



CALIFORNIA STATE SCIENCE FAIR

2007 PROJECT SUMMARY

Name(s) Rachel A. Reese	Project Number J1726
Project Title Reclaiming Farmland: The Effect of Gypsum on the Germination of Onion Seeds in Sodic Soil	
Objectives/Goals Sodium in the soil is a growing problem for the agricultural industry. About one third of the land in the US has some degree of salt buildup. My objective was to determine the optimum amount of gypsum, a calcium fertilizer, for the reclamation, by cation exchange, of salty agricultural soil. I used the germination rates of onion seeds to measure the soil suitability with various rates of gypsum; onions have low tolerance to salty soil.	Abstract I collected salty topsoil. Sodium levels were previously determined by laboratory analysis. I collected slightly salty, intermediate salty, and extremely salty soil samples. I calculated soil and gypsum ratios to create equivalents to tons per acre rates. For every soil sample, I ran ten trials each of 0 (control), 2.5, 5, 10 and 20 tons per acre of gypsum. I used a gram scale to measure the appropriate amounts of gypsum and soil. I mixed the different gypsum rates with the soil. I used a small amount of pea gravel at the bottom of the containers to help with drainage. After doing this, I placed the different mixtures into containers and planted one onion seed in each of the containers. I watered the soil and placed containers in a plant incubator. I recorded germination each day in my science notebook.
Methods/Materials In slightly salty soil, the germination rate in the control containers was 80%. The germination rate was slightly less at 2.5 tons of gypsum per acre (T/A) and 5 T/A gypsum. At 10 T/A gypsum, the germination rate improved to 100%. At 20 T/A, the germination rate dropped back to 80%. In moderately salty soil, the control (untreated) containers had a germination rate of 10%. The germination rate at 5 T/A gypsum was also 10% and was 0% for the 2.5 and 20 T/A treatments. Again, the 10 T/A gypsum treatment showed a higher germination rate, 50%. In the extremely salty soil, there was no germination of seed at any rate of gypsum application. In my trials I found that the gypsum at 10 tons per acre worked best in reclaiming salty soil.	Results My project showed increased germination with gypsum applied at 10 tons/acre. With the increasing problem of salty soils in San Joaquin farmland, the use of gypsum needs further study to determine optimal levels for maximum benefits. My project suggests that 10 T/A of gypsum is most helpful to germination rates. This rate is higher than usual gypsum treatment levels.
Conclusions/Discussion My project explores salty soil reclamation with various rates of gypsum, a calcium fertilizer.	
Summary Statement Father drove to fields to collect salty soil samples and helped glue papers on my board.	
Help Received	