

Instituto de Pesquisas Energéticas e Nucleares - IPEN

E-beam irradiation of “in nature” palm: texture  
and color evaluation

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e Turismo



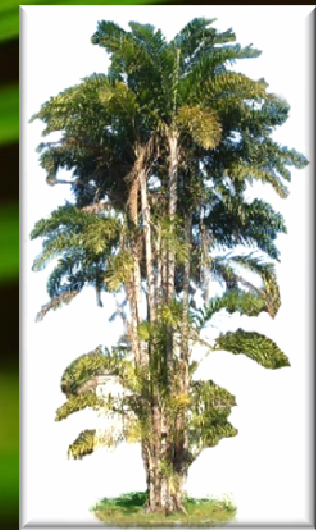
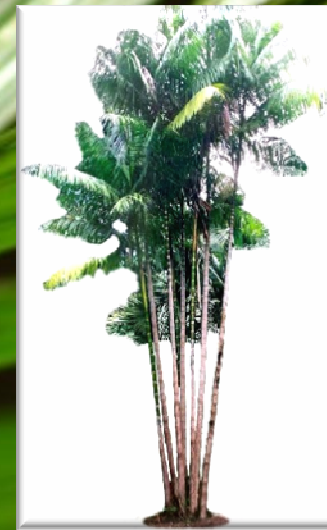
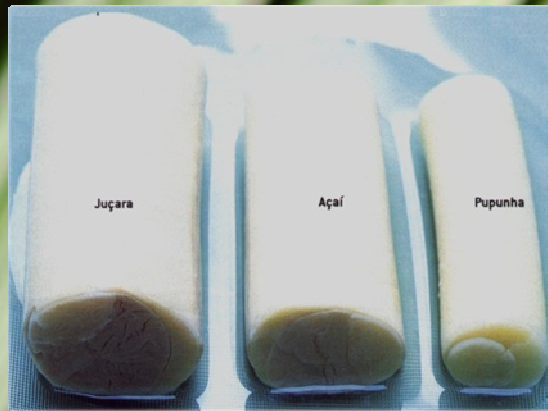
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## INTRODUCTION

The peach palm, a native plant from Latin America, has been used extensively for centuries by natives of this region. The peach palm is developing into an important commercial crop, especially for the gourmet market. Fresh, dried and canned the peach palm are being marketed for preparation of salads, soups, roasted chips and fillings. It is a good source of dietary fiber, and a moderate source of magnesium and iron (Bernhardt, 1999; Hojeije, 2006).



# FOOD IRRADIATION



Food irradiation has shown to be an effective tool to eliminate certain food borne-pathogens from food.

Safety and efficiency of food irradiation has been approved by several authorities (FDA, USDA, WHO, FAO) and scientific societies based on extensive research. The use of radiation to extend the useful life of fresh foods in addition, food irradiation offers more opportunity for tropical countries to export native fruits by retarding the ripening process.





## OBJECTIVE

The objective this study was to evaluate the physical characteristics the peach palm *in natura*, such as color and texture, combining the radiation process by electrons accelerator and refrigeration.

## MATERIAL AND METHODS

**Samples:** Samples of peach palm were provided by the factory “Floresta Indústria e Comércio Ltda.” located in the Ribeira Valley, Juquiá, São Paulo/SP – Brazil. Samples from the basal part (heart) the palm were used, the samples were sanitized and cut into slices with a 4.5 mm high, packed in styrofoam trays and covered with a plastic film PVC.



**Irradiation:** The Irradiation was carried out at room temperature at Instituto de Pesquisas Energéticas e Nucleares (IPEN) located in São Paulo, Brazil. The samples were irradiated at doses 0, 1.0 and 2.0kGy using an electron beam accelerator (Radiation Dinamics Co. model JOB 188, New York, USA). After irradiation, the bags containing peach palm (irradiated and controls) were stored in a cold chamber at 8°C.





**Color Analysis:** The color analysis was evaluated using a bench spectrophotometer (Color Quest II, Hunter Lab, Reston, USA). The calibration module used was the specular excluded reflectance (RSEX), with a D65 light source and a  $10^\circ$  visual angle. The reading system used was CIELAB, represented by the following parameters:  $L$  coordinate (brightness),  $a$  chromaticity coordinate ( $-a$  green,  $+a$  red) and the  $b$  chromaticity coordinate ( $-b$  blue,  $+b$  yellow).

