

## ABSTRACT

The growing awareness of the environmental impact of conventional plastics has driven the development of agar-based bioplastics as an eco-friendly alternative. However, these bioplastics are hydrophilic and brittle, necessitating improvements in water resistance and tensile strength. This study aims to evaluate the effect of chitosan and beeswax addition on the hydrophobicity and tensile strength of agar-based bioplastics. Various concentrations of beeswax (0%, 0.5%, 1%, and 2% wt/v) and chitosan (0%, 0.5%, 1%, and 2% wt/v) were used to determine the optimal concentrations for enhancing hydrophobicity and tensile strength.

The test results showed that the optimal combination of 1% wt/v chitosan and 0.5% wt/v beeswax produced the highest contact angle ( $97^\circ$ ), indicating improved hydrophobicity. Tensile strength testing demonstrated that chitosan addition improved the tensile strength of bioplastics, while higher concentrations of beeswax tended to reduce tensile strength. FTIR analysis confirmed interactions between chitosan and beeswax compounds in the bioplastic. This study highlights that the combination of chitosan and beeswax can enhance the mechanical properties and hydrophobicity of agar-based bioplastics, offering potential applications in eco-friendly packaging and other industries.

**Keywords:** bioplastics, agar, beeswax, chitosan, hydrophobicity, tensile strength.