

ORGANOLEPTIC AND PHYSICO-CHEMICAL ANALYSES ON APPLE FRUITS - COMPARATIVE STUDY

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Key words: apple fruit, organoleptic analyses, SUS, titratable acidity, total sugar

ABSTRACT

Fresh fruits are one of the indispensable components of rational human nutrition. The nutritional value of freshly consumed fruits is due to their chemical components easily accessible to the human body, plus a series of tasteful, olfactory and visual excitements that make them enjoyable at any time of the day or season.

The quality of an agricultural product is the result of a set of characteristics that can be observed, determined, measured, tried, compared to a norm. This gives the product the degree to which the determined properties correspond to the needs of the customer, that meaning the extent to which the products satisfy a particular need.

Considering the consequences that emphasize the importance of apple fruit consumption, in this paper we have made a comparative study between different apple varieties, namely in terms of organoleptic characteristics and physico-chemical properties of the fruits, two important aspects particular in determining the variability of the fruits' quality and their marketing.

Following the organoleptic analysis, the romanian apples (both the Jonathan and the Golden varieties) are distinguished, with an intense flavor specific to their variety.

According to the conducted physico-chemical analysis, we can state the fact that the romanian apples (both the Jonathan and the Golden varieties) show the highest values for the soluble dry substance and also for the total sugar content (expressed as % invert sugar).

INTRODUCTION

The cultivated apple (*Malus domestica* Borkh) is part of the Rosaceae family, the Pomoideae subfamily, and is a tree species of particular importance because it provides, along with banana and orange, the most fruit production on the globe. The importance of apple results from the food value of the fruit, its high epoxy potential, its high ecological plasticity, and the availability of a wide variety of crop technologies and, at the same time, very different. (Popescu and colabs., 1992, Ghena and Braniste, 2004).

Fresh apples contain water (77.8-88.5%), sugars (7.6-16.4%), acids (0.16-1.27%), tanoids (0.06-0.31%), pectin substances (0.23-1.14%), proteins (0.18-0.72%), mineral salts, cellulose, hemicellulose, lignin, enzymes, provitamin A, vitamin C, vitamins of group B , B2, B6, pantothenic acid, vitamin PP, biotin and other substances.

The processing of apples through biotechnologies is of high importance. By means of biotechnologies, the solid residues resulting from the processing of apples for juices can be transformed, into a substrate enriched in fibers with increased digestibility to be used as feed for animals. By using enzymatic preparations, the traditional processing technologies become biotechnology, becoming more efficient and less polluting (Bonciu Elena, Sărac I., 2016).

Although the cultivated area and also the production are on an upward trend, Romania is increasingly dependent on imported apples. According to some statistical data, about 80% of all apples consumed in Romania are imported, most of them from the European Union, though we are the seventh producer in Europe.

For apples, the variety is one of the basic links of the production and exploitation technology, being a mobile element with continuous improvement possibilities (Cociu V., 1990).

Nutrition is the primary factor in the evolution of human health, and from this point of view, apples are excellent. But, methods of processing are not always the most appropriate, especially if we talk about fruit juices. Notoriety, the publicity campaigns and sensory qualities attractiveness of the packaging are the main reasons why most people buy certain products. But, notoriety does not say anything about the quality of food or a fruit juice (Bonciu Elena, 2016).

In Europe, the countries with the largest apple production are Poland and Germany, Romania being the seventh largest producer of apples.

MATERIALS AND METHODS

The main quality characteristics of fruits and vegetables determine their qualitative value. Things such as standards, internal norms, workbooks are provided in normative acts. They are continually improving as a result of the improvement of production technologies, the introduction of new varieties and hybrids, the diversification of the exploitation.

The quality of an agricultural product is the result of a set of characteristics that can be observed, determined, measured, tried, compared to a standard. This approach gives the product the degree to which the determined properties correspond to the needs of the beneficiary, meaning the extent to which the products meet a particular need.

The quality of apples' maintenance under storage conditions must take into account the requirements of these fruits concerning conditions, namely temperature, air composition and humidity in controlled atmosphere storage. Apples are being kept at 0 - 1 °C resistant varieties - Delicious red and Delicious gold and at 3-4 °C varieties sensitive to cold - Jonathan; humidity at 90-95% and controlled air composition: 3-5% carbon dioxide, 3% oxygen and 92-94% nitrogen for resistant varieties and 3% carbon dioxide, 3% oxygen and 94% nitrogen for the others.

