Staying Afloat: Utilizing the Physiological Adaptation Mechanisms of Marsh Vegetation and the Use of Mathematical Modeling for Barrier Island Restoration, Year Three

Bush, Natalie

1,205,127 acres of land have been lost in Louisiana since 1932 which has a detrimental impact not only on the economy but the ecosystems. The objective of this research was to determine the physiological adaptations of marsh vegetation, their benefits, the influence of species and flooding conditions on plant growth, particularly comparing the height, dry mass, nutrient content, and arenchyma presence between flooded plants and unflooded plants. Thirty plants were used of six species and half were flooded while half were grown on land. After eight weeks, plant tops were harvested, dried, and weighed. An ANOVA test was used to analyze the data for significance at the 0.05 level. The flooded group mostly had a significantly greater dry mass than the unflooded group showing adaptability to hypoxia. For the tissue analysis, the dried materials were ground and underwent an ICP test, measuring for essential elements. There were statistically higher amounts of nutrients present in many of the flooded species than in the unflooded species, proving the benefits of flooded conditions. Roots were harvested for various species under both flooding conditions and prepared with standard laboratory protocol for microscopy. Arenchyma were abundant in the flooded roots and demonstrate their adaptions. On Grand Isle, 440 elevation measurements were taken for two sand plots and two vegetation plots, contour maps were programmed in MATLab and constructed to compare the elevations of the plots. The vegetation plots reached much higher elevations and showed the greatest height in the locations of the plants.

Awards Won:

Intel ISEF Best of Category Award of $5,000

First Award of $5,000