

Characterization of some jams obtained from exotic fruits

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Abstract

With their rich nutrient content, fruits and vegetables are of a great importance. Fruits have a very varied chemical composition, generally having as basic element water (up to 90%) and also containing: sugars, proteins, fats, organic acids, various mineral salts, pectic substances and tannins, vitamins and enzymes, in varying amounts.

Usually, in the production of jam, one fruit species is used as a raw material, but this study aimed to obtain a food product, rich in vitamins (D, E, K, B12, B6, B2, B1) and minerals, harmoniously blending some of the most beneficial fruits on body health: mango and pineapple.

Three types of jam were obtained, namely: mango jam, pineapple jam and a combination between the first two, a mango and pineapple jam. From the analysis of these jams the following aspects can be highlighted: i) The sensory properties of the jams were evaluated and it was observed that the mango and pineapple jam was the most appreciated in terms of sensory characteristics: color, smell and taste; ii) the jams were analyzed from a physicochemical point of view, determining the acidity, the content of vitamin C and of sugar; iii) The highest value of acidity was determined for the mango and pineapple jam (0.48%), and the lowest value was recorded for mango jam (0.31%).

As regards the vitamin C content, the highest value was found in the mango and pineapple jam assortment (1338,85 mg/L). More sugar content was found in the mango jam (74,6°Brix), and the lowest sugar content was found in the mango and pineapple jam (71,5°Brix).

Key words: jams, sensorial characteristics of jam, mango, pineapple, ginger

1. Introduction

Mango is a bushy, evergreen fruit tree native to East Asia. This tree is part of the *Mangifera* genus, belonging to the *Anacardiaceae* family. The mango fruit is considered sacred in India, Pakistan and the Philippines. The ripe fruit has an orange-reddish color, is very sweet and aromatic, is very rich in vitamins (A, C, E, B6, K), fiber, antioxidants, copper, zinc, pectin, starch, Omega 3 and Omega 6 and has 17 amino acids [3,6,13,14]. The consumption of this fruit has multiple positive effects on the health of the body, namely: protecting the skin and the vision, regulating the level of glucose in the body, strengthening

the immune system and protecting the body from viruses, preventing fatigue and insomnia, normalizing blood pressure, preventing cancer [5,12].

The pineapple (*Ananas comosus*) is a tropical, drought-tolerant plant native to the Americas that grows between 5 and 8 meters tall. The flesh of the fruit has a sweet taste, a rich aroma and its color varies from creamy white to yellow, being rich in citric and malic acid, vitamins A, B, B1, C, beta-carotene, potassium, magnesium and mineral salts [7,9]. The pineapple fruit is recommended to be consumed after meals rich in meat to unlock food conglomerates and remove digestive

pains. Having a strong anti-inflammatory effect due to bromelain, regular consumption of this fruit prevents the formation of blood clots that are responsible for thrombosis, vascular or cerebral accidents, thus reducing the risk of cardiovascular diseases. Also, a regular consumption of this fruit reduces the risk of cancer due to phytonutrients that prevent food amines and nitric oxide from mixing in the stomach, thus preventing the formation of potentially carcinogenic nitrosamines. In addition, it helps prevent asthma, high blood pressure, lowers cholesterol, strengthens the immune system, prevents constipation [2,4,8,15].

Jam is a gelled product obtained by boiling the fruits in a sugar syrup (to which pectin and acidifier have been added), with the aim of concentrating the product, packing it in hermetically sealed containers and pasteurizing it. In order to obtain products with higher nutritional value and pleasant sensory properties, it is customary to mix two or more fruits, obtaining mixed jams, associating the characteristics of all the fruits from the composition [1,11].

The aim of the study was to create an original product – mango and pineapple jam, as natural as possible, with special nutritional qualities due to the active chemical compounds of these fruits. Without preservatives, dyes or other chemical sweeteners, a "jam" food product has been created, consisting of two exotic fruits: mango, which is an important source of potassium and prevents the occurrence of colon cancer, and pineapple, which contains dietary fiber and bromelain, thus reducing the risk of blood clots.

2. Material and methods

To obtain the mango and pineapple jam, the following raw and auxiliary materials were used: mango, pineapple, lemon, ginger, sugar and plain water. These materials were purchased from local markets and supermarkets in Timișoara, Romania.