The valorification of fresh apples makes the organoleptic and physico-chemical analysis compulsory for both quality classes and consumer needs.

Different methods of analysis of food quality are highlighted, classified into two main groups: organoleptic and laboratory.

Organoleptic (psycho-sensory) methods are based on the appreciation of the quality of human sensory organs, which develops visual, olfactory, tactile, and tasteful sensations. Thus, characteristics such as: size, shape, color, consistency, health, smell, freshness, taste, succulence, pulp characteristics, variety authenticity, etc. are perceived.

These methods provide the first product information, but they may be subjective, as they depend on the accuracy of the senses, the operators' experience and the conditions of the course. It presents the advantage of speed and economy and is the most important decision for consumers when purchasing.

Experimental (laboratory) methods involve the determination with the help of devices, instruments, means of measuring the physical, mechanical, chemical, optical, thermal characteristics. They have a high degree of objectivity and precision because they are based on experiments carried out under optimum environmental conditions, well determined, using equipment and on the basis of normotechnical procedures provided in standard.

These two methods of analysis have also been the subject of this research. Specifically, from the organoleptic point of view, the appearance, color, taste and aroma of apple fruits were analyzed, and in terms of physicochemical analysis the soluble dry substance, titratable acidity, total sugar and ash were determined.

The material studied consists of 5 apple samples from two varieties of winter apple (Jonathan and Golden), which come from different countries (Poland, Romania, Hungary and Turkey) and have good and very good capacity storage, purchased from the supermarket. We chose these varieties because they come from the most demanding category of the market, both of which originate in the US, have approximately the same shape, size, taste and require the same storage conditions, and the shelf-life is 6 to 7 months.

As for the same varieties, but from different countries, we did a comparative study of the organoleptic characteristics and physico-chemical properties of the analyzed fruits. The organoleptic analysis was done according to SR 274: 2003 - Fresh Fruits and Vegetables - Apples.

Of the characters considered as quality elements for apples, the content in dry substance (SU%), sugar (%), total acidity (%) as well as the sugar / acidity ratio (Z/A%) of fruits, are considered for a long time, data of essential quality for this species.

From a physico-chemical point of view, we have analyzed:

- Soluble dry substance (SUS) by the refractometric method, with the help of the universal refractometer, and as a result the arithmetic average of three determinations was made. Corresponding to the value of the refractive index, determined at 20 ° C, the content of soluble substances, expressed as refractometric, was determined.

- The titratable acidity expressed as g of malic acid / 100 g of the product was made by neutralizing the acidity of the aqueous extract with a known 0.1 N NaOH solution in the presence of phenolphthalein. The obtained result is expressed as a percentage (%) by multiplying g / kg by 0.067, equivalent to malic acid.

- Total sugar determination was made by iodometric method (Schoorl variant) and expressed as% invert sugar.

- determination of ash content is a very important quality characteristic for many foods, but especially for those of plant origin. The ash expresses the percentage content of mineral substances and mineral impurities in a product. The determination of ash was performed by calcination of the sample through the slow method at 550-650 ° C. The result was expressed as a percentage.

RESEARCH RESULTS

The organoleptic analyzes (appearance, color, taste and aroma) and physico-chemical analyzes (soluble dry substance - SUS, titratable acidity, total sugar, total ash) were made on the five fresh apple samples.

The results of the organoleptic analysis for the apple varieties studied are presented in Table 1. Following the organoleptic analysis of the analyzed apple varieties, it was found that they fall within articles SR 2714: 2003 - Fresh Fruits and Vegetables - Apples. After the organoleptic analysis, Romanian apples (both Jonathan variety and Golden variety) are distinguished, with an intense flavor specific to the variety.

