

Effects of glycerol and thymol on physical, mechanical, and thermal properties of corn starch films

ABSTRACT

This study explores the preparation of corn starch (CS) films incorporated with glycerol, thymol, and combination of glycerol and thymol via solution casting technique. The resulting films were characterized in terms of structural changes, physical, optical, mechanical, and thermal properties. Results show that the presence of both glycerol and thymol in CS film increased the film thickness while reduced the moisture content, solubility, and transparency of the film. Fourier transform infrared spectroscopy revealed that intermolecular hydrogen bonding existed between CS, glycerol, and thymol. The presence of glycerol had more remarkable impact on tensile strength of CS films than that of thymol alone, while the combination of thymol and glycerol led to synergistic effects. Thermal degradation profiles of the films revealed the maximum degradation temperature of CS film with glycerol and thymol shifted to a higher temperature compared to other films indicating better thermal stability. In conclusion, the inclusion of glycerol and thymol led to improvement in overall performance of corn starch films.

Keyword: Starch films; Glycerol; Thymol; Solubility; FTIR; Mechanical properties; Thermal analysis