A Novel Analysis Utilizing Invasive Fermented Macroalgae

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This project fulfills future demands and need for sustainable, cheap resources. We have discovered that macroalgae, an underutilized resource, can be fermented and used for animal feed, fertilizer, bioethanol, as well as for the creation of carbon nanotubes. Avrainvillea amadelpha and Eucheuma spinosum were tested prior to fermentation, analyzing its fiber, lignin, cellulose, and hemicellulose content. Post fermentation, both species were quantitatively and qualitatively observed through chemical testing and scanning electron microscope usage. Based on the quantitative and qualitative results, we concluded that fermented Eucheuma sp. is ideal for animal feed and fertilizers; Avrainvillea can be used to create carbon nanofibers and bioethanol. Further experimentation confirmed that fermented Eucheuma sp. is a superior fertilizer in comparison to commercial fertilizers, compost, general topsoil, and non-fermented Eucheuma sp. The greatest barrier preventing the extraction of lignin from algae, the basis of carbon nanotubes, was the inability to pierce through the algae's thick cell wall. However, the fermentation actually allowed us to easily access the lignin because the process managed to partially degrade the cell wall. There are currently no preexisting methods for algal lignin extraction. Our project entails a model for algal lignin extraction as well as a self-sustaining greenhouse for the creation of organic fertilizer and bioethanol. The implementation of this project in coastal states and countries is highly recommended due to the research proving the possible effectiveness and usage for the invasive macroalgae readily found on beaches.

Awards Won:
Third Award of $1,000