

FINAL PROJECT

**MECHANICAL PROPERTIES AND UV
TRANSMITTANCE OF BIOPLASTICS BASED ON
PURPLE SWEET POTATO STARCH WITH GAMBIER
WASTEWATER ADDITION**

Submitted to Fulfill The Requirement for Bachelor Degree

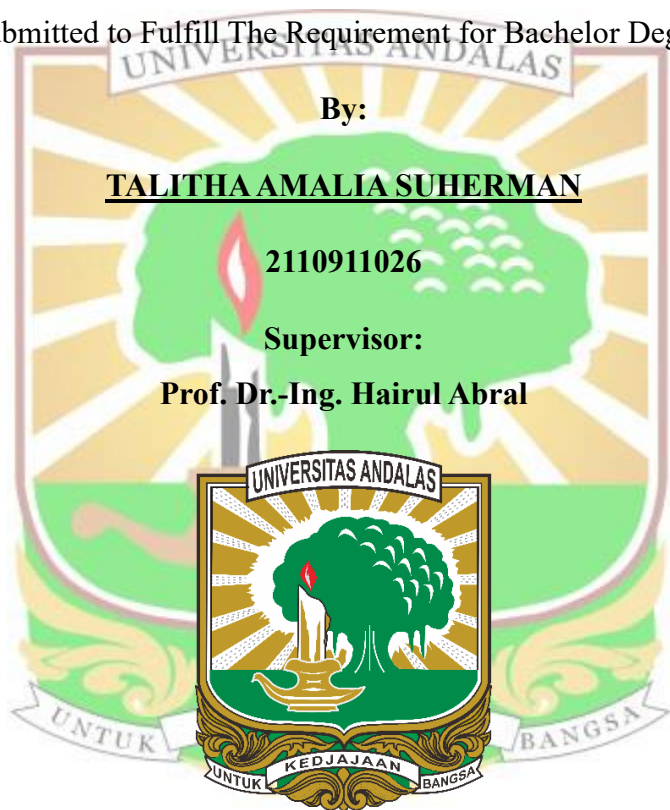
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ABSTRACT

The excessive consumption of plastic food packaging has led to severe environmental concerns, since it accumulates over decades due to its resistance to natural decomposition processes. To mitigate these issues, starch-based bioplastics have emerged as a promising alternative for food packaging. Derived from renewable sources like purple sweet potatoes, starch-based bioplastics are biodegradable, but often suffer from inadequate mechanical and barrier properties compared to conventional plastics.

This research focuses on improving the mechanical and barrier properties of starch-based bioplastics by incorporating functional compounds and reinforcements. Tannin, a natural compound found abundantly in Gambier wastewater, has shown potential as an additive to enhance the tensile strength and UV resistance of bioplastics. By integrating five variations of Gambier wastewater—0 ml, 5ml, 10 ml, 15 ml, and 20 ml—into the purple sweet potato starch matrix, this study aims to develop a bioplastic suitable for food packaging applications. Tensile testing was carried out according to the ASTM D638-14 type V Standard, and UV transmittance testing was done following the ASTM D1003-00 Standard.

The addition of Gambier wastewater increases the tensile strength and modulus of elasticity of the bioplastic film while decreasing its elongation at break. The tensile strength and modulus of elasticity drop with 15 ml and 20 ml of Gambier wastewater addition due to agglomeration and accumulation of excess compounds within the wastewater. The Gambier wastewater addition also shows an increase in UV protective effect, signified by the decrease of UV transmittance in every bioplastic film.

Keywords: Starch, Gambier wastewater, tensile strength, UV resistance