Soil Salinity Assessment Using Electromagnetic Induction

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BACKGROUND

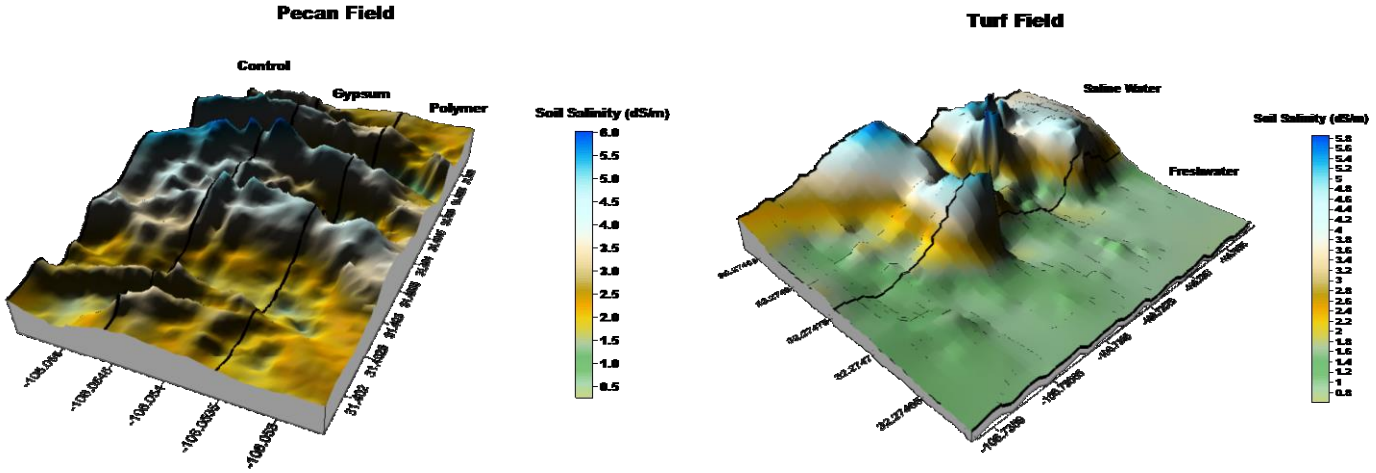
Salinity is a major problem affecting farm profitability, water quality and availability in arid regions such as the Far West Texas. Understanding salinity distribution within an irrigated area is necessary for developing effective salinity management practices. Conventional methods of assessing soil salinity at a detailed spatial resolution are expensive and time consuming. Electromagnetic induction (EMI) technique can determine soil salinity distribution in irrigated areas rapidly and in a non-invasive way. Advantages of this method are (i) high mobility, (ii) non-invasive way of salinity assessment and (iii) short time required to carryout the salinity assessment. However, EMI technique's accuracy is influenced by site specific factors such as soil clay content. This project evaluates the accuracy and factors affecting the accuracy of EMI technique to delineate salt distribution in the affected fields. The results of this project can help farmers to reduce salinity management costs by target application of amendments to salinity hotspots within the affected field.

Electromagnetic induction meter fitted with GPS unit

OBJECTIVES

- Evaluate the EMI technique for providing rapid and accurate assessment results of soil salinity and sodicity
- Determine soil factors that affect accuracy of EMI technique to facilitate technology transfer to other regions.
- Identify hot spots within an affected area to develop effective salinity management options, reduce costs, and increase farm profits.

FINDINGS AND BENEFITS



Examples of salinity distribution in pecan (left) and turf (right) fields obtained using EMI technique.

Initial results indicate that the EMI readings were strongly influenced by soil properties such as clay, field moisture, salinity and sodicity. EMI data had strong correlations with saturated paste salinity (EC_e) and sodicity (SAR) indicating that accuracy of technique was good. Results of the project also indicated that EMI technique can provide a rapid, inexpensive, and accurate salinity/sodicity distribution data both in agriculture and urban fields. Figures provided above clearly indicate soil salinity was much higher in control plots that did not receive any amendment in pecan fields and plots that received saline water irrigation in turf field. Study results can reduce cost of reclamation by targeting salinity hotspots within irrigated fields. Research results can also be used to evaluate effectiveness of current salinity management practices and develop efficient management practices that can improve soil quality and increase crop yields.

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USDA United States Department of Agriculture National Institute of Food and Agriculture

Texas Water Resources Institute
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