QUALITATIVE EVALUATION OF PEACH NECTARS, SOFT DRINKS, WITH HIGH NUTRITIONAL VALUE

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Abstract: *The aim of this study was to make a physicochemical and sensorial evaluation of five types of peach nectar, given for consumption by producers in Dâmboviţa County. Peach nectars are one of the most consumed types of nectar, because peaches are native fruits with special sensorial qualities. Quality Standards of nectars in Romania impose legal limits for: soluble solids, titratable acidity, vitamin C, insoluble substances, foreign bodies and other analyzes were performed according to the methods prescribed by CODEX ALIMENTARIUS. In accordance with Standards and CODEX ALIMENTARIUS, peach nectar pH should be maximum 4 pH units, relative density of about 1,0576, soluble solids content at least 11%, titratable acidity of not less than 0,4%, the content of vitamin C at least 10 mg ascorbic acid/100ml, the content of insoluble substances maximum 0,5g/100cm^3 and foreign bodies are not allowed. Comparative analysis of the results was in relation with Technical Standards for noncarbonated soft drinks industry.*

Keywords: peach nectar, characteristics physicochemical, sensorial analysis**.**

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1. INTRODUCTION

Nectar is juice with pulp obtained by homogenization of fruit creams with sugar syrup and, possibly, with citric acid and / or ascorbic acid [3].

Unfermented but fermentable pulpy product, intended for direct consumption, obtained by blending the total edible part of sound and ripe apricots, peaches or pears, concentrated or unconcentrated, with water and sugars or honey and preserved exclusively by physical means [14].

The product shall have the characteristic color, aroma and flavor of the fruit from which it is made, taking into consideration the addition of honey in substitution of sugars [14].

Peach nectar is considered a natural tonic that enhances digestibility, supports the immune system and improves the elimination of toxins, also fresh nectars speed healing infections and ulcers [16]. The nutritional value of peach nectars is given by the composition of peach fruit, raw material (*Persica vulgaris*), that contain important quantities of simple carbohydrates, easily assimilated by the human body, vitamins, fibers and potassium [21]. Carbohydrates are used as an energy source, have a plastic role, they increase the body's resistance to toxic substances [6]. Proteins have a structural and functional role, participating in biochemical reactions, are source of energy [5,6]. Vitamins are acting in the process of electron transport, enzyme activation and biocatalysis [2]. Fibers stimulate digestion, reduce blood cholesterol levels, and prevent colon cancer and balances blood sugar [15]. Potassium from peaches has an essential role, determinate fruit quality, maintain acid-base balance, in the activation of enzymes, together with sodium helps to regulate water in the body and normalize heart rhythm [21].

Peach nectar is an important source of simple glucides (glucose, fructose, sucrose) amino-acids (α – alanine, asparagines, isoleucine, serine, proline, threonine, valine), carotenoids (α – carotene, β – carotene, lutein,

luteoxantina, auroxantina, persicoxantina) and vitamins (vitamin C, vitamin E, vitamin B_2, B_6), organic acids and flavor substances [2].

Nectars offered to consumers by commercial networks, are beverages made from juice concentrate or puree, from one or more types of fruits, water and sugar added in different proportion, depending on the preferences of local consumers, government standards, pH, or the type of fruit and varieties used.

Technology for obtaining nectar is one which attempts keeping in an amount as high, vitamins and biologically active compounds of fruit, in this case peaches. The most important technological operation who affect the quality of the finished product is **pasteurization**, which attempt to be performed at the **optimum 85 ºC for 20 minutes**.

In this study were evaluated physico-chemical parameters (pH, density, soluble solids, titratable acidity, vitamin C, insoluble substances and foreign bodies) and sensorial analysis of five different samples of peach nectars, acquired form Dâmboviţa County local stores, aseptically packed.

Aseptic package is made from layers of cardboard, aluminum foil and polyethylene. This combination provides safety and comfort to use the product. Tetra Pak packaging systems provide in maximum hygiene and safety [20]. Aseptic technology offer products with long shelf life, which does not require refrigeration during transport and storage [19]. The advantages of this type of packaging are:

- storage and transportation at ambient temperature;
- high period of validity, without adding preservatives;
- keeps the same exceptional quality of the product for a long time;
- product recognition;
-consumer convenience;
-great cost-efficiency;

2. MATERIALS AND METHODS

Laboratory investigations were made at Faculty of Environmental Engineering and Food Science, "VALAHIA" University of Târgovişte, Romania.

