International Agribusiness Congress September 25 to 27 CIAGRO 2020 Science, Technology and Innovation: from the field to the meal

PRODUCTION OF NANOCOMPOSITE FILMS BASED ON STARCH AND EVALUATION OF THEIR USE AS COATINGS FOR STRAWBERRIES

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Abstract

Strawberries (*Fragaria* × *ananassa Duch*.) are highly demanded fruits because of their color, appearance and nutritional values, but, their postharvest storage presents short life due its metabolically active properties. The aim of this study was to develop edible coating materials and to determine their efficacy in shelf life and maintaining quality parameters of. 'Mohaven' strawberries. In this work, starch-based nanocomposite in the presence of cellulose nanocrystals (CNCs) and plasticized with glycerol were developed. CNCs were obtained using grape pomace as raw material, and added to filmogenic solutions (1, 2, 5, 10 and 15 g/100 g of ST). CNCs and nanocomposites were characterized. Filmogenic solutions were evaluate as coatings on strawberries. Coated and uncoated (control) strawberries were stored at 7 °C for 12 days and evaluated for weight loss, color and firmness. For every 100 g of grape pomace, 8.4 g of CNCs were obtained and the amorphous non-cellulosic materials were removed from the grape pomace and presented values for Crystallinity index (CrI) 71% in CNCs. Nanocomposites showed smaller permeability and the addition of 5 to 15% CNCs formed more opaque films and had improved tensile strength and Young's modulus, important characteristics in food packaging materials. The coated strawberries presented positive results in relation to weight loss, but the CNC based reinforcement was not able to form a coating on the fruits with better water vapor barrier property. The addition of CNCs did not cause changes in the physical and chemical properties of strawberries. The fruits presented initial firmness of 1.48 N and at the end of the experimental period, 1.22 N. The red coloring of strawberries was not changed by incorporating the applied coatings. Significant decrease in light values (L *) and parameter a*, of strawberries independent of treatment during storage period, but without interaction between time and treatment effect. The fruits presented L * values 39.50 and 36.97 N for the initial and end of the experimental period, respectively. For the parameter a* 35.02 and 32.29 were presented at the initial and 12th day of storage, respectively. The maintenance of color, even with the coating, indicates that they can be used without the fruits losing their original characteristics. This study provided an effective method to obtain CNCs from the agroindustrial waste and open the way to produce high-value starch-based nanocomposites. Besides that, the application of the coating, indicates that they can be applied without affecting the fruit's original characteristics.

Keywords: Packaging, Cellulose nanocrystals, Biopolymers, Edible coatings, Postharvest shelf life.

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