

## EVALUATION OF SENSORIAL ANALYSIS IN MATÉ (*ILEX PARAGUARIENSIS*) PROCESSED BY GAMMA RADIATION

Camilo Furgeri<sup>1</sup>, Ingrid T. Sabundjian<sup>1</sup>, Priscila V. Silva<sup>1</sup>, Débora C. Salum<sup>1</sup>, Deborah H. M. Bastos<sup>2</sup> and Ann L. C. H. Villavicencio<sup>1</sup>

<sup>1</sup>Instituto de Pesquisas Energéticas e Nucleares (IPEN / CNEN - SP)  
Av. Professor Lineu Prestes 2242  
05508-000 São Paulo, SP  
[camilo.furgeri@gmail.com](mailto:camilo.furgeri@gmail.com)

<sup>2</sup>Faculdade de Saude Pública, FSP/USP, Departamento de Nutrição Experimental  
Av. Dr. Arnaldo, 715  
01246-904 São Paulo, SP  
[dmbastos@usp.br](mailto:dmbastos@usp.br)

### ABSTRACT

Maté (*Ilex paraguariensis*) is a native species from South America which is widely consumed as *chimarrão* (made white hot water) and *tererê* (made white cold water) beverages. One of the basic questions for the food area is the relation between the quality observed by the consumers and the presence of compounds responsible for its flavor and aroma, essential parameters of the food quality. The radiation food processing has been demonstrating great effectiveness in the combat of pathogenic agents while little compromising nutritional value and sensorial properties of foods. This boarding affects directly the food industry, which represent quality and aggregate product value.

### 1. INTRODUCTION

The maté (*Ilex paraguariensis*), native vegetable in South America approximately has 80% of its area of pertaining production to Brazil, distributing itself in the States of the Mato Grosso of the South, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul [1].

Maté is used "in nature" for the typical drink preparation as *chimarrão* (infusion with hot water) and *tererê* (infusion with frozen water). The consumption of maté in the South America approximately reaches 30% of the population that consume in average, one liter of these drinks per day [2,3].

The maté (*Ilex paraguariensis*) is considered in literature as one of the best antioxidant composite sources. It contains substances like phenolic compounds, very active for the human's health. The action of these constituent has been related to the protection of the organism against the free radicals, generated in alive, that they are involved in the installation of some degenerative illnesses, as cancer, atherosclerosis, rheumatic artrite, cardiovascular clutters among others [4,5].

Problems related to the microbiological contamination of among others maté used for the drink preparation as teas, can be solved by the ionizing radiation processing. The radiation food processing has demonstrated great effectiveness in the combat of pathogenic agents, no compromising its nutritional values and organoleptic properties when lower doses were applied [6,7].

The sensorial analysis is a method that the consumer allows to perceive significant differences between processed products in different ways, evaluating and determining the acceptance it product in the market. The aim of this work was to verify the viability to use the ionizing radiation processing analyzing the sensorial characteristics of the maté after using different radiation doses.

## **2. MATERIAL AND METHODS**

### **2.1 Material**

The maté (*Ilex paraguariensis*) used in this work was supplied by Industry Mate Lion Junior S.A - Paraná, Brazil.

### **2.2 Methods**

#### **2.2.1 Samples**

Were used 4kg of maté weighed and conditioned in individual plastic bags contending 1kg each, totalizing 4 samples.

#### **2.2.2 Irradiation**

The samples were irradiated in the doses of 0; 5; 7; 10kGy in a source of  $^{60}\text{Co}$ , in the irradiator multipurpose at CTR (Technological Center of Radiation) IPEN-CNEN/SP. Dose rate was 3kGy/h. Harwell Gamma Chrome YR Bath 64 dosimeters were used for the measurement of radiation dose.

#### **2.2.3 Infusion**

The samples were submitted to the infusion into a fervent mineral water contend 250g/L each one and filtered using paper filters and later stored in thermal bottles of 1L.