Analyzed peach nectars were purchased from local stores, aseptically packed. The minimum content of fruit was 50% in nectars. All products were stored before being analyzed in term of storage corresponding to a temperature of 18-20 ºC.

The legend of samples is presented in the next table:

Table 1 Samples legend

No.	Sample code	Energy value	Storage conditions	Validity
1	BBA	59 kcal/250kj	18-20 ºC	12 months
2	BAB	52 kcal/220kj	18-20 ºC	12 months
3	ABB	54 kcal/229kj	18-20 ºC	12 months
4	BCA	69 kcal/293kj	18-20 ºC	12 months
5	BAC	57 kcal/241kj	18-20 ºC	12 months

Physical and chemical analysis

pH evaluation was determined according to STAS 10063-84.

Relative density was determined according to EN 1131 (1993).

Total soluble solids were determined by taking representative nectar of each sample on hand refractometer, closing the lid and taking reading directly at room temperature according to STAS 5956-71.

Titratable acidity evaluation was determined according to STAS 5952-79.

Vitamin C was determined according to STAS 5950-60.

Insoluble substances and foreign bodies according STAS 1073-84.

Sensorial analysis according STAS 12656-88, ISO 6564:1985, ISO 8587:1988 and ISO 11036: 1994, ISO 8589:1988.

3. RESULTS AND DISCUSSION

The results of the analyzed samples were compared between them and also, with the minimum and maximum values of Technical Standards for noncarbonated soft drinks industry.

3.1.1 Sensorial analysis

Sensorial analysis was developed in accordance with STATE STANDARDS. This is used in the following cases: technical quality control, products obtained by improved technology, approval of new products, contests and disputes.
Peach nectar samples were analyzed using Quantitative Descriptive Analysis (QDA). This method characterizes sensorial properties, providing complete description of this attributes. Using this technique is possible to evaluate qualitative and quantitative aspects of the nectar.
All the samples were coded and served in randomized order, at the 20 ºC temperature. The panelists, 10 at number, rinsed the mouth with bread and water between each sample. They completed a paper using the sensorial characteristics and descriptive terms, showed in table 2.
The panelists scored the samples using a scale of 0 – 10 to show the relative intensity of each attribute: 0 indicated total absence of the sensory attribute and 10 for the most intense attribute.
Spider's web plot (Fig.1) for peach nectars is based for 10 descriptive characteristics: color intensity, homogeneous consistency, odor intensity, astringency, off – odor, sour taste, sweet taste, harmonious taste, after taste, overall sensory impression.

Table 2 Sensorial properties evaluated
(after M. HRUŠKAR et al., 2012)

Sensorial properties	Descriptive term	Description
Color	Intensity	Total intensity of color pigments in the sample
Odor	Intensity	Total strength of all odors in the sample
	Off - odor	Not possible to pick out one particular odour type of fruit
Taste	Sour	Acidulous taste
	Sweet	Taste of sucrose
	Harmonious	Related to pleasing combination of elements in a whole: sourness and sweetness together
	After – taste	Total intensity of a food or beverage that is perceived immediately after that food or beverage is removed from the mouth
	Astringency	Drying-out, roughening and puckery sensation felt in the mouth
Consistency	Homogeneous	Well – arranged or disposed, with no constituent lacking or in exces
Overall sensory impression	-	Assessment based on a combination of all attributes contributing to a sensory quality

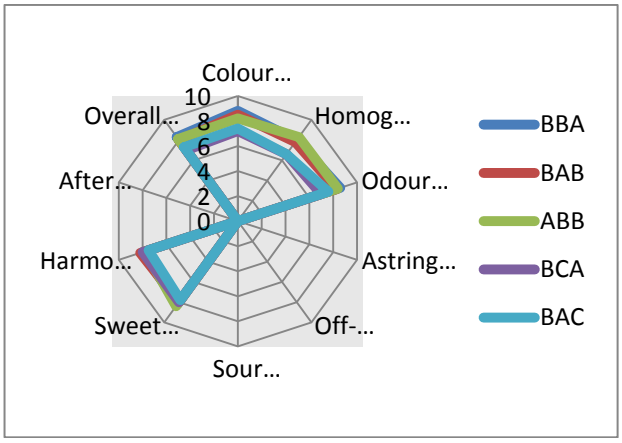

Figure 1 Sensorial analysis

The physico-chemical analysis was made according with methods presented in table 3:

