

BIOSHELL (Bioplastic Sheet with Lantana Camara L Extract): Foodstuff Packaging with Indicator and EcoFriendly Natural Preservatives

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Abstract. Environmental hazards caused by plastics pollution, especially those made from petrochemical materials at all stages of production and after their use, have prompted various substitution efforts with other materials that are more environmentally friendly. Bioplastics made from starch that modified with the addition of certain materials can be an alternative functional packaging material, for example, has antimicrobial properties, pH indicators, and is easily biodegradable. Various studies have shown that tembelekan flower extract (*Lantana camara* L) exhibits antimicrobial activity and is a good indicator of changes in pH. This study aims to obtain the effective concentration of extracts added and bioplastic characteristics resulting from the addition of these extracts. The research was conducted using an experimental method with the independent variable being variations in the levels of ethanolic extract of *Lantana camara* flowers added to bioplastics by 5%, 10%, 15% 20% and 25%. Furthermore, measurements of species density, water absorption, rate of biodegradation, test of minimum inhibitory concentration, morphological observations with Scanning Electron Microscope (SEM), and measurement of color changes as the effect of temperature and light were carried out. Based on the research data, it was found that the addition of extract content in bioplastics was inversely proportional to the specific density where for the 25% extract content the specific density was 1.021 gr/cm³ compared to bioplastics without the addition of extracts, which was 1.254 gr/cm³. The results also showed that the highest average water absorption was obtained in bioplastic without extract content of 79.61% and the lowest was bioplastic with 25% extract content of 47.22%. Observation of weight loss on days 1, 3, 7 and 10 showed a tendency for the higher the extract content, the relatively lower weight loss where on the 10th day the bioplastic without extract had lost 81.30% weight while the bioplastic containing 25% extract was 47.62%. On the observation of antimicrobial activity on days 1, 3 and 7 against *S. aureus* and *E. coli*, inhibition zones have been formed and seen in bioplastics with extract levels of 20% and 25% since day 1. Observations with SEM showed that the addition of the extract up to 25% showed a smooth surface morphology of the bioplastic indicating the material was well mixed. In the measurement of color stability, color changes on days 1 and 5 as the influence of temperature and light showed that color changes occurred but were not easily observable with the naked eye which showed good color stability. Overall, bioplastics containing tembelekan flower extract have the potential to be used as functional healthy food packaging

Keyword: food packaging; bioplastic; *Lantana camara*; antimicrobial; biodegradation