**Texture:** The texture was analyzed using a texturometer (TA-XT2, Stable Micro Systems) operating with Texture Expert software, with mode and operation of compressive force, with a test speed 1 mm/s. A stainless steel needle probe P/2N (2mm thickness) was applied in the center of the food. The parameter evaluated was the maximum force of rupture, obtained through the registry of the curve force x time. Resfriadas Heart of palm samples were analyzed after 1 hour at room temperature ( $25^\circ\text{C}$ ). 15 samples for each treatment were used.



**Statistical Analysis:** Results obtained from color and texture analysis were submitted to ANOVA and to the Turkey Test, to verify significant differences ( $p < 0,05$ ) among the different processing conditions.

## RESULTS AND DISCUSSION

**Color Analysis:** The color analyses are shown in Figures 1, 2 and 3. We could observe in Figure 1 that *L* parameter (brightness) did not show a statistical difference between non-irradiated and irradiated samples. However, 2.0kGy irradiated sample visually showed a darkening compared to others. Results of those samples irradiated with 1.0kGy remained closer to control sample, showing a similar color tone, even after different intervals of storage.

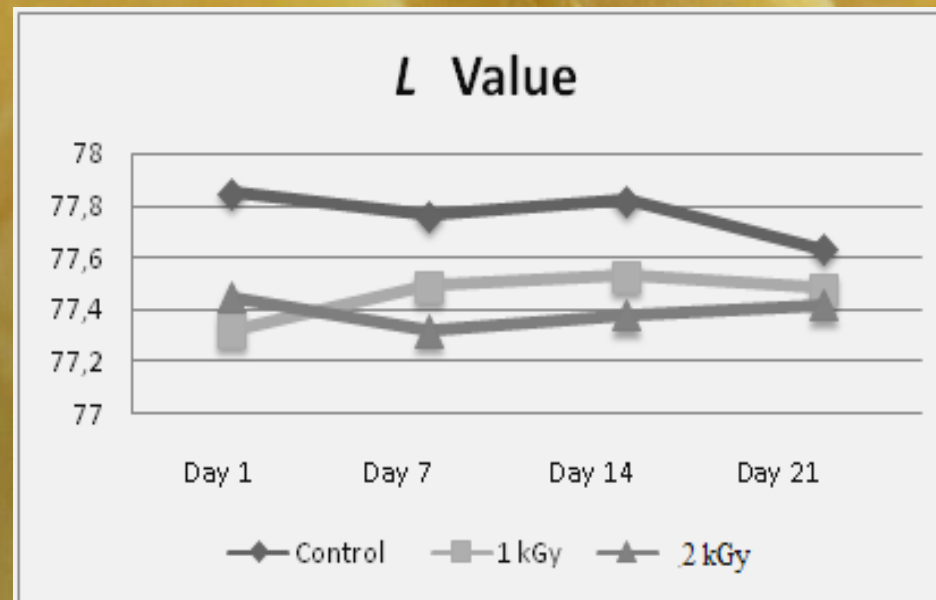


Figure 1. *L* Parameter (Brightness) of *in natura* peach palm samples at different storage periods (mean values).

Analyzing  $a$  parameter, it was possible to observe that peach palm samples irradiated and non-irradiated did not show a statistical difference. However, all samples showing green tone after 14 days of storage (Figure 2).

We could observe in Figure 3 that  $b$  parameter (+ yellow; - blue) show that the irradiated sample 2.0kGy differ significantly, while the sample 1.0kGy remained with the same characteristics of the control samples.

