Water Recycling: The Effect of Soap Nut Grey Water on the Environment (Soil Microbiome, Year 4)

Ramachandran, Shreya (School: American High School)

Due to growing interest in reusing grey water to combat drought, soapnuts, a natural berry shell, were studied for the past four years to see if its greywater could be used to irrigate lawns and vegetables without affecting aquatic life (Daphnia magna-Year1), lead to deficient/excessive nutrients(Year 2), E.Coli and Fecal Coliforms contamination(Year 3) or cause significant changes to the soil microbiome(current year). To that effect, Arabidopsis thaliana was grown in two different soils: Sandy and Sandy Loam(G.L) with three replicates for each type of grey water in two phases: Pre-Plant and Post-Plant. Soil DNA was extracted using the MOBIO Power Soil kit and the 16S v4 region was sequenced using Illumina platforms. Data was analyzed using QIIME(1.9.0) While the type of grey water had no significant effect on phylogentic and non-phylogenetic Beta diversity metrics (Unifrac and Bray-Curtis, $p > 0.05$), there was a significant difference between the two phases due to the establishment of the rhizosphere in both soils. No significant differences in Alpha diversity were measured with the Shannon index and PD Whole Tree in both the soils and among the grey waters. Regular water and soap nut grey water clustered together, indicating similar microbial communities. Grey water irrigation did not impact Sandy Loam(G.L) as much as Sandy Soil correlating with my previous results. Soapnut does not seem to perturb the soil microbiome indicating no negative effects. They are affordable and can be used for irrigation which makes them an ideal solution in drought-stricken areas of the world.

Awards Won:
Third Award of $1,000