A Novel Method to Alleviate the Water Crisis in Uganda

Chen, Michael (School: Ridgeview High School)

In Uganda, and around the world, the water crises have negatively affected society by introducing disease outbursts, diminishing the economic potential of women, etc. Plant matter has high moisture content, yet despite the potential to extract water from plants, there has been no research into the long-term usage of plant matter to sustainably support human water consumption. This experiment employs an analysis of the viability of utilizing solar stills to alleviate the water crisis in Uganda. Specifically, the relationship between the solar irradiance, ambient temperature, and the quantity of water distilled from Pennisetum purpureum is tested. A relationship was found by utilizing multiple regression to determine the linear effect the independent variables had on the dependent variable. Utilizing the regression statistics values, a formula was created to relate the variables: = 0.28286X1 + 3.35884X2 - 28.25924. The r value, p value, and residual output values all suggested a strong relationship in the formula. This is significant, as the experimental values for water production suggested approximately 40% moisture content extracted in an hour from the total mass on a typical sunlit day. This value correlates with 4.8L per day, which is the quantity necessary for two individuals, and allows for the water consumption of a village of 122 people with just 1 acre of Pennisetum purpureum. These results may be utilized for other plant matter such as typically unused plant waste, allowing for a small-scale solution to allow the citizens of Uganda to escape this cyclical failure of government and company attempts to improve their access to water.

Awards Won:
Ricoh USA, Inc: Ricoh Sustainable Development Award of $10,000