Bioplastic and Its Impact on Aquatic Ecosystems

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The purpose of this project was to design a bioplastic capable of replacing Polyethylene Terephthalate (PET) plastic. The biopolymer tested needed to be durable as well as malleable with low shrinkage characteristics. In order to achieve this, corn and avocado starches were each mixed with Polyethylene Glycol 400, glycerol, water, and LDPE to create thin films. The bioplastic films were placed in ecochambers containing water, Elodia plants, and ghost shrimp. Dissolved oxygen, temperature, and pH were measured along with plant and shrimp masses over a period of six days. Water quality was analyzed in order to determine the plastic's overall safety using spectrophotometer and turbidity analysis. The test results showed that the biopolymers had safety levels consistent with PET plastic, with each sample having 90%+ light transmittance above 500 nm. During plastic decomposition, the biopolymers acted as a natural fertilizer, which aided in the growth of Elodia. In the corn ecochambers, a mean plant growth of 46.27% was recorded, compared to 39.32% and 4.54% in the avocado and PET chambers respectively. Based on the data gathered, the bioplastics synthesized are a viable alternative to PET plastics; however, further testing should be conducted in order to determine shelf-life and molding capabilities.

Awards Won: