AUTHENTIFICATION OF SOME LOCAL RAW MATERIALS WITH HIGH BIOLOGYCAL VALUE

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Abstract. The present study provides information about the composition of each investigated vegetal product. As working materials vegetable there used products with a significant content of biologically active compounds providing antioxidant effect and affordable for population. The products described below by the analysis of their composition and physicochemical properties, where selected and prepared so as to be easily analyzed. The reason of fruits choosing as investigated material was the fact, that they are used in our daily alimentation, and they have energy and antioxidant value, bringing real health benefits. Fruits that are growing on the territory of the Republic of Moldova, contains a lot of biologically active substances, that's why they represent a raw material for production of high nutritional foods [4,5].

Key words: fruits, physicochemical methods, biologically active substances, vitamin C, carotene, polyphenols

Introduction

In recent decades, appeared the necessity to find new sources of biologically active substances, which has led increasing interest in fruits rich in useful natural compounds. Using of natural compounds from vegetal products, have many advantages in contrast to chemical synthesis of biologically active substances; for growth of their sources, should not be created special conditions, and also their quantity is enough for extraction in industrial proportions. Nowadays, this type of resources is processed to obtain a small number of compounds, or aren't used at all. The reason is the inaccessibility or high costs of technologies for the whole processing of raw materials. In that situation, a large amount of valuable substances remains untapped. Thereat, there is a problem to elaborate and to implement new national technologies for processing of plant resources. There is a variety of vegetal sources containing biologically active substances, that could serve as raw material for food production. Whatever fruits and vegetables are not so rich source of energy than animal products, they are important for their intake of vitamins, minerals, dietary fibers, enzymes, aromatic volatile substances, and their contribution to regulation of metabolic processes. A problem of big importance is the great amount of fruits and vegetables used to ensure a satisfactory level of consumption, because it isn't that easy to maintain their quality during the whole year of storage [2].

Materials and methods

The following fruits have been described in terms of chemical composition and antioxidant activity: peach (*Prunuspersica*), apricot (*Prunusarmeniaca*, "Big Red" variety), raspberry (*RubusIdaeus*, "Gugutsa's hat" variety), blueberries (*Vacciniummyrtillus L*, "Duke" variety), strawberries (*Fragariaxananassa*, "Selva" variety), blackberry (*Rubusfruticosus* L., "Arapaho" variety), aronia (*Aroniamelanocarpa*, "Nero" variety), apple (*Malusdomestica*, "Golden" and "Gala" varieties), sea buckthorn (*Hippophaërhamnoides L.*), Goji (*LyciumBarbarum*, "Miracle" variety) were harvested between July and August 2018 from different parts of the

Republic of Moldova at full maturity. Fruits were harvested manually. After harvest, altered fruits and other impurities have been removed. Freshly harvested fruits were stored at 5 ± 2°C. The biologically active substances (%) in fruits were determined [8].

1. ***TitratableAcidity*** was determinateby method which consists in titration with a standard volumetric solution of 0.1N NaOH in the presence of phenolphthalein.

2. ***pH measurement*** was performed using a "Hanna Instruments" pH-meter, previously calibrated with buffer solutions having pH 4.0 and pH 7.0 respectively.

3. ***Dry matter determination*** was carried out using the PAL-1 digital refractometer.

4. ***Vitamin C*** according to GOST 24556-89.

5. ***β-carotene*** according to GOST 8756.22-80.

6. ***Total polyphenols*** was determinate by Folin-Ciocalteu method. The total polyphenols content of the fruit peel and pulp was expressed in gallic acid equivalents, mg GAE / 100 g FW (Sconta, 2012), the results being readable on the DR 5000 spectrophotometer, wavelength 750 nm.

7. ***Antioxidant capacity*** was determinate by the potentiometric method.

8. ***Anthocyanin's content*** was measured by spectrophotometric method at 540 nm, modified at the TPA department, UTM, extracted with a solution of 95% ethyl alcohol and 1.5 N hydrochloric acid 85:15 to discoloration [6, 7].

Results and discussions

Usually, fruit acidity is caused by the presence of several acids as well as their salts. The slightly acidic (sour) taste of fruits, represent an appreciated component of its organoleptic quality. Our knowledge about the acidity of a product, especially the acidity of fruits, allows us to appreciate better its evolution, starting with its harvesting to the time of processing. The amount of acids in the fruit is related in conventionally grams of malic, citric, or tartaric acid per 100 grams of product (Table 1). The obtained data are very different in comparison with those provided from bibliographical sources.

Table1. *Titratable acidity of fruits and berries*

Specie	Acid	g/100g	Bibliographic
Peach	malic	0,937	0,65
Apricot	malic	2,723	1,19
Raspberry	citric	0,810	2,18
Cranberry	citric	0,575	0,67
Strawberry	citric	0,437	1,09
Blackberry	citric	0,191	1,67
Aronia	malic	0,003	0,47
Green Apple	malic	0,002	0,47
Red Apple	malic	0,002	0,47
Sea Buckthorn	tartaric	0,025	4,5
Goji	malic	0,002	0,47

So, it was concluded, that the amount of an acid in a feedstock doesn't provide clear data. In Table 2 we show the experimental pH value of the analyzed fruit species, because namely pH is very important for the resistance of microorganisms during the conservation process. According to Table 2, it can be noticed that the lowest pH value was obtained for Sea Buckthorn (2.77) and the highest (4.96) was founded in Goji.

Table 2. *pH values of fruits and berries*

Specie	Experimental pH	Bibliographical pH
Peach	3,80	3,3-4,0
Apricot	3,89	3,3 - 4,0
Raspberry	3,38	2,9 - 4,0
Cranberry	3,14	2,0 - 3,8
Strawberry	3,82	3,2 - 3,8
Blackberry	4,17	3,2-4,5
Aronia	4,10	3,5-4,5
Green Apple	3,61	2,9
Red Apple	4,02	2,9
Sea Buckthorn	2,77	2,0-3,0
Goji	4,96	4,1-5,2

Vitamins are necessary for the vital activity of organisms. Their absence causes serious functional metabolic disorders. They form numerous redox systems that regulate the cellular redox potential and act as activators of enzymes [1,7]. The animals are unable to synthesize the necessary vitamins, and horticultural products are an important source of vitamins, and in the case of vitamin C, they are the unique source.Descendent order of vitamins quantity in fruits is following: vitamin C (0,5 – 40mg per 100g of raw material, can to achieve values of 150-300mg in Sea Buckthorn and Goji), provitamin A (0,02-0,09mg per 100g;but 1,531mg in raspberry,1,392mg in apricot)–Figure 1.

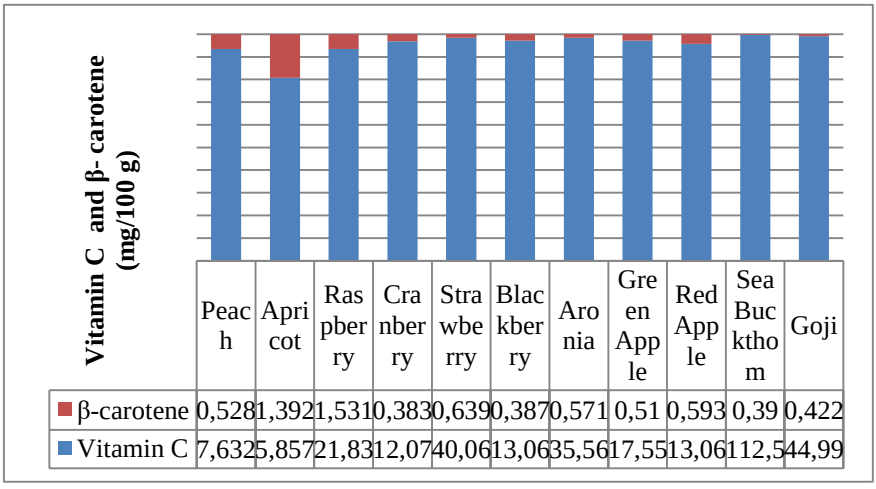


Fig.1. *Vitamin C and β-carotene content in fruits and berries*

Phenolic substances are compounds with the phenolic functional groups in their molecules. In fruits these substances are the determinants of color, taste and flavor. Phenolic substances are represented by derivatives of phenolic acids (benzoic, cinnamic etc.) and complex compounds such as tannins, polyphenols, anthocyanin's and flavones. Phenolic substances are involved in the breathing process, increase the resistance of plants to the attack of microorganisms. While the fruit grows, the amount of phenols in their

composition increases, and then decreases very slowly, usually maintaining a constant value.

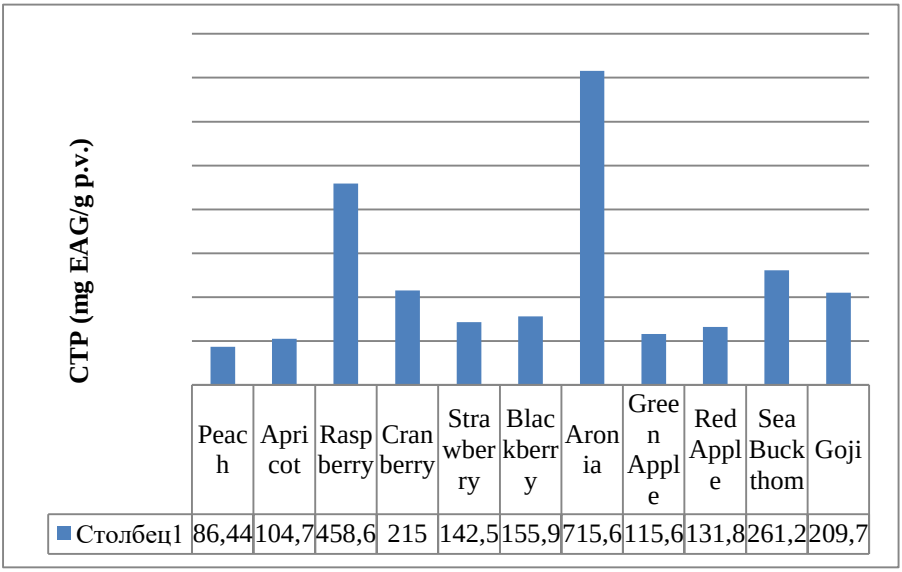


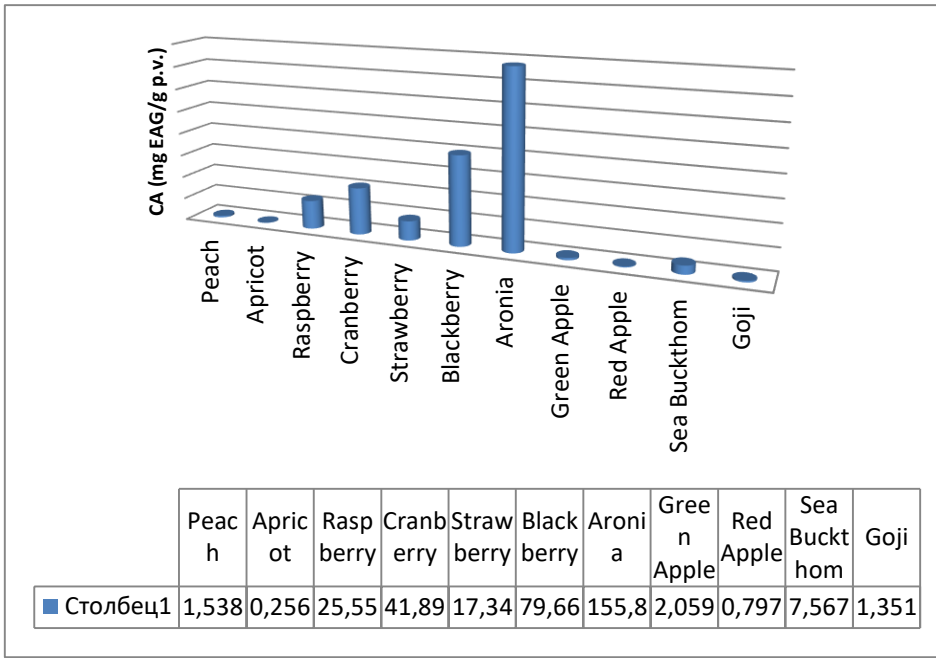
Fig.2. *Total polyphenol content of fruits*

In the Figure 2, can be easily observed that Aronia exhibits the highest amount of total polyphenols, being followed by raspberries, sea buckthorn, blueberries, goji, blackberries, strawberries, apples. Reduced amounts of polyphenols are founded in peaches and apricots.