Table 3 Analysis methods

Physico-chemical parameters	Method	Source	Allowed values
pH (pH units)	Potentiometry	STAS 10063- 84	3.3-4
Relative density	Pycnometry	EN 1131 (1993)	~1.0576
Soluble solids (%)	Indirect by refractometry	STAS 5956- 71	Min.11
Titratable acids (% malic acid)	Titrimetry	STAS 5952- 79	Min.0.4
Vitamin C (mg/100ml)	Iodometric	STAS 5950- 60	Min.10
Insoluble solids (g/cm^3)	Oven drying	STAS 1073- 84	Max.0.5
Foreign bodies (g/cm^3)	Oven drying	STAS 1073- 84	Missing

3.1.2 **pH-value**

The variation of the pH in the nectar samples analyzed in the assay is shown in Fig.2.

pH ranged in the nectar samples between 3.51 – 3.72 pH units. All the samples have the pH values according with the limits of admissibility. According to STAS, the maximum allowed for peach nectar is 4.

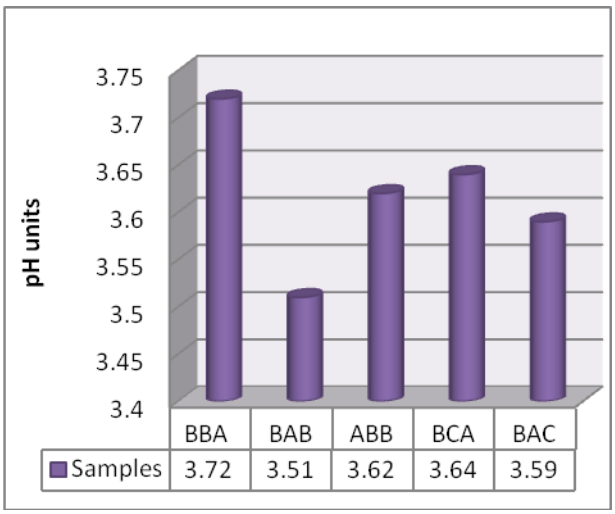

Figure 2 pH evaluation

pH variation is due to the different varieties of peaches, and has a decisive role in establishing the heat treatment applied.

3.1.3 **Relative density evaluation**

In the bellow graphic is presented the variation of the relative density of peach nectars. This may be an important indicator in determining the degree of dilution of peach puree with water.

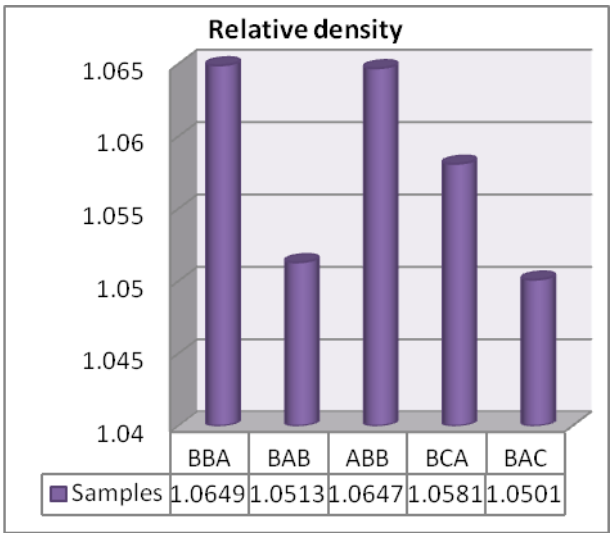

Figure 3 Relative density determination

The relative density of the samples is between 1.0501 and 1.0649. According to CODEX ALIMENTARIUS the limit allowed is 1.0576, three samples has the values above the maximum allowed and two samples corresponds with the current legislation.

The density is a parameter which shows the mass of 1 ml of sample, is used to find out if in production were added higher amounts of water that necessary.

