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SENSORIAL EVALUATION OF IRRADIATED MANGOES

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ABSTRACT

Mango *(Mangifera indica L.)* is a tropical fruit of great economical relevance in the world, mainly for tropical countries like Brazil. It consists in the second tropical fruit more important grown in the world. On the other hand it is a very perishable fruit and its delivery to distant points is restricted due to short shelf life at environmental temperature. Food irradiation process is applied to fruits for their preservation, once it promotes disinfestation and even maturation retard, among other mechanisms. The Brazilian legislation permits the food irradiation and does not restrict the doses to be delivered. In order to verify eventual changes, sensorial evaluation is very important to study how irradiation affects the quality of the fruit and its acceptability. Mangoes were irradiated in a Cobalto-60 source, from the Radiation Technology Center, CTR, of IPEN/CNEN-SP at doses 0,5 kGy e 0,75 kGy. The sensorial evaluation was measured through Acceptance Test where irradiated samples were offered together with control sample to the tasters who answered their perception through hedonic scale. The parameters Color, Odor, Flavor and Texture were analyzed. Statistical analysis showed that only Odor parameter was different from control (sample irradiated at 0.5kGy). Few tasters indicated that irradiated mangoes had fewer odors in relation to non-irradiated samples.

1. INTRODUCTION

Mango (*Mangifera indica L.*) is a tropical fruits of great economic relevance and is the second tropical fruit more cultivated in the world. Being a high perishable fruit its delivery to distant centers is restricted due to short shelf life at environmental temperature after harvesting. [1]. The international price of Brazilian mango is very interesting once its production is made in period of low demand. As other countries try to grow their production period, our country needs to take measures to assure high quality and uniformity of fruits that reach the consumer [2].

Ionizing treatment in fruits and vegetables has the main objective to assure the preservation through microorganism reduction, desinfestation and occasional maturation retard [3].

The prediction of shelf-live of food is extremely important nowadays in food science once different parameters could contribute to spoil it and consequently strict control is necessary.

As food is complex chemical systems, the identification of which chemical mechanism is determining its quality is frequently difficult to assess. As a consequence the Quality Identity Standard is normally established as well as the way it is controlled. It could evolve microorganism analysis, desired acidity, pH measurements, texture analysis and among others sensorial evaluation.

Sensorial evaluation is defined as a scientific discipline to measure, analyze and interpret reactions of food and materials characteristics. Its major applications is in food industry and research, as for example in developing a new product, evaluate the effect of raw materials changes or in technological processing in a final product, marketing tests for a new product and others.
Lacroix [4] analyzed mangoes (Nagng Glahng Wahn), treated by gamma radiation (0.49 to 0.77kGy), combined to thermal treatment or not. Results showed that both treatments increased the time of fruit maturation. The irradiated fruits had a small increase in ascorbic acid content in the first day after irradiation. Sensorial evaluation through hedonic scale indicated significantly differences in texture and flavor of the pulp, with certain stiffening immediately after irradiation. With the storage time the fruit became softer, resulting best acceptability. The Irradiation process, combined or not with thermal treatment, increases the maturation time of the fruit, without impacts on its acceptability and sensorial quality.

2. MATERIALS AND METHODS

2.1. Materials

Mango type Tommy Atkins came from Petrolina, northeast region of Brazil. The fruits used in this experiment were harvested in stage 3 as they were mature and close to attributes found in supermarket for being bought.

2.2. Irradiation

Irradiation was performed in a 60Co Multipurpose Source in CTR (Radiation Technology Center, CTR, of IPEN/CNEN/SP) with doses of 0.5kGy and 0.75kGy.

Dosimetry was done using Amber routine dosimeter (Harwell, United Kingdon) and dose rate was established using Fricke reference dosimeter to plot calibration curves. The whole dosimetry system is in IDAS program from International Atomic Energy Agency.

2.3. Sensorial evaluation

The sensorial evaluation was performed in the day immediately after irradiation and the panel was composed by 48 tasters, male and female, and from 18 to 55 years old.

Each participant received a form to be filled with personal information. After the profile verification, the Acceptance Test was applied where the attributes color, odor, flavor and texture was evaluated through a 10 cm hybrid hedonic scale (where 0 corresponding to "dislike very much", 5 representing "neither like / neither dislike" and 10 being "like very much").

After this, each taster observed two portions of mangoes (irradiated and no irradiated) in order to answer the Buying Willing Test. In this test a form, similar to the previous test, was used but with hedonic scale of 5 points (from 1, representing "Certainly not buying", to 5, being "Certainly buying"). Statistical analysis was performed using analysis of variance (two factors: sample and tasters) and the Tukey test at 5% for comparing the averages.

3. RESULTS AND DISCUSSION

3.1. Tasters profile

The profile of 48 tasters is presented in graphs (Figures 1 to 5), including Gender, Age, Education Level, Consumption of Mangoes per Week and Knowledge about Food Irradiation.

