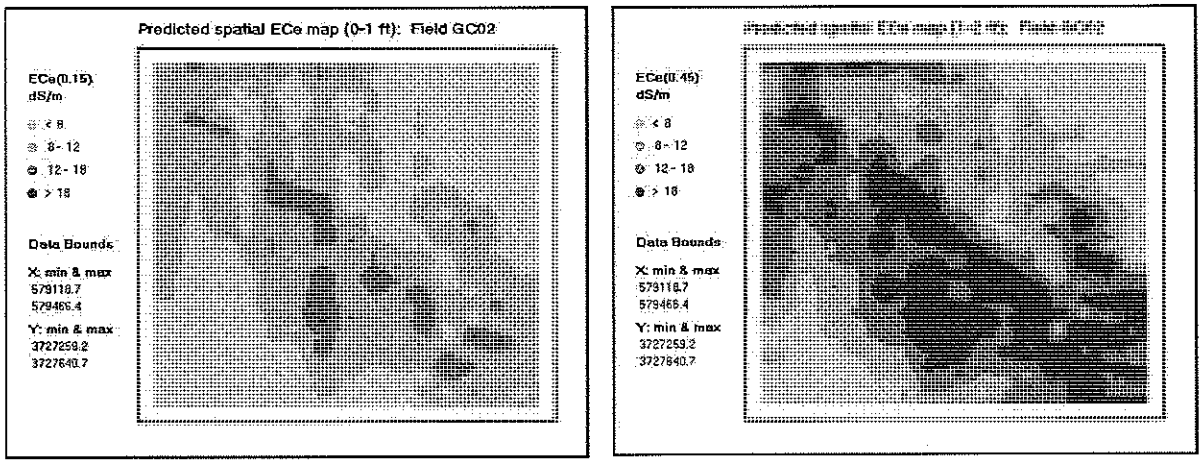
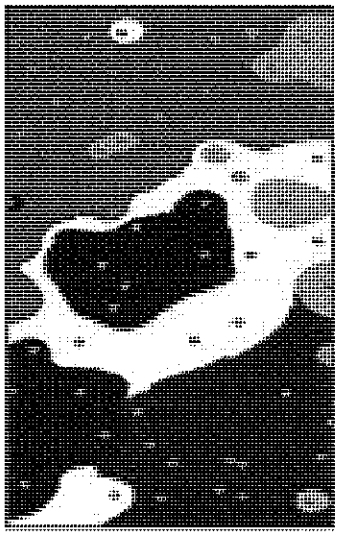


Figure 2. Salinity Laboratory remote sensing salinity unit.




Generated salinity maps (Figure 3 and 4) provide depth information diagnosis of the cause of the salinity problem (e.g. under irrigation, poor drainage etc.). Using the salimity (electrical conductivity) maps with developed software (ESAP- available on our website) enables optimal sampling and site specific management recommendations, as shown in Figure 5.



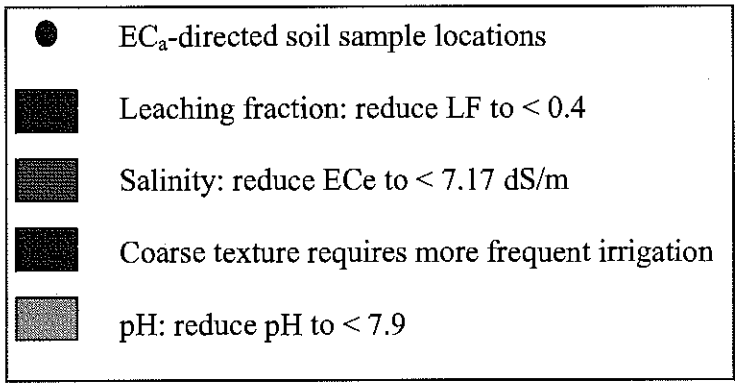



Figure 5. Management recommendations for site site-specific management units.

Turfgrass Case study:
In cooperation with UCR turfgrass specialists and industry consultants, we are mapping salinity distributions (electrical conductivity), and water infiltration rates of golf fairways (course in Orange County) irrigated with treated municipal wastewaters of moderate salinity (EC > 2 dS/m) and moderately elevated SAR (sodium absorption ratio- a measure of sodium hazard). Root zone salinity buildup and poor infiltration of shallow subsoil material results in insufficient water intake and plant water stress. In this case salinity and sodicity levels are not sufficiently elevated to account for the turf condition/appearance. The cost effective remediation is selected deep ripping and reseeding, however this may not be acceptable due to playing demands thus alternative remediation may be undertaken by gradual surface application of sand/loam.