3.1.4 **Soluble dry substances evaluation**

All fruits contain a significant amount of sugars. These are in the form of soluble solids substances, but is required the addition of sugar to the product.

The content of soluble solids substances is shown in Fig.4.

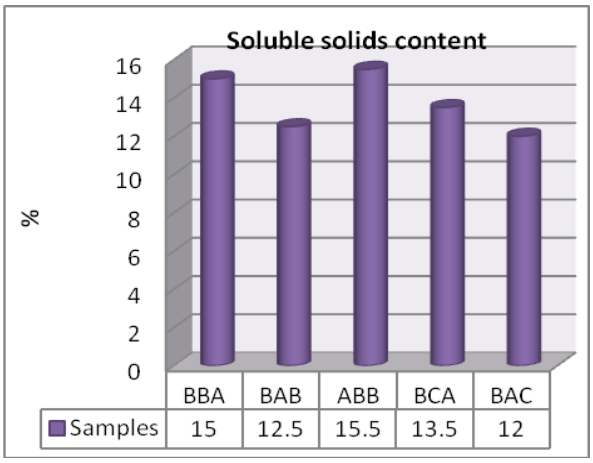

Figure 4 Soluble solids evaluation

The product should be within the permissible values of STAS (according STAS, % soluble solids, min.11%). Soluble solids content of samples analyzed is between 12% and 15.5%. The minimum value is 12% and all the samples are within the limits allowed by the Standard. Two samples had the highest values 15% (sample BBA) and 15.5% (sample ABB), other values are close to the minimum allowable limit.

3.1.5 **Titratable acidity evaluation**

The acidity represents the percentage of acids that characterizes the peaches, raw material of nectar.

Titratable acidity variation in the samples analyzed is presented in Fig.5.

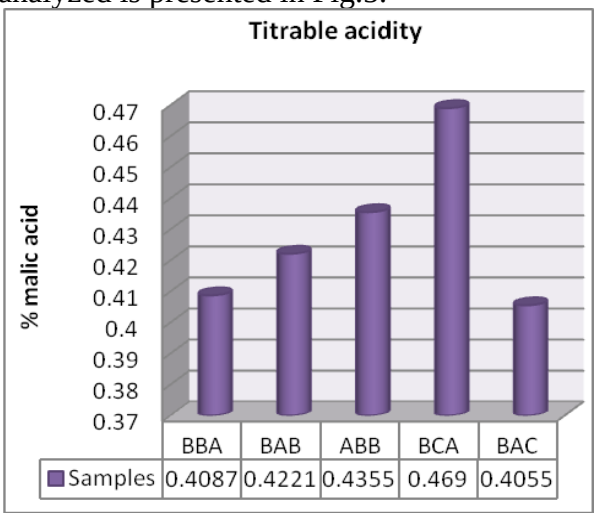

Figure 5 Titratable acidity variation

Titratable acidity ranged between 0.4055% and 0.469 % malic acid. All five samples analyzed had titratable acidity value close to the minimum allowed value of 0,4% malic acid. Two types had similar acidity, close to the minimum value, as follows: BBA sample – 0.04087% malic acid and BAC sample – 0.4055% malic acid, other samples had higher values but close to the limit of Standard.

3.1.6 **Vitamin C determination**

Vitamin C is a very important antioxidant who participates in stopping degenerative processes in the human body. The recommended daily intake of vitamin C is 60 mg.

The variation of vitamin C content in samples is presented in Fig.6.