3 varieties of jam were made, namely: mango jam, pineapple jam and mango and pineapple jam, using the following recipes:

Table 1. Assortments of jams

Raw/auxiliary material	Assortment 1 (mango jam)	Assortment 2 (pineapple jam)	Assortment 3 (mango and pineapple jam)
Mango (g)	2600	-	2600
Pineapple (g)	-	1500	1500
Lemon (g)	92	92	92
Ginger (g)	40	40	50
Sugar (g)	700	700	1000
Water (mL)	700	500	1000

The fruits were washed in clean tap water, and then, with the help of a sponge, the dust/dirt from their surface were removed. The fruits were peeled and cut into medium, uniform pieces. The pieces thus prepared, together with the strips of ginger, were placed in a stainless-steel bowl, after which the syrup made from water, pectin, sugar and lemon juice was added. The obtained mixture was boiled until the desired consistency was reached.

The jams were analyzed for physicochemical and sensory properties. For the sensory evaluation, a number of 15 students from the Faculty of Food Engineering from Timișoara were consulted. The samples were presented in coded plastic containers. The sensory

characteristics (appearance, color, consistency, smell, taste) of the jam samples were evaluated, using the five-point hedonic scale: 5 = extremely pleasant; 4 = moderately pleasant; 3 = indifferent (neither pleasant nor unpleasant), 2 = slightly unpleasant; 1 = extremely disliked.

Also, the jams were analyzed for titratable acidity (TA, in % of malic acid), content of sugar (in °Brix) and content of vitamin C (in mg/L). The determination of the titratable acidity was carried out by titration with a standard solution of NaOH with concentration of 0.1 mol/L, in the presence of 1% phenolphthalein as indicator. The determination of the sugar content was carried out by the refractometric method, and the

determination of vitamin C was carried out using the titration method, based on its reducing properties. The method is based on the titration of ascorbic acid from the samples to be analyzed with the redox indicator 2,6-dichlorophenol-indophenol until a persistent pink color appears, for at least 5 seconds.

3. Results and Discussion

The fruits were washed in clean tap water, and then, with the help of a sponge, the dust/dirt from their surface were removed. The fruits were peeled and cut into medium, uniform pieces. The pieces thus prepared, together with the strips of ginger, were placed in a stainless-steel bowl, after which the syrup made from water, pectin, sugar and lemon juice was added. The obtained mixture was boiled until the desired consistency was reached.

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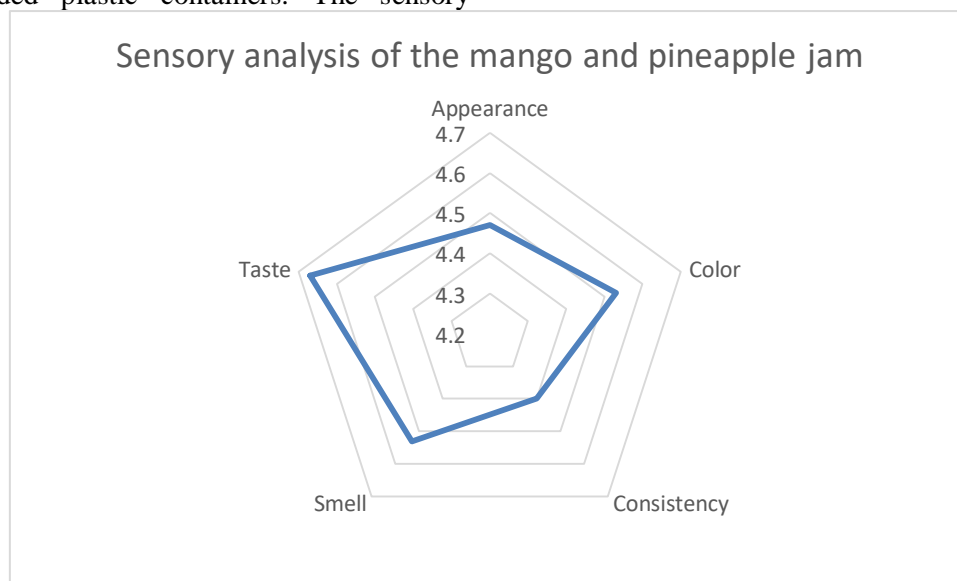


Figure 1. Graphic representation of sensory analysis for the mango and pineapple jam

The results obtained for the mango and pineapple jam, highlights the fact that, in terms of appearance, out of the 15 tasters, 8 gave the maximum score of 5 points, 6 gave the score of 4 points and only one taster gave 3 points, the average score obtained being 4.47 points.

