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DEVELOPMENT AND CHARACTERIZATION OF MUSA ACUMINATA PEEL-BASED BIODEGRADABLE ACTIVE PACKAGING FILMS

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DEVELOPMENT AND CHARACTERIZATION OF *MUSA ACUMINATA* PEEL-BASED BIODEGRADABLE ACTIVE PACKAGING FILMS

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ABSTRACT

Polyethylene, polypropylene, polyethylene terephthalate (PET), and polyvinyl chloride (PVC) are petroleum-based plastics that are frequently used in food packaging but are not biodegradable and greatly pollute the environment. The need for environmentally friendly packaging options has grown as worries about plastic waste have grown. By adding useful ingredients that can lower oxidation and stop microbial development, active packaging has become a viable strategy for improving food quality and shelf life.

The goal of this project is to create biodegradable active packaging films using banana peels (*Musa acuminata*), an underutilized agricultural waste that is high in cellulose and bioactive substances. Banana peels were used to extract cellulose, which was then combined with antioxidant and antibacterial substances to create functional films. Fourier Transform Infrared (FTIR) spectroscopy, solubility tests, biodegradability evaluations, antioxidant activity studies, and antimicrobial testing were used to analyze the physicochemical and functional characteristics of the produced films.

The findings show that films made from banana peels have a lot of promise as environmentally friendly substitutes for traditional packaging materials made of petroleum. A stable polymer matrix was supplied by the extracted cellulose, and the added bioactive substances improved the antibacterial and antioxidant properties. This study promotes the value-adding of agricultural waste and lessens reliance on non-biodegradable plastics, which helps global sustainability initiatives, especially Sustainable Development Goal (SDG) 12 (Responsible Consumption and Production) and SDG 14 (Life Below Water). All things considered, this study offers insightful information about the structural, functional, and environmental advantages of using biodegradable films made from banana peels for active food packaging applications.