IND-80 THE USE OF POLYSACCHARIDE FROM CASHEW TREE GUM (POLICAJU) AS A COATING FOR "TOMMY ATKINS" MANGOES

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INTRODUCTION

Brazil is the second largest world exporter of mangoes, being the Tommy Atkins variety the one, which represents the largest percentage of the world's trade of this fruit. This is mainly due to its intense colour, high productivity and good resistance during long distance transportation. However, the volume of post-harvest losses is still significant.

Nowadays, the use of edible coatings is an alternative to retard fruits' senescence, as they work as a selective barrier for the transport of gases and solutes (Han 2000), thus reducing the excessive loss of mass due to transpiration. Such coatings have the advantages of being both of low cost and non-toxic, as they can be taken together with the food. The coatings of polysaccharide obtained from the cashew tree gum (POLICAJU) presents rheological properties comparable to those of gum Arabic, thus allowing its use in the food and pharmaceutical industries.

The objective of this work is to verify the applicability of POLICAJU as a material to produce edible coatings for Tommy Atkins mangoes and to evaluate the effect of such coatings during the shelf-life of the fruits.

MATERIALS AND METHODS

Extraction of polysaccharide from cashew tree (Anacardium occidentale L.)

The polysaccharide (POLICAJU) has been obtained according to the methodology described by Menestrina *et al*. (1998).

Preparation of POLICAJU coatings

POLICAJU solutions were prepared in the concentrations of 1.5 and 3.0 %, to which both sorbitol (0.4 % w/w) and Tween 80 (0.05 % w/v) were added.

Determination of the wettability

The applicability of the coatings was evaluated by the wettability of POLICAJU solutions on the surface of mangoes, measured in terms of the spreading coefficient (W_s). This property is calculated based on the balance of the adhesive forces (represented by the adhesion coefficient - W_a) and the cohesive forces (represented by the cohesion coefficient – W_c) of the liquid. These coefficients were determined using a contact angle meter (OCA 20, Dataphysics-Germany) as described by Casariego *et al.* (2007).

Selection and treatment of the fruits

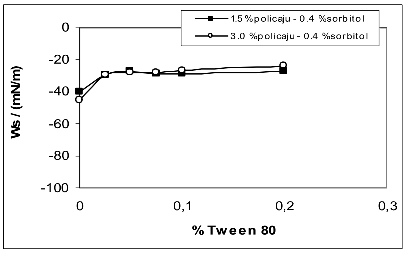
The fruits were obtained from the local market. They have been subsequently selected and standardized (discarding those with injuries or in an inadequate stage of maturation), being divided into two groups (test and control). The mangoes were immersed in a sodium hypochlorite solution of 0.5% (v/v) during three minutes, rinsed twice in water and let dry. After this treatment, the test group fruits were immersed in the POLICAJU solutions during two minutes; the excess solution was drained and the fruits were dried at room temperature. The control group was not subjected to this coating procedure. Both groups (test and control) were then placed, separately, in plastic containers, covered and stored in a cold room (4°C).

Physical-chemical analyses

Both groups (test and control) were evaluated after 1, 8, 15, 29 and 45 days of storage for mass loss and pH. The mangoes were individually weighted and the results were expressed in grams. The mass loss was expressed as a percentage, dividing the difference in weight by the initial weight. pH was determined using a potentiometer.

RESULTS AND DISCUSSION

Fig. 1A indicates that there might not be a significant difference in the values of *Ws* between the solutions containing 1.5 % and 3.0 % of POLICAJU. However, a statistical analysis made between the values of *Ws* for the two POLICAJU concentrations used, shows that there is a statistically significant difference ($p < 0.05$) when concentrations of Tween 80 of 0.0 %, 0.1 % and 0.2 % are used. This means that the use of Tween 80 improves the surface properties of the solutions (Tukey test, $p < 0.05$). The results also show that an increase of the concentration of Tween 80 leads to an increase of *Ws*, being the optimum reached when 0.2 % of Tween 80 are used. There was a small change in the pH (5.39 to 4.69) during the storage of both groups (control and test), therefore indicating that there was no apparent effect of the POLICAJU coatings tested on this property. Mass losses in fruits occur mainly due to the water, which is eliminated by transpiration, as caused by the difference of vapour pressure between the fruit and the atmosphere (Sousa *et al.*, 2000). Figure 1B shows that the fruits coated with POLICAJU (both 1.5 % and 3.0 %) lost significantly less water than those, which were not coated. The water loss was the lowest in the fruits treated with POLICAJU at 1.5 %; for these fruits, a 50 % lower mass loss was registered after 45 days of storage when compared with the control group fruits. Such result is very favourable once most of the polysaccharide coatings are effective barriers to O_2 and CO_2 but are generally poor barriers to water vapour due to their hydrophilic nature (Assis *et al.*, 2003).



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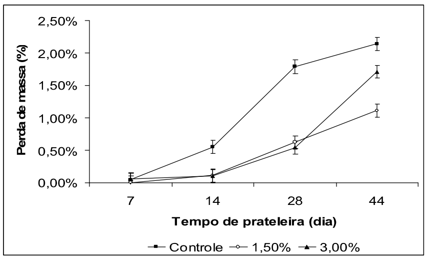

B

Figure 1: A) Change of the spreading coefficient (*Ws*) of POLICAJU coating on the surface of the mangoes. B) Mass loss (in percentage) of the Tommy Atkins mangoes as a function of the storage period at 4° C.

CONCLUSIONS

The POLICAJU coatings presented good values of wettability on the surface of the mangoes, suggesting that it is possible to use them as post-harvest edible coatings. During storage a small reduction of pH occurred both in the test group and in the control group; therefore, POLICAJU coatings do not seem to influence this property. However, the mass loss was lower in the fruits coated with POLICAJU, exhibiting a 50 % reduction of water loss for the coating containing 1.5 % of POLICAJU and a reduction of 20 % for the coating containing 3.0 % of POLICAJU. These results suggest that POLICAJU coatings have a positive effect in the post-harvest behaviour of mangoes.

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