

RINGKASAN

Bioplastik adalah plastik yang dapat terurai secara alami oleh mikroorganisme dan berasal dari bahan terbarukan seperti pati. Salah satu sumber pati yang potensial digunakan dalam pembuatan bioplastik adalah tepung tapioka. Namun, bioplastik berbasis pati memiliki kelemahan dalam sifat fisik dan memerlukan penambahan bahan penguat berukuran nano serta *plasticizer* untuk meningkatkan sifat mekaniknya. Penelitian ini bertujuan untuk: 1) Mengetahui pengaruh penambahan *plasticizer* gliserol terhadap karakteristik sifat fisik dan mekanik bioplastik; 2) Mengetahui pengaruh penambahan serat nanoselulosa dari kulit ubi kayu terhadap karakteristik sifat fisik dan mekanik bioplastik.

Penelitian ini merupakan penelitian eksperimental dengan menggunakan Rancangan Acak Lengkap (RAL) yang terdiri atas dua faktor perlakuan. Faktor pertama adalah konsentrasi gliserol dengan tiga taraf, yaitu 10% (G1), 20% (G2), dan 30% (G3). Faktor kedua adalah proporsi serat nanoselulosa dengan tiga taraf, yaitu 0% (N1), 2% (N2), dan 4% (N3). Variabel yang diamati dalam penelitian ini mencakup karakteristik fisik dan mekanik bioplastik meliputi ketebalan film, kekerasan film, laju transmisi uap air (WVTR), transparansi, warna film, biodegradabilitas, kuat tarik, dan elongasi bioplastik.

Hasil penelitian menunjukkan bahwa penambahan gliserol dengan berbagai konsentrasi berpengaruh terhadap sifat fisik dan mekanik bioplastik, termasuk laju transmisi uap air, warna, kuat tarik (tensile strength), dan biodegradabilitas bioplastik. Sementara itu, penambahan serat nanoselulosa dengan berbagai konsentrasi yang berbeda tidak berpengaruh nyata terhadap sifat fisik dan mekanik bioplastik.

SUMMARY

Bioplastics are plastics that can be naturally decomposed by microorganisms and sourced from renewable materials, such as starch. One potential source of starch used in the manufacture of bioplastics is tapioca flour. However, starch-based bioplastics have weaknesses in their physical properties, so the addition of nano-sized reinforcing materials and plasticizers is needed to improve their mechanical properties. This study aims to: 1) Determine the effect of the addition of glycerol plasticizer on the characteristics of the physical and mechanical properties of bioplastics; 2) To determine the effect of the addition of nanocellulose fibers from cassava peels on the characteristics of the physical and mechanical properties of bioplastics.

This study is an experimental study using a Complete Random Design (CRD) consisting of two treatment factors. The first factor is the concentration of glycerol with three levels, namely 10% (G1), 20% (G2), and 30% (G3). The second factor is the proportion of nanocellulose fibers with three levels, namely 0% (N1), 2% (N2), and 4% (N3). The variables observed in this study include the physical and mechanical characteristics of bioplastics including film thickness, film hardness, water vapor transmission rate (WVTR), transparency, film brightness, biodegradability, tensile strength, and elongation of bioplastics.

The results showed that the addition of glycerol in various concentrations had an effect on the physical and mechanical properties of bioplastics, including water vapor transmission rate, brightness, tensile strength, and biodegradability of bioplastics. Meanwhile, the addition of nanocellulose fibers in various different concentrations had no real effect on the physical and mechanical properties of bioplastics.