Bringing Contaminated Soils Back to Life, Remediating Brine Contaminated and Alkaline Soils Using Phytoremediation and Engineered Drainage Techniques

Ellingson, Benjamin (School: Maddock High School)

The purpose of this project is to develop remediation techniques to restore salt contaminated soils back to productive farmland. The ultimate goal of this study is to develop an inexpensive and affordable technique that could be used by landowners. The procedures consisted of first testing the amount of water needed to remediate highly, moderately, and slightly contaminated soils by monitoring the electric conductivity and chloride concentrations while simulating different amounts of rainfall. Secondly, different drainage systems were tested to determine the most effective method to relocate the water carrying salt from the contaminated soils to the phytoremediation area. Thirdly, different salt tolerant plant species were tested to determine which crops were best for varying EC levels (levels of contamination). Finally, phytoremediation techniques were tested to determine the most efficient crop for removing salt from the soil. An increase in the amount of simulated rainfall reduced the salinity of the soil at an increased rate. The drainage systems with a gravel base and close spaced drainage tiles worked very efficiently, whereas the widely spaced drainage was ineffective. Most of the salt tolerant plants were effective in the slightly contaminated soils and varied greatly in the moderately contaminated soils. Phytoremediation was an effective technique to absorb the salts and reduce the concentrations within the basin. By implementing this research, through saturation, proper drainage, and the use of phytoremediation techniques, soils that have been infertile for decades can be remediated and put back into agricultural production in a matter of weeks.