Alternative Water Sources for Sustainable Irrigated Agriculture

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BACKGROUND

Meeting congressionally mandated Renewable Fuels Standards (RFS2) goal of using 36 billion gallons of bioenergy by 2022 requires a comprehensive regional strategy such as bringing addition area from different regions within the country under bioenergy crops. In the southwest U.S. region such as west Texas and southeast NM, bringing vast abandoned crop lands and areas having permeable soils under bioenergy crops can be a part of such a regional strategy. While the region has adequate supply of land, finding reliable source of water to produce bioenergy crops is the main challenge. This challenge can be met by developing marginal quality water sources such as municipal and industrial wastewater, graywater, and saline groundwater for bioenergy crops production. Use of marginal quality waters to irrigate bioenergy crops may prove beneficial, if the bioenergy crops can grow under elevated salinity and the effects on soil and shallow groundwater can be minimized by appropriate management.This project evaluates the feasibility of using treated urban wastewater for producing select bioenergy crops (e.g., switchgrass, sorghum, castor, and jatropha) and its effects on saline soils representing El Paso, TX and Almogordo NM (collected from BGNDRF- Brackish Groundwater National Desalination Research Facility) using greenhouse column study approach.

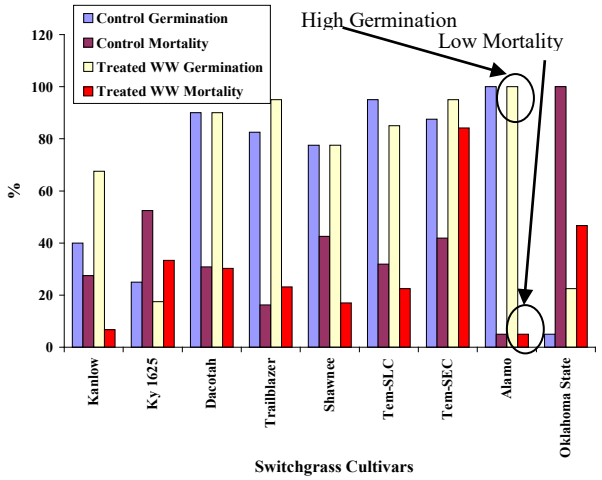
Switchgrass being grown in greenhouse soil columns

OBJECTIVES

- Determine germination and seedling mortality of select bioenergy cultivars
- Evaluate bioenergy crop performance under marginal quality water.
- Determine changes in soil salinity and potential for groundwater contamination.

BENEFITS

Results indicated while jatropha and camelina were not tolerant to salinity, cultivars of castor, switchgrass, sorghum and canola were relatively salt tolerant. Average biomass yields for switchgrass and sorghum were 7.4 and 21.6 Mg/ ha, respectively. Canola seed yield was 917 kg / ha. There were no significant differences for biomass/oil seed yield between wastewater (EC~ 2.6 dS/m) and freshwater (EC ~ 1.4 dS/ m) irrigated columns. Soil salinity increased compared to pre-study levels, but, most of the increases in salinity came from the solubilization of Ca salts. Economic feasibility study results indicated that fertilizer is a major production cost and marginal quality water irrigation was highly profitable when no amendments were added. Irrigation with reclaimed municipal wastewater improved soil nutrients (NPK) status and reduced cost of production.



Salinity tolerance of different switchgrass cultivars

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