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Development of zein-based edible coating containing essential oil aiming extending papaya (*Carica papaya* L.) shelf life

M.E. Soares¹, R. Bernardes-Filho², L.A. Colnago², R.T. Nassu^{*3}

¹Universidade de Sao Paulo, Brazil, ²Embrapa Instrumentação, Brazil, ³Embrapa Pecuaria Sudeste, Brazil

Zeins are hydrophobic proteins that can be extracted from maize grains or from corn gluten meal (CGM), which is a by-product of ethanol and starch production. The hydrophobic properties make zeins suitable for using in edible coatings applied to food and medicines. Papaya (*Carica papaya* L.) fruit show a high softening, stem-end-rot and diseases caused by fungi during its ripening. Aiming to extend papaya's fruit shelf life we prepared zeins based coatings containing oleic acid (OA) as plasticizer and/or pink pepper (*Schinus molle* L.) essential oil (PO), due to its antimicrobial properties. Zeins were extracted from CGM (supplied by Ingridion Inc.) and analyzed by Fourier Transform Infrared Spectroscopy (FTIR), which indicated a typical starch free protein spectra. The coating solutions were prepared in 70% ethanol aqueous solution (v/v) as follows: F1 (4% zein; 0.1% PO); F2 (4% zein; 0,25% OA; 0.1 PO); F3 (8% zein; 0.1% PO) and F4 (8% zein; 0.2% PO). Papaya fruits were immersed in these solutions during 3 seconds and then they were dried for 24 hours. Non-coated fruits were the control samples. The papaya fruits were then stored at a temperature of 26°C and relative humidity of 53% during seven days. Mass loss, color and low-field Nuclear Magnetic Resonance (LF-NMR) analyses were performed at 1, 2, 4 and 7 days. Papaya fruits coated with F2 and F4 formulations lost 11% of their mass, followed by F3 (13.5%) and control (16.5%) in the 7th day. Hue value varied from 85 to 95° and no significant difference ($p < 0.05$) was found among the treatments, indicating that the coatings did not affect the fruits colour. Regarding to NMR, an increase of transverse relaxation time (T_2) was verified, indicating the softening of the fruits due to ripening. Formulation F4 was the best for extending papaya's fruit shelf life.

Keywords: zein, corn gluten meal, papaya, pink pepper