The most appreciated characteristic in the case of mango and pineapple jam was the taste (66.66% of the tasters giving a maximum

score of 5 for this feature).

For color and smell identical average scores were obtained (namely 4.53 points), while the least valued characteristic for mango and pineapple jam was consistency.

The results of the physicochemical analyzes for the jam samples are presented in the following graphs (mango jam – MJ; pineapple jam – PJ and mango and pineapple jam – MPJ).

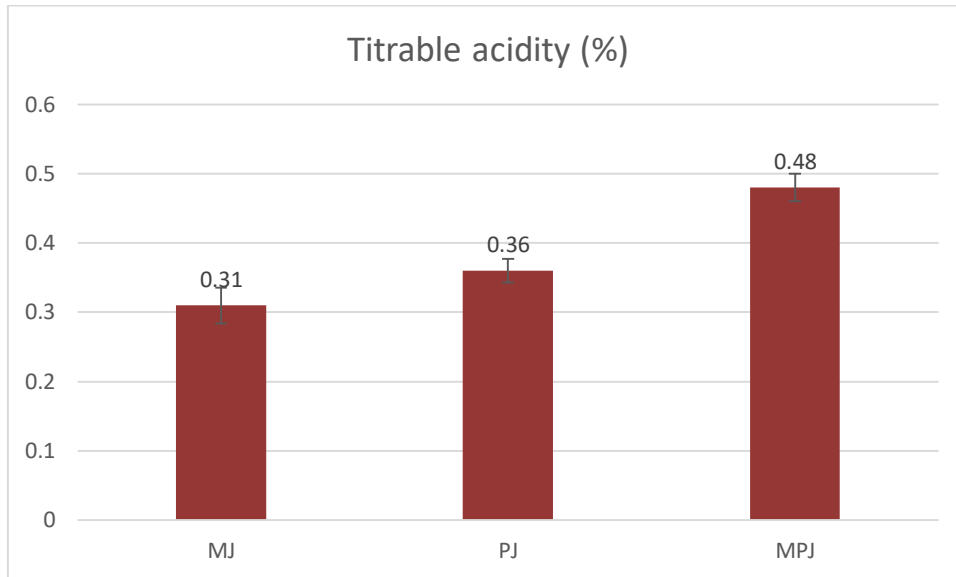


Figure 2. Titrable acidity (% malic acid) of the analyzed jam samples

The total acidity expressed in malic acid, according to STAS 5952-71, is a maximum of 0.5% for products preserved with sugar. The titrable acidity value (% acid malic) for the analyzed jam samples varied between 0.31% and 0.48%, these values being close to the values obtained by other authors, who

highlighted a value range of total acidity between 0.23% and 0.83%, for the different types of jams [3]. Also, the values obtained fall within the limits established by the norms in force.

