FINAL PROJECT

TENSILE PROPERTIES OF BIO-BLENDED PLA FILMS WITH VARIATIONS OF BAJAKAH TAMPALA ROOT EXTRACT

Submitted as one of the requirements for the completion of bachelor degree program

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BACHELOR DEGREE PROGRAM

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PADANG

2026

ABSTRACT

This research examines the tensile properties of bio-blended polylactic acid (PLA) films made by adding varying amounts of Bajakah Tampala (Spatholobus littoralis Hassk) root extract. PLA is a biodegradable plastic made from renewable sources and is widely used today because it is safe, easy to process, and environmentally friendly. Bajakah Tampala extract was added as a natural additive because it contains useful compounds such as flavonoids, phenolics, tannins, saponins, and alkaloids. Bio-blended films were prepared with extract variations of 0.05 g and 0.075 g, followed by homogenization and ultrasonication to ensure uniform distribution. The finished films were then tested using the ASTM D638-14 Type V tensile test standard to measure tensile strength, elastic modulus, and elongation at break. The results showed that pure PLA conducted the highest tensile strength of 38.08 MPa, which then decreased with addition of Bajakah Tampala of 0.05 g reaches 33.60 MPa, the lowest tensile strength were found in the highest amount of Bajakah Tampala extract of 0.075 which is 29.92 MPa. On the other hand, the modulus of elasticity of pure PLA increased from 2.17 MPa to 2.23 MPa with the addition of 0.05 g of Bajakah Tampala, then it further increased to 2.57 MPa with 0.075 g of Bajakah Tampala extract, indicating improved stiffness. The elongation at break of pure PLA with value of 2.64% later decreased to 2.36% with addition of 0.05 g Bajakah Tampala extract, then further decreased to 2.02% with increasing amount of extract of 0.075 g due to particle agglomeration and limited compatibilization capacity. Overall, the incorporation of Bajakah Tampala extract influences the mechanical behaviour of PLA films by decreasing tensile strength and elongation while improving stiffness. Despite these changes, the resulting properties remain within the acceptable range for PLA-based materials, indicating their potential suitability for biodegradable food packaging application.

Keywords: PLA, Bajakah Tampala, bio-blended film, tensile properties, food packaging, biopolymer, mechanical characteristics.