UDC: 664.856.036.523
Professional paper

COMPARISON OF SOME QUALITY AND MICROBIOLOGICAL SAFETY PARAMETERS IN PEACH JUICE WITH DIFFERENT FRUIT CONTENTS

Namik DURMISHI[1*], Ismail FERATI[1], Gafur XHABIRI[1], Rejhana LUMA[1], Ljubica KARAKASOVA[2], Viktorija STAMATOVSKA[3], Iliana LAZOVA-BORISOVA[4]

[1]*Faculty of Food Technology and Nutrition, University of Tetova, Tetovo, MK*
[2]*Faculty of agricultural sciences and food, Ss. Cyril and Methodius University,Skopje, MK*
[3]*Faculty of Technology and Technical Sciences, University St. Kliment Ohridski - Bitola, MK*
[4]*Institute of Cryobiology and Food Technologies, Agricultural Academy-Sofia, BG*
[*]*Corresponding author e-mail: namik.durmishi@unite.edu.mk*

Abstract

In the processing industry of fruit and vegetable an important branch is the technology of juice production. Fruit juices are becoming an important part of the modern diet in many communities. It acts as a nutritious drink and can play an essential role in a healthy diet because they provide good taste and a variety of nutrients naturally found in fruits. Juices are available in their natural concentrations or in processed forms, are fat-free, beverages with nutrient rich in vitamins, minerals and natural phytonutrients that contribute to good health.
The demand for quality and safe juices from the raw material, processing and final product is of paramount importance. For the study were taken different fruit percentages (35% and 50%), the packaging of the samples was the same as in Tetra Pak packaging. SAMPLE 1: Peach nectar contains: 50% fruit content produced from concentrated peach juice. Ingredients: concentrated peach puree, water, sugar, acid (citric acid), antioxidant (ascorbic acid). SAMPLE 2: Peach juice with 35% fruit content. Ingredients: water, peach puree, sugar, acid (citric acid), pectin, flavor, vitamin C, sweetener. Methodology of work: after sampling, the same were prepared for testing in the laboratory, and for microbiological analysis, to prevent contamination of the product or load with aerobic microorganisms, from the same samples were performed: sensory analysis by 4 tasters (color, taste, smell and homogeneity), physical and chemical analysis(pH, electrical conductivity, total acidity, °Brix), in the laboratory.

Keywords: sensory analysis, peach juice, pH, °Brix, total acidity, TNM, yeasts and molds.

1. Introduction

Beverages are a very important sector of the food industry based on all types of liquid foods including alcoholic (beers, wines) and non-alcoholic beverages (water, soft drinks or cola, fruit juices and smoothies, tea, coffee, milk drinks), and carbonated drinks. The quality of any beverage production system is related to the effectiveness of its quality management system, namely the quality of the raw ingredients, the appearance of the processing, the quality of the equipment and the satisfaction of the customers. Many beverages are recalled due to many food safety reasons, such as the risk of packaging contamination, microorganism explosions, and deteriorating product quality characteristics, such as unpleasant odors, unpleasant taste and smell, or textural deformations. Modern processing methods aim to optimize all quality factors using a highly efficient, short-term processing followed by pasteurization and aseptic filling. Essential juice processing is the step of reducing microbes in order to ensure product safety (Khandpur&Gogate, 2016). In the production of beverages, water treatment is the main step to ensure the final quality product, because water is the main ingredient (87% –94%) of any beverage and product safety is based on the quality of its main ingredient. Water quality is directly related to the organoleptic and physic-chemical properties of all beverages, as well as their microbiological content is related to the composition of water that will be used to produce any type of beverage.