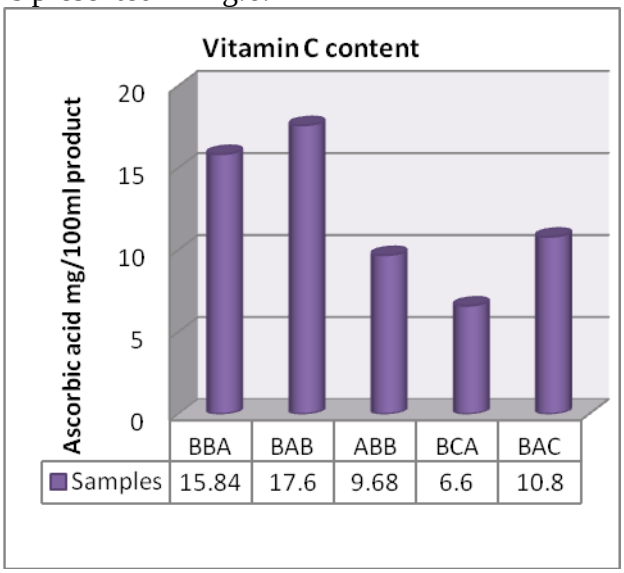

Figure 6 Vitamin C variations in peach nectar

In peach nectars, the quantity of vitamin C allowed is at least 10 mg ascorbic acid/100 ml product analyzed. Two samples had values closed to the limit: 9.68 mg ascorbic acid / 100 ml nectar and 6.6 mg ascorbic acid / 100 ml of nectar. The other three samples had values that exceeded the minimum accepted.

3.1.7 Insoluble substances and foreign bodies

The insoluble substances (cellulose, hemicelluloses, protopectin) pass from fruit raw material to peach nectar.

Fig.7 presents the content of insoluble substances.

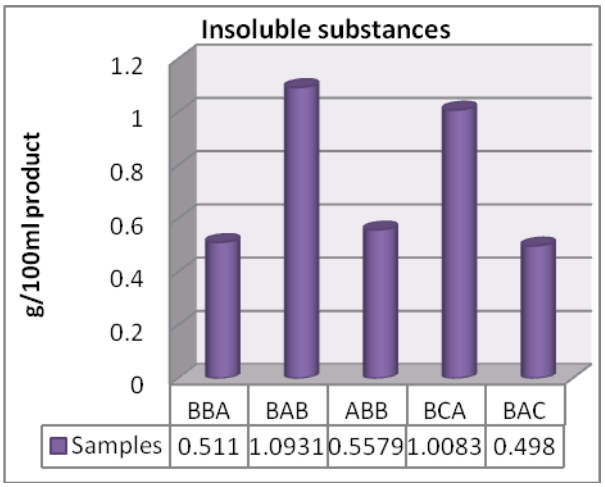

Figure 7 Insoluble substances content

Insoluble content of the peach nectars analyzed is between 0.498 g/100 ml and 1.0931 g/100ml.

Four samples analyzed showed values above maximum limit of 0.5 g/ 100 ml nectar. A single sample (BAC) had the value 0.498 g / 100 ml nectar, comply with Regulation.

Foreign bodies are missing in the samples analyzed.

The nutritional value of juice with pulp is characteristic of fruit, raw material and is given by the content and quality of nutrients (carbohydrates, lipids, proteins), quality of vitamins and minerals as well as other biologically active compounds [14].

Peaches are used to manufacture nectars due to their qualitative and technological characteristics: pulp smoothness, aroma, content rich in sugar [7]. Peach nectar contains relevant amounts of carbohydrates, potassium, sodium, phosphorus, calcium, fibers and vitamin C.

Has been chosen physicochemical analyzes as above, because:

- pH has a decisive role in determining the heat treatment applied to the product, also pH levels cause the selection of microorganisms;
- relative density is an important indicator in determining the degree of dilution with water of peach puree [3];
- soluble substances content, naturally present in peach puree decreases when is diluted with water and is necessary the addition of sugars for the final product to be within limits of Standards (min.11%);
- the acidity cause the taste of the product and as lower it is, the microorganisms grow even harder;
- vitamin C is an antioxidant involved in the normal functioning of the body, balance the immune system, participates in the synthesis of adrenal glands hormones, slows the aging process [17] ;
- insoluble substances originating from raw fruits have positive effects on the digestive process and on satiety, along with their removal from the body is eliminated a significant amount of water and toxic substances [15];

4. CONCLUSIONS

The study has shown that nectars are considered suitable for human consumption, in according to the chemical composition.

pH of analyzed products ranged from 3.3 pH units, no product surpassed the limit.

The relative density was within the maximum limit, with values close to the amount allowed by applicable rules of 1.0578.

Soluble solids and titratable acidity satisfy the conditions of Technical Regulation existing.
The content of vitamin C in analyzed products was properly in three samples while two samples were not in accordance with the Standard values in Romania.
Insoluble content passed limits in four samples evaluated, a single sample corresponded Norms.
Foreign bodies absent of all five products analyzed, all are in limits with Technical Standards in force.

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