Anthocyanin dyes are natural red pigments that can be founded in vegetal products. Their compounds with carbohydrates are relatively resistant to moderate temperatures, because carbohydrates protect anthocyanin's against degradation [4].

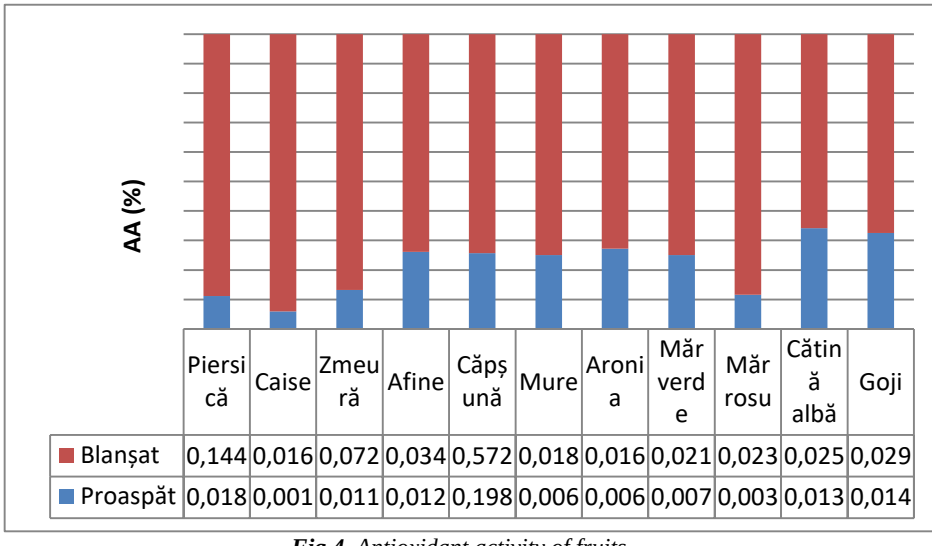
Analyzing data from Figure 3, it can be observed, that high quantity of anthocyanin's is in aronia (156,76mg / 100g fruits), followed by blackberries (79,66mg/ 100g), blueberries (41,89mg / 100g) and raspberry (25,55mg / 100g).

Antioxidants are biologically active substances that prevent the oxidation or inhibition of oxygen-promoted or peroxide-promoted reactions and thus protect cells from oxidative stress [6]. Regardless of their practical use, content and percentage of nutrients, all samples of the fruits studied have antioxidant activity, regardless of the degree of technological maturation or the area where they were harvested.



	Peach	Apricot	Raspberry	Cranberry	Strawberry	Blackberry	Aronia	Green Apple	Red Apple	Sea Buckthom	Goji
Столбец1	1,538	0,256	25,55	41,89	17,34	79,66	155,8	2,059	0,797	7,567	1,351

Fig.3. *Anthocyanin's content in fruits*



	Piersică	Caise	Zmeură	Afine	Căpșună	Mure	Aronia	Măr verde	Măr rosu	Cătină albă	Goji
Blanșat	0,144	0,016	0,072	0,034	0,572	0,018	0,016	0,021	0,023	0,025	0,029
Proaspăt	0,018	0,001	0,011	0,012	0,198	0,006	0,006	0,007	0,003	0,013	0,014

Fig.4. *Antioxidant activity of fruits*

Data presented in Figure 4 suggests that fresh strawberries present the highest antioxidant activity, being followed by peach, raspberry, goji, white sea buckthorn,

blueberries. Lower values have been obtained for apples, aronia, blackberries and apricots.

Conclusion

- Bioactive fruits are important sources of bio-elements that are used in nutrition and medicine.
- Fruits described in the paper represent a pure store of antioxidants, their rich content of phenols, anthocyanin's, vitamin C, β-carotene, being necessary to neutralize free radicals.
- By analyzing the biological value of fruits, can be noticed that the highest content of vitamin C can be founded in the sea buckthorn, the content of β-carotene in raspberries, the content of polyphenols and anthocyanins in aronia, and antioxidants in strawberries.

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