

## RINGKASAN

Peningkatan sampah plastik yang sulit terurai mendorong pengembangan bioplastik berbasis pati sagu dan polivinil alkohol (PVA) sebagai alternatif ramah lingkungan. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan gliserol sebagai *plasticizer* (0%, 1%, dan 2%) dan serat nanoselulosa dari kulit ubi kayu sebagai penguat (0%, 2%, dan 4%) terhadap sifat fisik, mekanis, dan biodegradabilitas bioplastik komposit PVA-pati sagu.

Penelitian menggunakan Rancangan Acak Lengkap (RAL) dua faktor dengan 9 kombinasi perlakuan dan 3 ulangan (27 unit percobaan). Parameter uji mencakup ketebalan (mm), WVTR ( $\text{gr/m}^2 \cdot \text{jam}$ ), transparansi (UV-Vis 550 nm), kuat tarik dan elongasi (ASTM D882-12), serta biodegradabilitas (*soil burial test* 14 hari secara visual), dianalisis dengan ANOVA dua arah dan uji lanjut DMRT (SPSS 26.0).

Hasil penelitian menunjukkan bahwa penambahan gliserol dan serat nanoselulosa menghasilkan bioplastik dengan ketebalan 0,23-0,28 mm, WVTR 2,12-3,90  $\text{g/m}^2 \cdot \text{jam}$ , transparansi 0,77-1,41, kuat tarik 0,77-1,90 MPa, dan elongasi 71,19-146,59%. Konsentrasi gliserol berpengaruh nyata meningkatkan ketebalan, WVTR, dan elongasi tetapi menurunkan nilai kuat tarik. Serat nanoselulosa meningkatkan ketebalan dan kuat tarik tetapi menurunkan nilai transparansi. Interaksi keduanya berpengaruh nyata pada uji ketebalan, kuat tarik, transparansi, dan elongasi tetapi tidak berpengaruh nyata pada uji WVTR. Seluruh sampel menunjukkan degradasi visual (perubahan warna, retak, dan rapuh) selama penguburan dalam tanah, terutama pada konsentrasi gliserol tinggi. Sehingga bioplastik komposit PVA-pati sagu ini berpotensi sebagai material kemasan ramah lingkungan.

## SUMMARY

*The escalating accumulation of non-biodegradable plastic waste has encouraged the development of bioplastics based on sago starch and polyvinyl alcohol (PVA) as environmentally friendly alternatives. This study aimed to evaluate the effects of glycerol as a plasticizer (0%, 1%, and 2%) and nanocellulose fibers derived from cassava peel as a reinforcing agent (0%, 2%, and 4%) on the physical, mechanical, and biodegradability properties of PVA-sago starch composite bioplastics.*

*The study applied a two-factor Completely Randomized Design (CRD), consisting of nine treatment combinations with three replicates (27 experimental units). The observed parameters included thickness (mm), water vapor transmission rate ( $\text{gr/m}^2\cdot\text{hours}$ ), transparency, tensile strength and elongation, and biodegradability through a 14-day soil burial test based on visual observation. Data were analyzed using two-way ANOVA followed by Duncan's Multiple Range Test (DMRT) at a 95% confidence level using SPSS version 26.0.*

*The results showed that the incorporation of glycerol and nanocellulose fibers produced bioplastics with thickness values ranging from 0.23 to 0.28 mm, WVTR from 2.12 to 3.90  $\text{g/m}^2\cdot\text{h}$ , transparency from 0.77 to 1.41, tensile strength from 0.77 to 1.90 MPa, and elongation from 71.19% to 146.59%. Glycerol concentration significantly increased thickness, WVTR, and elongation, but decreased tensile strength. The addition of nanocellulose fibers increased thickness and tensile strength while reducing transparency. The interaction between glycerol and nanocellulose showed significant effects on thickness, tensile strength, transparency, and elongation, but had no significant effect on WVTR. All samples exhibited visual degradation characteristics, such as color change, cracking, and increased brittleness, during the soil burial test, particularly at higher glycerol concentrations. Therefore, PVA-sago starch composite bioplastics demonstrate promising potential as environmentally friendly packaging materials.*