#### **2.2.4 Sensorial analysis**

Twenty seven non trained panelists evaluated the global difference between each sample (processed with different doses of irradiation) and the sample controlled (not submitted to the processing for irradiation), the test applied it was "Difference of the Control". The samples irradiated of maté had been presented codified with numbers of three digits and served in dismissible cups of 50 ml with approach temperature of 70°C, together with a sample-control

identified with letter C. Was requested to the panelist the attribution of notes to each sample, according to degree of global difference in relation to the control. The flavor, the color, the aroma, the appearance, viscosity, the texture and other attributes had been defined as parameters of global difference that the consumer considered excellent. The results had been expressed as average of the difference in relation to the control.

### 2.2.5 Statistical Analysis

The data were evaluated through variance analysis (Anova)  $p < 0.05$ .

## 3. RESULTS

The acceptance test evaluated the global attributes of maté irradiated in doses of 5; 7; 10kGy and in maté control (without being processed for irradiation). This test was carried through to verify the sensorial reply of the consumers, in relation to the different products. Some panelist had told in the register used in the sensorial analysis, to feel residual taste in the irradiated samples, as also different degree of bitter taste. However the variance analysis results (table 1) demonstrates that the calculated F.

**Table 1:** Analysis of Variance

Coefficient of Variation	G.L. <sup>a</sup>	S.Q. <sup>b</sup>	Q.M. <sup>c</sup>	F calculate <sup>d</sup>
Samples	2	8.99	4.495	0.84
Panelists	26	91.21	3.51	---
Residue	52	278.68	5.35	---
Total	80	378.88	---	---

<sup>a</sup> G.L: Degree of liberty

<sup>b</sup> S.Q: Sum square

<sup>c</sup> Q.M: Square middle

<sup>d</sup> No significative difference. ANOVA  $p < 0.05$ .

## 4. CONCLUSION

No significant difference between maté irradiated (5, 7 and 10 kGy) and the control in a level of significance of 95% ( $p < 0.05$ ).

## 5. ACKNOWLEDGMENTS

We thank CNPq, CNEN, IPEN-CNEN/SP, CAPES and FAPESP for financial support.

## 6. REFERENCES

1. Esmerindo, M.C.; Toniazzi, G.; Waczuk, A.; Dariva, C.; Oliveira, D. Caracterização físico-química: influência das etapas do processamento industrial. *Ciênc. Tecnol. Aliment.*, vol. 22, 2002.
2. Lima, V. L. A. G.; Melo, E. A. Teor de Compostos Fenólicos Totais em Chás Brasileiros. *Braz. J. Food Technol.*, v.7, n.2, p.187-190, jul./dez., 2004.
3. Borille A. M. W.; Reissmann C. B.; Freitas R. J. S. Relação entre compostos fitoquímicos e o nitrogênio em morfotipos de erva-mate (*Ilex paraguariensis* St.Hil.). B.CEPPA, Curitiba, v. 23, n. 1, p. 183-198, jan./jun. 2005.
4. Filip, R.; Lopez, P.; Giberti, G.; Coussio, J.; Ferraro G. Phenolic compounds South American *Ilex* species. *Fitoterapia*, v.72, p. 774 – 778, 2001.
5. Bastos, D.H.M.; Fornari, A.C.; Queiroz, Y.S.; Torres, E.A.F.S. Bioactive compounds of chimarrão infusions related to the moisture of yerba maté. *Brazilian archives of biology and technology*. v.49, p.399- 404, 2006.
6. Villavicencio, A.L.C.H.; Mancini-Filho, J.; Delinceé, H.; Bogner, A. Effect of irradiation on anti-nutrients (total phenolics, tannins and phytate) in Brazilian beans. *Rad. Phys.Chem.*, v. 57, n. 3 - 6, p. 299, 2000.
7. Aquino, S.; Gonzalez, E.; Reis, T. A.; Sabundjian, I. T.; Trindade, R. A.; Rossi, M. H.; Corrêa, B. and Villavicencio, A. L. C. H. Effect of gamma irradiation on mycoflora of guaraná (Paulinia cupana) Radiation Physics and chemistry. V76 (8-9), 2007.