EVALUATION OF EDDIBLE FILMS OF COMMERCIAL CITRIC PECTIN TO PROLONG THE SELFH LIFE AND QUALITY OF PEARS

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Introduction. Consumers demand less use of chemicals on minimally processed fruits and vegetables so more attention has been paid to the search for naturally occurring substances able to act as alternative antimicrobials and antioxidants (1). The ability of edible films to retard moisture, oxygen, aromas and solute transport may be improved by including additives such as antioxidants, antimicrobials, colorants, flavors, fortifying nutrients and spices in film formulation (2). The objective of this work was to develop and characterize edible films made from commercial citric pectin for its application in food industry.

Methods. Edible films were prepared using 0.1% of $CaCl_2$, 1.7% of plasticizer and commercial citric pectin (Sigma, 7.2 metoxilation degree) in 9 concentration (0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 1.5 and 2.0%). The edible films were characterized by water activity, gas permeability, and mechanical, thermal (DSC), and rheological properties.

Results. In table 1 is observed that as the concentration of pectin increases the applied stress is higher, this can occur because there is more interaction between the links of its components, which implies a greater force to achieve elongation. In citrus pectin films for all concentrations of the applied stress value decreases with increasing water activity, ie the water absorption of the pectin matrix makes it softer and less resistant to rupture due to the plasticizing effect of water in the polymer matrix. The highest film elasticity was in the concentration of 0.8%; the film of 2.0% showed the highest strain values but also the values of maximum applied stress, likewise lower film had the lowest concentration and the lower deformation stress applied. The DSC method shown that the films can´t be affected in a range of 0-100°C, it means that the polysaccharides presents made a synergy between them and is able to blend water in the film (3). Rheological data shown the behavior of citrus pectin films which shows that the fluid viscosity increases in the concentrations of 0.4, 0.5 and 0.6% with increasing agitation speed, this type of behavior is shown in dilatant fluids.

Table 1. Mechanical properties of citric pectin edible films

A (%)	**B** (N/mm^2) γ	**C** (%)	**D** (N/mm^2)	**E**	**F** (mm)
0.4	0.1312	9.9560	0.7981	0.4270	0.050
0.5	0.1870	11.716	0.7607	0.3770	0.050
0.6	0.2295	14.476	1.4337	0.3556	0.051
0.7	0.1432	19.116	1.0697	0.3440	0.069
0.8	0.1195	18.858	1.1565	0.3335	0.077
0.9	0.0982	18.756	1.0742	0.3210	0.126
1.0	0.0907	18.196	1.0652	0.3076	0.126
1.5	0.571	13.816	2.1944	0.2783	0.144
2.0	0.0081	21.554	4.8777	0.2516	0.157

a) chia mucilage, b) Young module, c) deformation, d) maximum effort, e) water activity, f) thickness

The permeability in pears with citrus pectin coating was increased in CO_2 and decreased in available oxygen (Fig 1), because, glycerol reduces between the biopolymers, thereby increasing the intermolecular space and hence the permeability of the films, besides the plasticizer being a hydrophilic molecule favors adsorption-desorption of water molecules (4).

Fig 1. a) Control, b) pears with citrus pectin film

Conclusions. Edible films of citric pectin represent a new alternative for its application in postharvest fruits with additives.

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