

Daniel Smith (REU Student), Aldo R. Pinon-Villarreal (Mentor), A. Salim Bawazir (Advisor)

Research Problem

- ❖ Re-vegetation of native plants in the Southwest is difficult due to lack of rainfall, inaccessibility to ground water and dominance of exotic species

Proposed Solution

- ❖ Rehabilitate impaired habitats by transplanting vegetation in clinoptilolite zeolite (CZ) boreholes in shallow water tables; CZ wicks water from shallow water tables to rootzone of vegetation supplying moisture without constant irrigation

Hypothesis

- ❖ Native vegetation transplanted in CZ media will have higher survival and growth than plants grown in-situ soil

Scope

- ❖ Transplant five species in boreholes filled with CZ connected to groundwater in four rehabilitation plots
- ❖ Periodically determine plant survivorship (mortality, stress, growth, etc.) soil moisture (θ_v), and depth to groundwater table (DGwT)

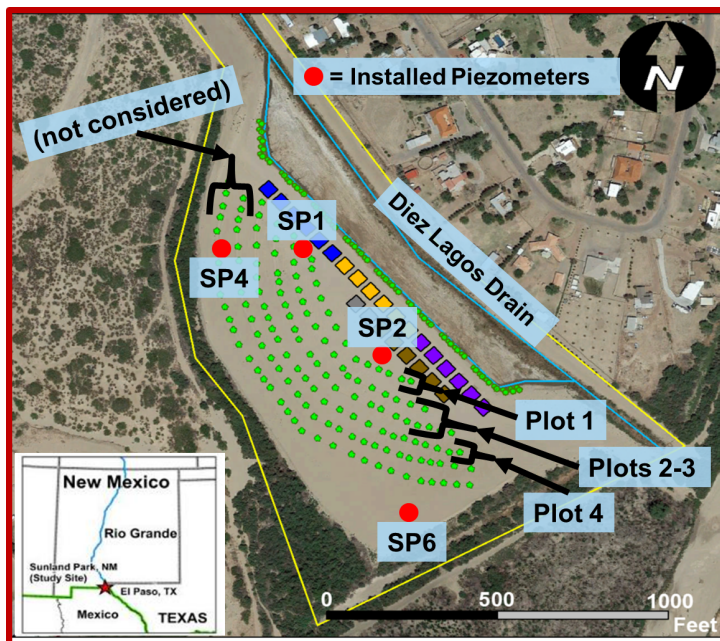


Table 1: Avg. depth to groundwater table (DGwT) and volumetric moisture content (θ_v) per plot measured between June 15-July 16, 2015

Plot No.	Average DGwT (m)	Average θ_v (%)
1	1.68	5.3
2-3	2.18	4.0
4-Sand	3.66	2.2
4-Silt Loam	3.66	5.5



Drilling CZ borehole



Pouring dry CZ in borehole



Determining plant variables

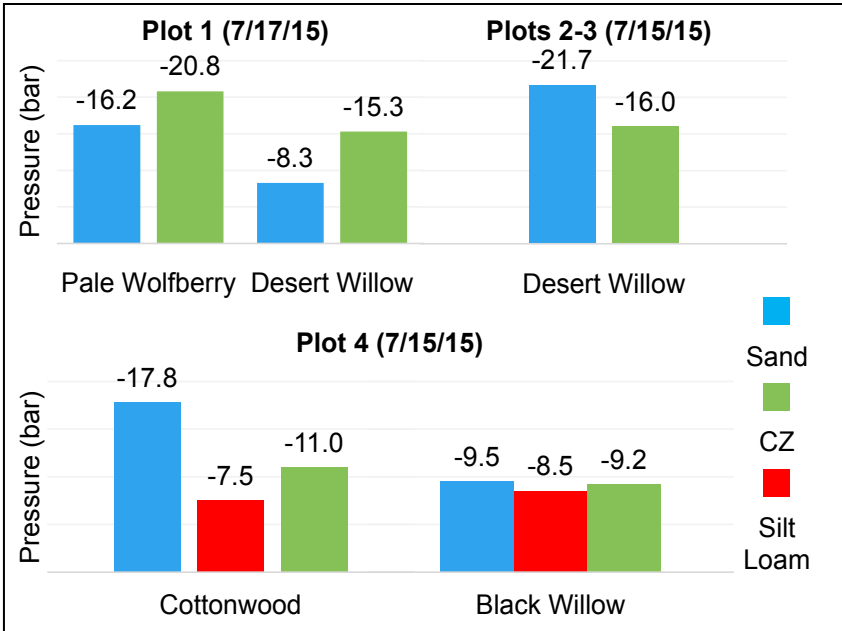
Figure 1. Map of the Sunland Park Test Bed showing the location of the riparian rehabilitation plots and piezometers

Major Findings:

Table 2. Survival fractions (total plants alive/total initial transplants) as of 7/22/15 for species-substrate groups / plot

Plot No.	Fourwing Saltbush		Pale Wolfberry		Desert Willow	
	Sand	CZ	Sand	CZ	Sand	CZ
1	15/24	--	10/13	11/23	12/13	3/3
2-3	0/16	4/14	1/21	--	4/9	7/12
Plot No.	Cottonwood			Black Willow		
	Sand	Silt Loam	CZ	Sand	Silt Loam	CZ
4	10/20	7/9	7/10	3/17	11/12	5/10

Figure 2: Stem water potential measured on three plants from each species-substrate treatment per plot



Conclusion and Recommendations

- ❖ Vegetation in clinoptilolite zeolite (CZ) generally had higher survival versus in-situ riparian soil (RS)
- ❖ Higher stress in CZ-Plot 1 is unclear and needs further research
- ❖ Transplanting in late spring (April), high temperature in June, and lack of early precipitation may have contributed to stress/mortality
- ❖ It is recommended to allow at least a month from CZ installation to transplanting, and to do it in late winter instead of early spring

