Math 456 Data Project Proposal:

Remediation effects of five different treatments on soils irrigated with cannery wastewater.

Background Information:

Land application of effluents and bio-solids can be an effective land remediation tool for degraded soils depending on the chemical nature of waste applied, methods of amendment application, soil type, and land use practices.

In the central valley of California, roughly 520 of 620 food processing companies use agricultural land to dispose of food processing waste products. Economic alternatives to such practices are limited. Application of food processing waste products on agricultural should be evaluated to ensure the potential effects on soil quality, crop health, and groundwater quality are maintained within acceptable parameters according to environmental and public health standards.

Site Information:

The Pacific Coast Producers (PCP) fruit cannery operation in Oroville,CA applied approximately 86 million gallons of cannery water over 199 acres in an 8 day irrigation event. This effectively applied 1.3 acre feet of water containing high level of organic biosolids, nitrogen, and salts, specifically Sodium (Na) and Potassium (K). Approximately 770 lbs of Na is applied per acre per year. High rates of sodium have caused alkali (ph > 8) and sodic conditions (Na% > 15), which is related to poor forage quality and increased erosion potential, and otherwise unhealthy soil conditions.

Experimental Design:

Randomized complete block design in a 17 x 20 meter field with 6 treatments (Control treatment + 5 experimental treatments). Seven blocks with six treatments for a total of 42 1m^3 plots. Each plot was separated by a 50 cm buffer. Site data has been collected bi-annully since 2000. Experimental trials began in 2012 and lasted through 2015. *In 2013, The cannery changed their production process to utilize potassium, K, salts instead of Na salts.*

Research Questions:

Did the treatments significantly improve the soil growing conditions compared to the control?
Did switching the water quality from sodium dominated salts to potassium dominated salts improve soil quality?