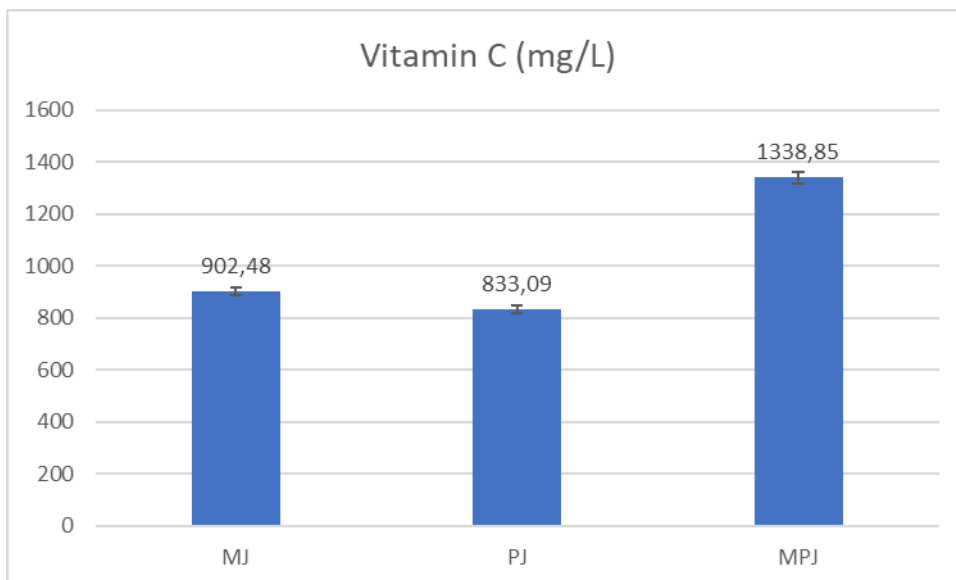


Figure 3. Vitamin C content of the analyzed jam samples

Regarding the vitamin C content of the analyzed samples, it can be emphasized that the values of this parameter are between 833.09

mg/L and 1338.85 mg/L, the highest value being recorded in the case of mango and pineapple jam.

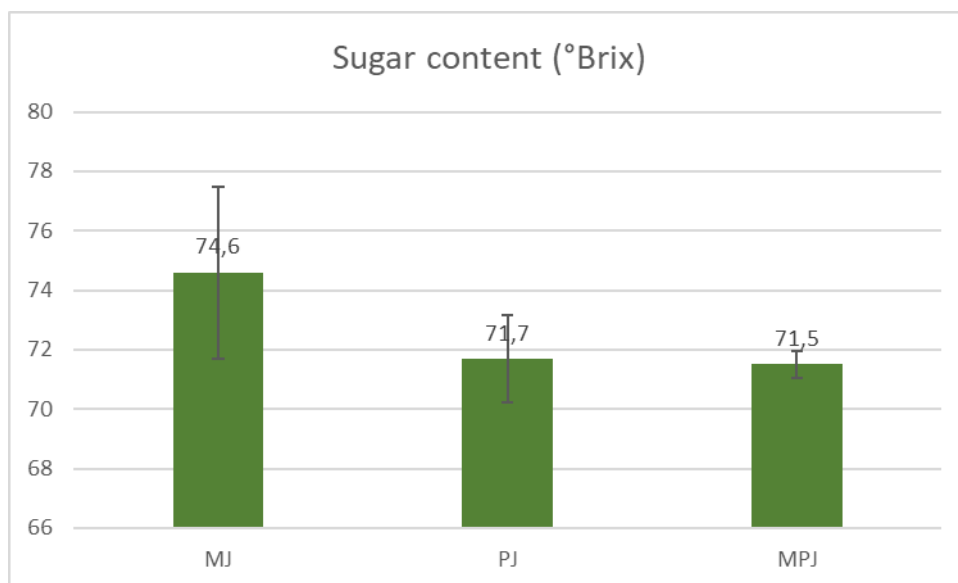


Figure 4. Sugar content of the analyzed jam samples

The amount of sugar introduced in the technological process of obtaining jams is of particular importance, because it influences the increase of the osmotic pressure of the liquid phase of the product and thus contributes to blocking the development of spoilage microflora. The sugar content of the analyzed samples is between the values of 71.5°Brix and 74.6°Brix, falling within the product standard, the minimum allowed value being 70°Brix. The results obtained are in accordance with the results of other studies, which showed a value range between 68.0-74.0°Brix [10].

4. Conclusion

The three types of jam obtained are characterized by special organoleptic properties, due to the raw and auxiliary materials used in their composition.

Following the evaluation of the sensory properties, it was observed that for the mango and pineapple jam, the most appreciated sensory characteristics were: color, smell and taste.

The highest acidity value was determined for the mango and pineapple jam assortment (0.48%), and the lowest value was recorded for the mango jam (0.31%).

Regarding the vitamin C content of the analyzed jam samples, values between 833.09 mg/L and 1338.85 mg/L were determined, certifying that the products obtained have special nutritional properties.

A higher value of sugar content was observed in the mango jam assortment (74.6° Brix) and

the lowest sugar content was found in the mango and pineapple jam assortment (71.5° Brix).

Thus, exotic fruit jams, consumed in moderation and integrated into a balanced diet, can bring extra taste and valuable nutrients, contributing to a varied and healthy diet.

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