

## ABSTRAK

### **Optimasi perbandingan sorbitol–gliserol sebagai *plasticizer* dan penambahan ekstrak bawang putih terhadap karakteristik bioplastik berbasis limbah nasi sisa**

Limbah nasi sisa berpotensi dimanfaatkan sebagai bahan baku bioplastik ramah lingkungan untuk mengurangi ketergantungan terhadap plastik konvensional. Penelitian ini bertujuan untuk mengetahui pengaruh perbandingan sorbitol–gliserol sebagai *plasticizer* dan penambahan ekstrak bawang putih sebagai agen antibakteri terhadap karakteristik bioplastik berbasis limbah nasi sisa. Penelitian dilakukan menggunakan variasi rasio sorbitol–gliserol (1:0, 3:2, 0:1, 1:1, dan 2:3) serta konsentrasi ekstrak bawang putih (0%, 2%, dan 4%). Karakterisasi meliputi pengujian kuat tarik, elongasi, swelling power, biodegradasi, dan aktivitas antibakteri terhadap *Escherichia coli* dan *Staphylococcus aureus*. Hasil penelitian menunjukkan bahwa perbandingan sorbitol–gliserol dan penambahan ekstrak bawang putih berpengaruh terhadap karakteristik bioplastik. Formulasi terbaik diperoleh pada rasio sorbitol–gliserol 1:1 dengan penambahan ekstrak bawang putih 4%. Seluruh sampel terdegradasi sempurna dalam waktu 14 hari dan menunjukkan aktivitas antibakteri terhadap *Escherichia coli* dan *Staphylococcus aureus*. Berdasarkan perbandingan dengan standar SNI, parameter biodegradasi telah memenuhi persyaratan, sedangkan kuat tarik dan elongasi masih belum memenuhi standar. Hasil penelitian menunjukkan bahwa limbah nasi sisa berpotensi dimanfaatkan sebagai bahan baku bioplastik ramah lingkungan.

**Kata kunci:** *bioplastik, limbah nasi sisa, sorbitol–gliserol, ekstrak bawang putih, antibakteri.*

## ABSTRACT

### **Optimization of Sorbitol–Glycerol Ratio as a Plasticizer and Garlic Extract Addition on the Characteristics of Bioplastics Derived from Leftover Rice Waste**

Leftover rice waste has the potential to be utilized as a raw material for environmentally friendly bioplastics to reduce dependence on conventional plastics. This study aimed to determine the effect of the sorbitol–glycerol ratio as a plasticizer and the addition of garlic extract as an antibacterial agent on the characteristics of bioplastics made from leftover rice waste. The study was conducted using variations of sorbitol–glycerol ratios (1:0, 3:2, 0:1, 1:1, and 2:3) and garlic extract concentrations (0%, 2%, and 4%). The bioplastics were characterized by tensile strength, elongation, swelling power, biodegradation, and antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. The results showed that the sorbitol–glycerol ratio and the addition of garlic extract affected the characteristics of the bioplastics. The best formulation was obtained using a sorbitol–glycerol ratio of 1:1 with 4% garlic extract. All samples were completely biodegraded within 14 days and exhibited antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. Based on a comparison with the Indonesian National Standard (SNI), the biodegradation parameter met the required standard, whereas the tensile strength and elongation parameters did not yet meet the specified standard. These findings indicate that leftover rice waste has good potential as a raw material for environmentally friendly bioplastics.

**Keywords:** *bioplastic, leftover rice waste, sorbitol–glycerol, garlic extract, antibacterial activity.*