Elimination of deteriorating water quality ingredients ensures water quality as well as the safety of beverages with significant sensory properties (Ashurst and Hargitt, 2009). Water quality issues may include corrosion factors (lead and copper release mechanisms), metals, chemicals, microbiological issues, pH impact, disinfection effectiveness (Cantor, 2009). Despite the fact that beverages are a rich source of various ingredients along with nutrients for humans, they are also a valuable growth medium for a veracity of decaying microorganisms, namely mold, yeast and bacteria. Microorganisms spread through internal parameters (pH, water activity, nutrient content, antimicrobial constituents or physical barriers and biological structure of food) and external parameters (relative humidity, temperature, storage, transport conditions and surrounding environment) (Nychas et al, 2008; Pothakos et al, 2014). For the control of microorganisms, various strategies have been implemented in which prevention is very important; these strategies include identifying different sources of microbial supply and contamination throughout the food production chain (assessment of indirect pollution through raw material, environment, processing practices, storage and transportation) (Walls, 2005). These should be checked by adopting good manufacturing practices, good hygiene practices and proper risk analysis system (ISO, HACCP) within the food processing area, and an adequate follow-up of standard operating procedures (Lianou and Sofos, 2007).Yeast and mold contribute to the breakdown of sugary foods and beverages, namely soft drinks, syrups, etc. The main peaks associated with beverage spoilage include Lachancea, Candida, Torulaspora, Saccharomyces and Zygosaccharomyces (Arias et al., 2002).

2. Material and methods

For the study were taken different fruit percentages (35% and 50%), the packaging of the samples was the same as in Tetra Pak packaging. SAMPLE 1: Peach nectar contains: 50% fruit content produced from concentrated peach juice. Ingredients: concentrated peach puree, water, sugar, acid (citric acid), antioxidant (ascorbic acid). SAMPLE 2: Peach juice with 35% fruit content. Ingredients: water, peach puree, sugar, acid (citric acid), pectin, flavor, vitamin C, sweetener. Methodology of work: after sampling, the same were prepared for testing in the laboratory, and for microbiological analysis, to prevent contamination of the product or load with aerobic microorganisms, from the same samples were performed: sensory analysis by 4 tasters (color, taste, smell and homogeneity), physical and chemical analysis(pH, electrical conductivity, total acidity, °Brix), in the laboratory.

Fig1. Samples for sensory analysis

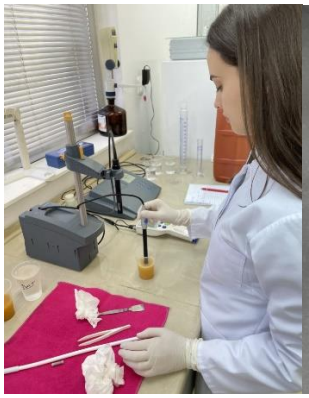
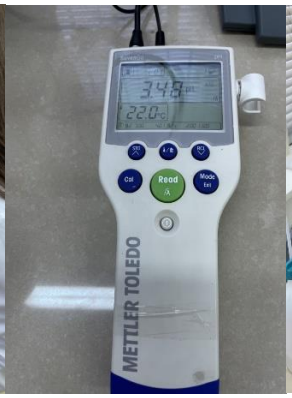



Fig2. Determination of pH

Fig3. Determination of electrical conductivity



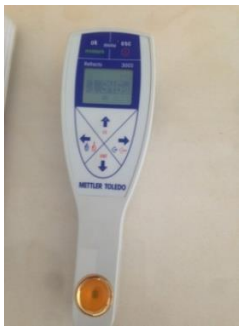


Fig4. Determination of total acidity

Fig5. Determination of the degree °Brix

3. Results and discussion

Determination of the total number of microorganisms 0.1 ml of the sample to be analyzed is poured into the petri dishes with PCA (plate count agar) and the material is spread evenly over the entire surface of the petri dish. The dish is incubated at 30 ° C for 72 hours. After 72 hours the number of colonies is read and the total number of microorganisms is calculated.

Determination of yeasts and molds. The preparation of the nutrient medium is done according to the data of the manufacturer. If dilutions are obtained from each sample dilution of 0.1 ml it is placed by the method of stretching in special Petri dishes with nutrient medium Dichloran rose bengal chloramphenicol agar (yeast glucose chloramphenicol - YGC can be used instead). The incubation of the dishes is done at 22-25 ° C, while the reading of the developed colonies (results) is done on the 3rd and 5th day of incubation.