Organoleptic analysis of apples

Table 1

No.	Apple variety	Organoleptic properties		
		Aspect	Color	Taste and aroma
1.	Jonathan (Poland)	Healthy, clean fruits, free of visible foreign matter, no pests and no damage caused by pests; Tronconic fruits, with smooth, glossy epicarp; Smooth, crispy and succulent pulp	Strong red epicarp with yellow spots; White-yellowish pulp.	Sweet-sour taste, specific flavor, tasteless and odorless smell.
2.	Jonathan (Romania)	Healthy, clean fruits, free of visible foreign matter, no pests and no damage caused by pests; Spherical fruits with smooth, glossy epicarp; Straight, crisp and succulent pulp.	Strong red epicarp with yellow spots; White-yellowish pulp	Sweet-sour taste, intense flavor, specific, tasteless and foreign smell.
3.	Golden (Hungary)	Healthy, clean fruits, free of visible foreign matter, no pests and no damage caused by pests; Ovoid fruits with smooth, glossy epicarp; Smooth, fine, crispy and juicy pulp	Yellow-green epicarp; Yellowish pulp	Sweet-sour taste, specific flavor, tasteless and foreign smell.
4.	Golden (Romania)	Healthy, clean fruits, free of visible foreign matter, no pests and no damage caused by pests; Ovoid fruits with smooth, glossy epicarp; Smooth, fine, crispy and juicy enough pulp	Yellow epicarp; Yellowish pulp	Sweet taste, intense flavor, specific, tasteless and foreign smell.
5.	Golden (Turkey)	Healthy, clean fruits, free of visible foreign matter, no pests and no damage caused by pests; Almost taper fruits with smooth, glossy epicarp; Smooth, fine, crispy and juicy pulp.	Yellow-green epicarp; Yellowish pulp	Sweet-sour taste, specific flavor, tasteless and foreign smell.

The results of the physico-chemical analysis for the studied apple varieties are presented in Table 2.

The analyzed apples were found to fall within the limits indicated by the literature of specialty for the analyzed physico-chemical parameters: soluble dry matter, titratable acidity, total sugar, total ash (Table 3).

According to the physico-chemical analysis, the Romanian apples (both Jonathan and Golden) are found to have the highest values for the soluble dry substance and the total sugar content (expressed as% invert sugar).

Physico-chemical analysis of apple fruits

Table 2

No.	Apple variety	Physico-chemical parameters			
		SUS (refractometric degrees)	Titrateable acidity (g malic acid / 100 g)	Total sugar (% of invert sugar)	Ash (%)
1.	Jonathan (Poland)	11.3	0.27	10.2	0.12
2.	Jonathan (Romania)	13.8	0.55	11.53	0.19
3.	Golden (Hungary)	13.4	0.26	10.27	0.13
4.	Golden (Romania)	15.2	0.25	12.36	0.15
5.	Golden (Turkey)	14.5	0.29	10.65	0.18

Physico-chemical parameters of fresh apples

Table 3

No.	Physico-chemical parameters	Value
1.	Soluble dry substance (refractometric grades)	9 -16
2.	Total Sugar (%)	6.85 – 16.72
3.	Titration Acid (g malic acid / 100 g)	0.20 – 0.7

CONCLUSIONS

Vegetables and fruits are foods of a vegetable origin of mass consumption, with an important role in nutrition due to their distinctive sensory traits and the precious nutrients that they contain: carbohydrates, enzymes, organic acids, vitamins and mineral salts. A particularity of vegetables and fruits results from the fact that most of them can be used by man directly as fresh food, as well as in different culinary or preserved forms. The importance of eating vegetables and fruits is complemented by their participation in a significant proportion in the concept of dishes and cooked dishes: we can say that there is no menu where vegetables and fruit do not interfere in a proportion, sometimes quite high.

Another direction of the importance of vegetables and fruits refers to therapeutics of their use as adjuvants of medical treatment and preventive medicine.

Following the conducted analysis we can conclude that:

1. The analyzed correspond, from an organoleptic point of view, to the articles SR2714: 2003 - Fresh Fruits and Vegetables - Apples.

2. The determined physical-chemical parameters in the case of the analyzed apples fall within the limits indicated in the literature of specialty

3. Romanian apples are distinguished by their organoleptic properties (intense flavor specific for the variety) and their sugar content.

The conclusions highlighted the necessity of such a study in the context of the existence on the Romanian market of imported fruits, namely of the same varieties as the native ones, most of the times the difference in sales being made by the price.

Due to the tendency to promote a healthy diet, the present study wanted to demonstrate the link between the quality of imported and aboriginal apples and certain physicochemical parameters.

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