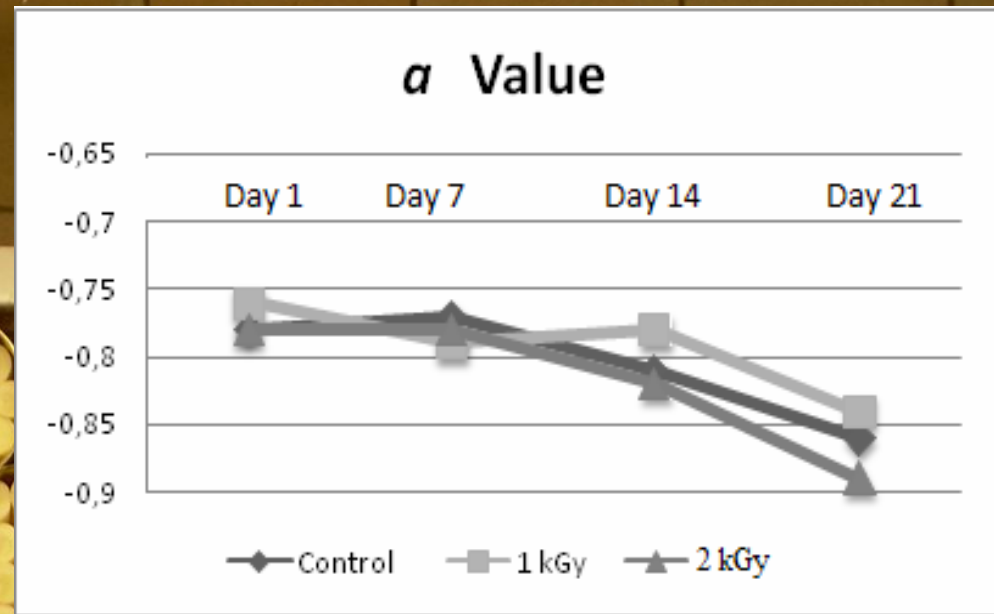


Figure 2.  $a$  Parameter (Brightness) of *in natura* peach palm samples at different storage periods (mean values).

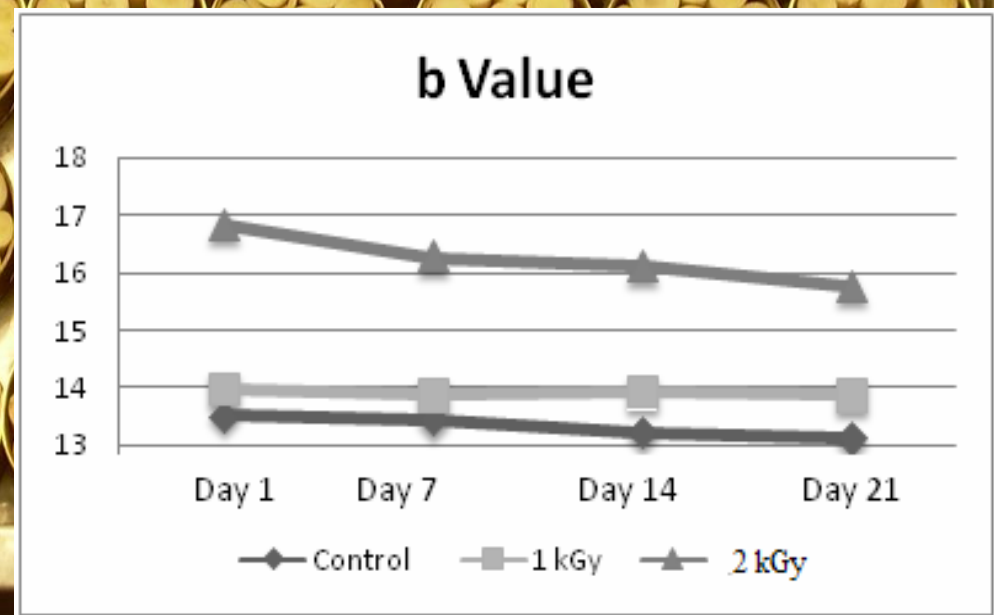


Figure 3.  $b$  Parameter (Brightness) of *in natura* peach palm samples at different storage periods (mean values).



From the texture analysis, we could observe that non-irradiated and 1.0kGy samples did not differ each other, although 2.0kGy demonstrated lower firmness (table 1).

Table 1. Peach palm *in nature* texture analysis at different storage periods.

Doses	Texture / Force (N)			
	Day 1	Day 7	Day 14	Day 21
Control	5,3 <sup>a</sup>	3,2 <sup>a</sup>	2,5 <sup>a</sup>	2,5 <sup>a</sup>
1.0kGy	5,3 <sup>a</sup>	3,1 <sup>a</sup>	2,6 <sup>a</sup>	2,7 <sup>a</sup>
2.0kGy	5,8 <sup>ab</sup>	3,7 <sup>ab</sup>	3,4 <sup>ab</sup>	3,5 <sup>ab</sup>

Different lowercase letters accept at a 5% level of probability between the treatments and the days of storage, by the Turkey test.

**CONCLUSION**

Texture and color analysis showed no significant change between non-irradiated and 1.0kGy samples, regardless of storage time. Slight differences were only observed in those samples irradiated with 2.0kGy.

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