Work progress

1. Nutrient preparation, weighing and homogenization.
2. Place in autoclave and sterilize nutrient media at 121°C for 15 minutes.

Fig6. Preparation of samples

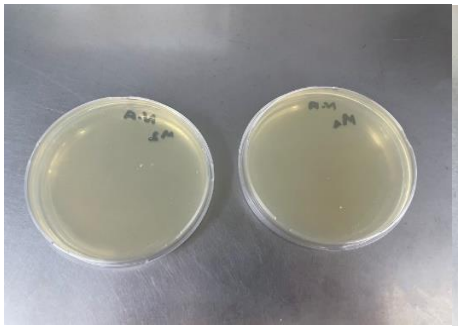
1. Plant the sample in the nutrient medium. Pour 15-20 ml of nutrient medium into each petri dish, stay until it hardens, then pour 0.1 ml of sample into the petri dishes and spread evenly over the entire surface of the petri dish.

Fig7. Preparation of samples

2. Incubation - After the samples have been planted and the agar has solidified, they are incubated at 30 °C for 72 hours.

Fig8. Preparation of samples

3. Counting the colonies (results);



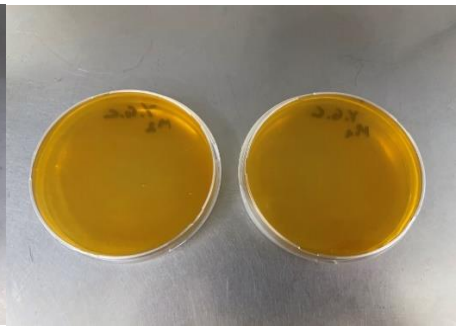


Fig9. Total number of microorganisms **Fig10.** Determination of yeasts and molds

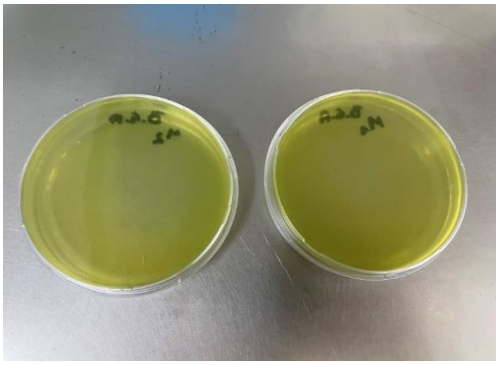


Fig11. Determination coliform bacteria

Table 1. Sensorial parameters Sample 1 (S1)

Parameters	**1**	**2**	**3**	**4**
Color	5	5	5	5
Taste	5	5	5	4
Aroma	5	4	4	5
Homogeneity	5	5	5	4
Total point	20	19	19	18

In Table 1 results obtained for sample 1 resulted the taster 1 rated with a maximum of 20 points, the taster 2 with 19 points, the taster 3 with 19 points and the taster 4 with 18 points where the same gave less points for the taste and homogeneity parameter. Based on the evaluations by the tasters and the points obtained, sample 1 results in high quality.

Table 2. Sensorial parameters Sample 2 (S2)

Parameters	**1**	**2**	**3**	**4**
Color	3	3	4	5
Taste	4	3	5	5
Aroma	4	4	4	4
Homogeneity	4	5	4	4
Total point	15	15	17	18

In the results obtained in Table 2. It was concluded that the results obtained for sample 2 resulted the taster 1 rated with a maximum of 15 points, the taster 2 with 15 points, the taster 3 with 17 points and the taster 4 with 18 points where he gave more points for flavor and color parameter while less points for flavor and homogeneity. Based on the evaluations by the tasters and the points obtained, sample 2 results in lower quality than sample 1 based on the percentage of fruit content.

