# Biodegradable and edible film based on persimmon (*Diospyros kaki* L.) used as a lid for minimally processed vegetables packaging

**Julia Rabelo Vaz Matheus, Rebeca Melgaço de Assis, Thiago Ramos Correia, Mônica Regina da Costa Marques, Marcia Christina Amorim Moreira Leite, Franciele Maria Pelissari, Roberta Fontanive Miyahira and Ana Elizabeth Cavalcante Fai**

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## Abstract

Biodegradable films based on persimmon (*Diospyros kaki* L.) with glycerol and pectin were developed, characterized, and applied as a lid for bowls with minimally processed vegetables (MPV) (cucumber, carrot, and beetroot), with PVC as a positive control. Microbiological and physical parameters of MPV were investigated during refrigerated storage. The films presented high values of water vapor permeability (WVP) (5.77–6.63 × $10^{-6}$ g $h^{-1}$ $m^{-1}$ $Pa^{-1}$) and water solubility (WS) (68.80–80.86 %) and 0.75–1.35 MPa, 17.71–20.55%, and 3.82–10.06 MPa of tensile strength (TS), elongation at break (EB), and Young's modulus (YM), respectively. The addition of glycerol and pectin decreased TS and increased YM, EB, and WS of films. Thermogravimetric analysis showed two important steps of degradation related to glycerol, polymer backbone, pectin, and monosaccharide ring: 205 and 335 °C. Scanning electron microscopy revealed a homogenous microstructure of the films. The film with lower WVP and thickness, higher TS, good flexibility, and a more vivid color was selected as a lid for MPV bowls. Vegetables covered with film or PVC presented similar results regarding thermotolerant coliform evolution (< 3 to 160 MPN $g^{-1}$); psychrophiles and fungi count (< 2 to 8.72 log CFU $g^{-1}$); pH value (5.95 to 6.18 for cucumber; 5.96 to 6.10 for carrot; 6.02 to 5.75 for beetroot); and optical properties. Persimmon film reduced the dehydration process of MPV, though to a lower extent than PVC. This study indicates the potential of persimmon-based film as an alternative to synthetic lids for vegetable packaging.