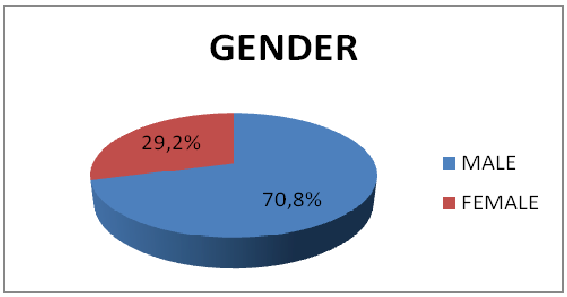

Figure 1. Gender

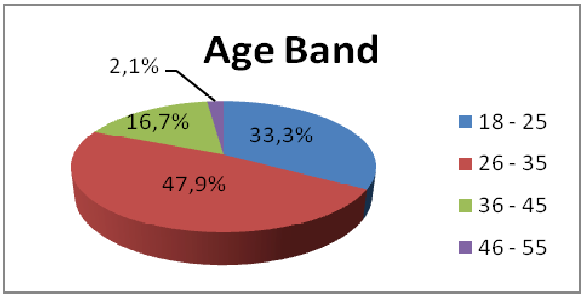

Figure 2. Age Band

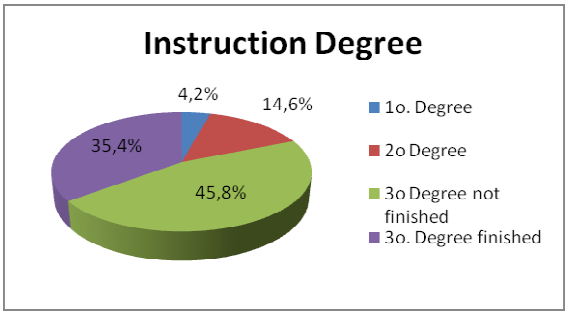

Figure 3. Instruction Degree

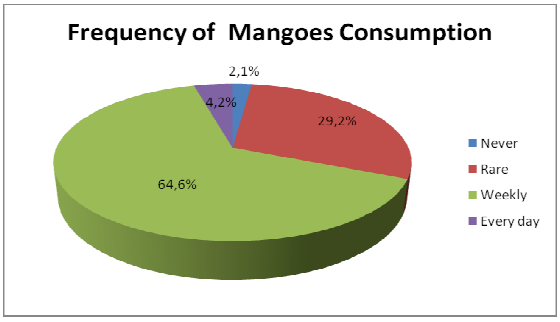

Figure 4. Frequency of Mangoes Consumption

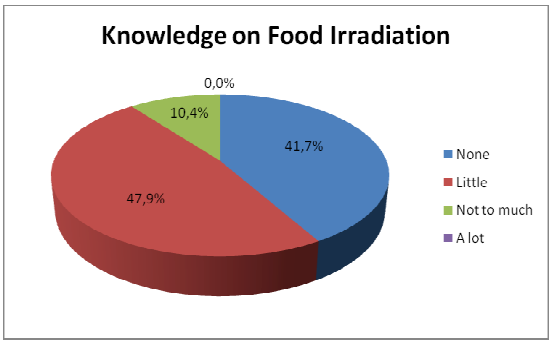

Figure 5. Knowledge of Food Irradiation

3.2. Acceptance test

The analysis of variance indicated statistically difference only for the Odor attribute while for the others attributes, such Color, Flavor and Texture, there were no significant difference. The scores obtained from the panel are presented in Table 1. The Tukey test showed that the difference for Odor was between mango irradiated at 0.5kGy and the control sample. Even for Odor, there was no significant difference for sample irradiated at 0.75kG, demonstrating that irradiated sample, in general point of view, is not so different in their characteristics from control sample.

Table 1. Scores obtained from panellists (averages and standard deviation) of the parameters for the sensorial evaluation of mangoes.

	Color	Smell	Taste	Texture
Control	7.4 ± 1.6	7.5 ± 1.3	7.5 ± 1.5	7.5 ± 1.5
Dose 0.5 kGy	7.1 ± 1.7	6.6 ± 1.8	7.6 ± 1.2	7.5 ± 1.6
Dose 0.75 kGy	6.8 ± 2.0	7.1 ± 1.6	7.2 ± 1.7	7.0 ± 1.6

Averages in each column with different letters are significantly different ($p<0.05$).

3.3. Willing to buy test

The result of the willing to buy test is presented in Table 2. The great number of answers was for “Probably buying” (48%), followed by “Certainly buying” (31%). Together these figures sum to 79% that represents a good intention to buy irradiated mangoes.

Table 2. Results of willing to buy test.

Score	Description	Answer number	Percentage (%)
1	Certainly not buying	1	2
2	Probably not buying	2	4
3	Maybe buying / maybe not buying	7	15
4	Probably buying	23	48
5	Certainly buying	15	31

4. CONCLUSION

By the results from Acceptance test one could verify that Odor was the only parameter with statistical difference comparing sample irradiated at 0.5kGy with control. During the test few tasters perceived that the irradiated mangoes had odor less intense compared to control sample. The Willing to buy test indicated the great part of participants would buy mangoes treated by radiation. From this facts, one can conclude that less intense odor due to irradiation is not so determinant for consumer. On the other hand, buying a irradiated mango is linked to information about irradiation process and from the profile we can see that 90% of the participants "know few" or "never heard about" food irradiation.

The sensorial evaluation showed that ionizing radiation does not interfere in qualitative attributes of the fruits.

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