Table 3. Results of physical and chemical analysis

Parameters	**S1**	**S2**
pH	3.48	3.15
Electrical conductivity	1870 µS/cm	1630 µS/cm
Total acidity	0.32 %	0.34 %
◦**Brix**	12.40	8.0

The results obtained in Table 3 resulted as follows: the pH scale resulted in approximate values as in sample S1 and that of S2 with small differences, the electrical conductivity in sample S1 resulted in a value of 1870 µS/cm while in sample S2 with 1630 µS/cm, the total acidity in sample S1 resulted 0.32 (%) while in sample S2 with higher values of 0.34% while the degree ◦Brix in sample S1 resulted 12.40 while sample S2 value ◦Brix 8. The results obtained were within characteristic and stated limits on the packaging for the analyzed samples, but there were differences because it is affected by the fruit content as percentage (%) in production of the analyzed juice.

Table 4. Results of microbiological analysis

Parameters	**S1**	**S2**
Total number of microorganisms	Not found	Not found
Yeasts and molds (Y.G.C)	Not found	Not found
Coliform bacteria (B.G.A)	Not found	Not found

The results obtained for the microbiological aspect in the table in table 4 in peach juice show that no developed colonies were found. The produced peach juice is considered safely based on the obtained microbiological results.

4. Conclusions

For the analyzed parameters and the obtained results, we can conclude that:

1. The juices analyzed from the sensory aspect (organoleptic) resulted in high quality, based on the tasters the sample S1 with more points of 20 was evaluated by the taster 1, while the sample S2 with 18 points in total was evaluated by the taster 4.
2. The pH value resulted in a higher value of 3.48 in sample S1 while 3.15 resulted in sample S2 i.e., there were characteristic changes for the analyzed juice.

3. Regarding the °Brix scale, changes were noticed in sample S1, the values were 12.40, while in sample S2 with 8.0 characteristic stated on the packaging, as a result of% of fruit in the juice;
4. The total acidity results from 0.32% in sample S1 while in sample S2 the limits were higher up to 0.34%;
5. The electrical conductivity in sample S1 results in a value of 1870 μS/cm while in sample S2 the value was 1630 μS/cm, the values obtained show that the liquid has different fruit contents in %;
6. From the microbiological safety both analyzed samples resulted in the absence of microorganisms, so molds and yeasts were safe

As a final conclusion we say that the analyzed samples were in the declaration, as well as with different fruit percentages, some differences were observed between them, but the differences were within the limits provided by applicable regulations, we can conclude that the samples analyzed meet the requirements for quality and safety and can be consumed as quality and safe juices.

References

[1]. Philip R. Ashurst, "Chemistry and Technology of Soft Drinks and Fruit Juices" Third edition, 2016;
[2]. Durmishi.N, Skript interne. Teknologjia e prodhimit të pijeve joalkoolike dhe freskuese, dispencë ligjerata, 2019, Tetovë;
[3]. Kongoli.R, Boci.I, Teknologjia e përpunimit të frutave dhe perimeve, Industria e Konservimit, 2007, Tiranë;
[4]. Musaj. A, "Kontrolli i cilësisë së ushqimit" 2011/12 Mitrovicë;
[5]. Xhezair. I, "Lënda e parë në industrinë ushqimore, dispencë ligjerata, 1" 2017, Tetovë;
[6]. Bates. R.P, Morris. J.R and Crandall. P.G, Principles and practices of small – and medium – scale fruit juice processing, 2001, University of Florida, USA;
[7]. Md.Anwar Hossain, Matiur Rahman and Md.Zillur Rahman Shabuz, (2012), Quality of Industrially Processed Fruit Juices: An Assessment Using Multivariate Framework, Bangladesh;
[8]. https://www.researchgate.net/publication/335374877_Quality_Control_in_Beverage_Production_An_Overview
[9]. https://www.researchgate.net/publication/257826904_Peaches
[10]. https://www.researchgate.net/publication/286024014_Quality_of_Industrially_Processed_Fruit_Juices_An_Assessment_Using_Multivariate_Framework
[11]. www.fao.org