RINGKASAN

Limbah plastik yang sulit terurai mendorong pengembangan bioplastik sebagai solusi ramah lingkungan. Penelitian ini mengkaji pembuatan bioplastik komposit berbasis PVA dan pati tapioka dengan penambahan sorbitol sebagai *plasticizer* dan serat nanoselulosa dari kulit ubi kayu sebagai bahan penguat. Tujuan utamanya adalah mengetahui pengaruh variasi konsentrasi sorbitol (10%, 20%, 30%) dan nanoselulosa (0%, 2%, 4%) terhadap sifat fisik dan mekanik bioplastik. Sorbitol berfungsi meningkatkan fleksibilitas, sedangkan nanoselulosa diharapkan menambah kekuatan tarik dan ketahanan terhadap kelembapan.

Hasil penelitian menunjukkan bahwa konsentrasi sorbitol berpengaruh nyata terhadap kekerasan, elongasi, dan biodegradabilitas bioplastik. Semakin tinggi konsentrasi sorbitol, maka bioplastik menjadi lebih lentur dan lebih mudah terurai, namun nilai kekerasan dan kuat tariknya cenderung menurun. Penambahan nanoselulosa berpengaruh nyata terhadap kuat tarik dan transparansi, konsentrasi 2% memberikan hasil paling optimal. Kombinasi antara sorbitol dan nanoselulosa tidak menunjukkan pengaruh yang signifikan pada sebagian besar parameter, namun tetap memberikan kecenderungan terhadap sifat keseluruhan material.

Penggunaan PVA, pati tapioka, sorbitol, dan nanoselulosa memberikan potensi besar dalam pengembangan bioplastik yang kuat, fleksibel, dan mudah terdegradasi. Penelitian ini merekomendasikan eksplorasi lebih lanjut terhadap variasi bahan dan kondisi produksi untuk mendapatkan formulasi bioplastik yang lebih optimal dan aplikatif.

SUMMARY

The issue of plastic waste that is difficult to decompose has driven the development of bioplastics as an environmentally friendly solution. This study investigates the production of composite bioplastics based on PVA and tapioca starch with the addition of sorbitol as a plasticizer and nanocellulose fibers derived from cassava peel as a reinforcing agent. The main objective is to determine the effects of varying concentrations of sorbitol (10%, 20%, 30%) and nanocellulose (0%, 2%, 4%) on the physical and mechanical properties of the bioplastics. Sorbitol is expected to improve flexibility, while nanocellulose is anticipated to enhance tensile strength and moisture resistance.

The results show that sorbitol concentration significantly affects the hardness, elongation, and biodegradability of the bioplastics. Higher concentrations of sorbitol increase the flexibility and degradability of the material, but tend to decrease its hardness and tensile strength. The addition of nanocellulose significantly improves tensile strength and transparency, with 2% concentration yielding the most optimal results. Although the combination between sorbitol and nanocellulose did not show significant effects on most parameters, it still influenced the overall characteristics of the bioplastics.

The combination of PVA, tapioca starch, sorbitol, and nanocellulose presents a strong potential for developing bioplastics that are strong, flexible, and biodegradable. This research recommends further exploration of ingredient variations and processing conditions to obtain a more optimal and applicable bioplastic formulation.