# VALORIZATION OF STARCH FROM BANANA PEEL WASTE INTO BIOPLASTIC: ANALYSIS OF PHYSICAL AND MECHANICAL PROPERTIES

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# ABSTRACT


## VALORIZATION OF STARCH FROM BANANA PEEL WASTE INTO BIOPLASTIC: ANALYSIS OF PHYSICAL AND MECHANICAL PROPERTIES

Banana peel waste (BPW) is valorized in this study for the development of bioplastics as a raw material with the aim of obtaining biodegradable and environment-friendly substitutes for conventional plastics. The main objectives include the development and characterization of BPW-based bioplastics in combination with tapioca and corn starch, focusing on their physical, mechanical, and chemical characteristics. The banana peel waste turned out to be pre-treated, dried, and ground and was made in fine starch powder, which was then mixed with starchy cross linker and glycerol to make different compositions. The different samples of bioplastic were analyzed using Fourier-transform infrared spectroscopy (FTIR), optical microscopy, water absorption test, ultraviolet visible spectrophotometry, and mechanical property testing with a universal testing machine. The results showed that the formulation significantly affected the properties of the bioplastic: increasing amounts of BPW resulted in increased water absorption while tensile strength and transparency were reduced, while increasing proportions of tapioca and corn starch improved mechanical properties and optical clarity. FTIR confirmed the existence of the relevant functional groups that give rise to polymer interactions, while microscopy indicated surface imperfections and structural differences among the blends. The ideal formulation aims to balance the two most essential components to yield good characteristics for its specific application in bioplastics. In summary, bioplastics based on BPW are promising biodegradable and sustainable materials, but further optimization and studies on scale-up are suggested to improve their commercial viability and application in various industries.

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