Green Watts: Investigating Power Generation of Spartina patens Compared to Chlorophytum comosum by Utilizing a Mixed Shewanella oneidensis MR-1 Community in a Plant Microbial Fuel Cell (A Novel Fourth Year Study)

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Plant Microbial fuel cells have the potential as a sustainable, renewable energy source using Florida's wetlands and indigenous plants. Plant-MFC's use bacteria to convert solar energy into green electricity. However, due to oxidation in the soil, plant-MFC's as an energy source is limited. If oxygen can be removed from the cell system, electrical output could be increased. This study was conducted to explore increasing bioelectricity production in a plant-MFC by inoculating a facultative bacteria, Shewanella oneidensis MR-1 into an indigenous wetland species, Spartina patens compared to an invasive species, Chlorophytum comosum. Four cells were created using S. patens and C. comosum, two inoculated with S. oneidensis. Systems were monitored daily for seven days using a multi-meter to measure millivolts. Data was analyzed for power density, internal resistance, voltage and current density for all cells. The researcher observed in two trials that the experimental P-MFC's inoculated with the S. oneidensis outperformed their controls cells in both plant species. In trial one, S. patens inoculated with S. oneidensis produced the highest power density, while in the second trial, the C. comosum experimental cell produced a maximum power density of 2268 mW/cm2 or 944% more than its control and lit a LED. Both trials provide new insight in how a facultative anaerobe inoculated into a plant-MFC is capable of producing more power as compared to a naturally adapted community. These improved cells have the potential for implementation in wetlands as sustainable, high power generation as green electricity through indigenous plant modular systems.

Awards Won:

First Award of $5,000