Generating Bioplastics From Banana Peels: An Innovative Approach To Reduce Artificial Plastic Pollution

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Purpose: It is crucial to explore eco-friendly, starch-based bioplastics because artificial plastics have greatly polluted the planet. The purpose of this experiment was to discover which type of banana peel yielded the strongest bioplastic. Three different banana peels were investigated: the plantain hybrid Musa acuminata x balbisiana, Cavendish banana, and dwarf Manzano banana. Procedure: The peels were treated with the preservative sodium metabisulfite, and glycerol was added to allow for more gelatinization. The researcher blended the peels and baked them on parchment paper. A fruit penetrometer was used to obtain the relative strength of the banana peels' bioplastics, and the values were recorded in total pressure (kPa) until material failure. A higher kPa value indicated a stronger bioplastic. Results: The mean kPa values for the plantain hybrid, Cavendish banana, and dwarf Manzano banana were 8.22 ±1.50, 4.22 ±1.11, 4.43 ±1.16, respectively (n=30, 10/group). An ANOVA single factor test was run, and a statistical difference existed among the groups ($p<.0001$). A t-test was performed, and the plantain hybrid bioplastic was statistically stronger than that of the dwarf Manzano and Cavendish bananas ($p<.0001$). No statistical difference existed between the Cavendish and dwarf Manzano bananas ($p>.05$). Conclusion: Banana peels are an excellent source for future bioplastics with the added benefit of finding a purpose for the typically discarded banana peel. The plantain hybrid yielded the strongest bioplastic compared to that of the dwarf Manzano and Cavendish bananas. Future research should explore other biomechanical properties, such as the relative flexibility of bioplastics derived from banana peels.