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ANTI BACTERIAL AND DEGRADATION ACTIVITIES OF PECTIN BASED DEEP EUTECTIC SOLVENT BIOPLASTIC WITH DIFFERENT CONCENTRATION OF TANNIC ACID

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This Final Year Project Report entitled **"Antibacterial and Degradation Activities of Pectin Based Deep Eutectic Solvent Bioplastic with Different Concentration of Tannic Acid"** was submitted by Nur Atiqah Binti Zukifli, in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Biology, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

ANTIBACTERIAL AND DEGRADATION ACTIVITIES OF PECTIN BASED DEEP EUTECTIC SOLVENT BIOPLASTIC WITH DIFFERENT CONCENTRATION OF TANNIC ACID

Petroleum-based plastics are linked to numerous environmental issues throughout their lifecycle, such as pollution, persistent presence in marine and terrestrial environments, greenhouse gas emissions, and more. As an alternative to conventional plastics made from petroleum, bioplastics are a rapidly expanding class of polymeric materials. However, there is a need to assess the true environmental impact of using bioplastics also been connected to significant environmental problems like greenhouse gas emissions and unfavourable land use change. Therefore, this study was carried out to produced pectin based DES bioplastic and analyse the antibacterial activity, water quality and degradation activity of the samples. The properties of pectin as a degradable bioplastic were improved by using Deep Eutectic Solvent (DES) as a plasticiser and tannic acid as a crosslinker at concentrations ranging from 1% to 3%. The disc diffusion assay is used to investigate the boosting antibacterial effect of tannic acid at different concentrations (1%, 2%, and 3%) against *Staphylococcus aureus* and *Escherichia coli*. Bioplastic with 3% tannic acid (19.00±1.00) has the largest average diameter of inhibition zone against *S. aureus*. The zone of inhibition produced by bioplastic containing 1% tannic acid (15.33±1.53) was the smallest against *S. aureus*. Meanwhile, bioplastic with 3% tannic acid has the largest average diameter of inhibition zone (16.67±0.58) towards *E.coli*. Tannic acid was found to improve and increase the antibacterial potential of a pectin-based DES bioplastic in this study. Bioplastic with 3% tannic acid has highest antibacterial activities against bacteria. The soil burial test and sea water degradation test were used to determine the qualitative of sample physical appearance bioplastics for 29 and 31 days respectively. Bioplastic containing 3% tannic acid and commercial biodegradable plastic showed the slowest degradation as the fragments of sample still appear after 31 days. The results revealed that increasing the concentration of tannic acid slowed the degradation rate of bioplastic. Finally, the properties of bioplastic/pectin/DES were altered using different concentrations of tannic acid as a crosslinker to create a new green alternative to synthetic plastics.

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