Effectiveness of Musa Acuminata, Solanum Tuberosum, and Ipomoea Batatas as Sources of Starch to Create Bioplastics

Shirts, Brenlie (School: Success Academy DSU)

As the demand for plastics increases, plastic pollution increases as well. Plastic pollution has been shown to have deleterious effects on marine life, the environment, and human health. In order to minimize these effects, an alternative is needed. Bioplastics--namely starch bioplastics--could be a solution to this problem. This experiment aimed to compare the effectiveness of different starchy foods as starch sources to create bioplastics. Russet potato (Solanum tuberosum), Sweet Potato (Ipomea batatas), and Banana (Musa acuminata) peels were chosen due to their availability and common waste. To create each bioplastic, the peels were boiled and blended with hydrochloric acid in order to modify the starch through acid hydrolysis. Sodium hydroxide was added to neutralize. In order to create an ideal texture, glycerin was then added as a plasticizer. The mixture was poured into glass petri dishes and baked at 130 degrees Celsius. Tensile strength was determined for each sample. Statistical analysis was performed. A two-sample t-test comparing banana and russet potato resulted in a p-value of <.0005, indicating that the banana bioplastic had significantly higher tensile strength than the russet potato bioplastic. A second two-sample t-test comparing russet potato and sweet potato also resulted in a p-value of <.0005, indicating that the russet potato bioplastic had significantly higher tensile strength than the sweet potato bioplastic. This shows that banana peels would be the most effective starch source in producing bioplastics. Implementation of similar bioplastics could create a needed positive impact on our planet.

Awards Won: