

STUDIUL REFERITOR LA COMPOZIȚIA BIOCHIMICĂ A FRUCTELOR DE ARONIA STUDY ABOUT THE BIOCHEMICAL COMPOSITION OF CHOKEBERRIES FRUITS

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Abstract

The purpose of this scientific work is to present the biochemical content of the fruits on chokeberries (*Aronia melanocarpa* (Michx.) Elliot). It also shows the nutritional value of the Aronia's fruits for the human health and the therapeutic properties that it possesses. The research carried out during the period 2015-2017 regarding the average quantities accumulated by: dry substances, which is 20.6%, the sum of the sugars 4.90%, the accumulated acidity of 2.42%, the tanning substances and colorings of 182.92 mg%, vitamin C - 17.6 mg%, the biochemical content of the fruit of Aronia. It also shows the nutritional value of Aronia fruit for human health and its therapeutic properties and fruit quality expressed by the sugar / acid ratio ranging from 2.02 to 3.45.

Cuvinte cheie: Aronia, antociani, vitamina C, substanțe biologice active, Republica Moldova.

Keywords: chokeberry, anthocyanins, vitamin C, biologically active substances, Republic of Moldova.

1. Introduction

Chokeberry fruits are beneficial because they contain a wide spectrum of biologically active substances with a positive influence on biochemical processes in the human body (Ghendov-Moșanu, 2012). Chokeberry are forest fruits with a general tonic effect that increase vitality due to the richness and high concentration of vitamins and nutrients with beneficial properties for health. Studies show that by its special compounds, chokeberry improves the immune system, balances metabolism and lowers stress hormone levels. Chokeberry fruits are rich in pro-anthocyanins, substances found in grape seeds. In addition, chokeberry has 10 times more quinic acid than cranberry. Chokeberry fruits have valuable nutritional properties and bring many health benefits. Chokeberry is recommended by nutritionists and because of its high vitamin P content (higher than any other fruit). Vitamin P has, among other things, the role of fixing vitamin C in the body and restoring the tonus of the capillary vessels. Chokeberry contains 5 times more vitamin P than grapes. 100 ml of chokeberry juice per day or 15 grams of chokeberry are sufficient to cover daily needs with important vital substances. Chokeberry has proven to be one of the most powerful antioxidants of nature. In simple terms, antioxidants are compounds such as vitamins E and C, found in natural foods and that protect the body's cells from the harmful effects of oxidation. Chokeberry fruits contains 15 times more antioxidants than blueberries. The ORAC (Oxygen Radical Absorbance Capacity) test shows that, the level of antioxidants in chokeberry fruits is 16062 for 100g. It is one of the highest antioxidant values among the 277 foods studied in this regard. (<https://prodieta.ro/aronia>, <http://www.sadyk.ru/kalina-i-ryabina>).

2. Material and methods

The research was conducted at the Institute of Horticulture and Food Technologies during the period of 2015-2017 years, where chokeberry (*Aronia melanocarpa* (Michx.) Elliot) was studied. The chokeberry fruits were harvested from the collection on the territory of the experimental sector of the Small Fruits and Strawberry Laboratory, which is located in the Center Area of the Republic of Moldova. The chokeberry fruits were harvested manually in September, on dry time, at full maturity. The content of nutrients, biologically active according to methods established for research, was determined in the chokeberry fruits.

3. Results and discussions

Chokeberry fruits contain a wide range of biologically active substances, which is why they are a raw material with a high potential for the production of foods with high nutritional value.

In general, among the biologically active substances contained in the chokeberry fruits, the greatest attention of the researchers is directed towards the presence of vitamin C, flavanoids, tanning substances and sugars (Ghendov-Moșanu, 2012).

Therefore, as an indicator for the characterization of the research object was chosen the vitamin C and the sugar content.

The fruit of the chokeberry, grows and matures for 80-90 days, and when intensely colored (Figure 1) in the middle of August and early September, it is harvested in dry time (Balan, Sava et al., 2017). Ripe fruits of chokeberry were used to determine the vitamin C content, dry matter, sugars, the content of tanning substances and dyes, and the data obtained were compared with those from the specialty literature.

In the Table 1, we presents the study results and the content of biologically active nutrients accumulated in chokeberry fruits.

The chemical composition of chokeberry fruits emphasizes their quality. According to the results presented in the Table 1, we can say that the quality of the fruits is appreciated during the years 2015-2017 according to the average quantity of dried substances, which is 20.6%, the sum of the sugars 4.90%, the accumulated acidity was 2.42%, tanning and colouring substances of 182.92 mg%, vitamin C - 17.6 mg%.

According to the analysis of the chemical composition of the appreciated chokeberry fruits of based on the results obtained by Șișchina, 1983 and by Sava et al., 2015 during the period 2013-2014, are presented in Table 1 compared with the period 2015-2017 years which are shown in Table 2.

Based on the analysis of the data presented in the specialty literature and obtained as a result of the researches carried out, we can state that, the fruits of chokeberry growing on the territory of the Republic of Moldova and other places of the world according to all the quality indicators have a different nutritional content according to variety, plantation location, pedoclimatic conditions of region and climatic conditions of year, applied technology, etc.

The vitamin C content of the chokeberry fruits presented by Șișchina in the period up to 1973 varied between 9.0-26.4 mg% and the fruits harvested and subjected to the biochemical analysis during the period 2013-2014 (Sava et al., 2015) varied between 17.3-18.74 mg% while in the period 2015-2017 it exceeded previous results with the limit of 16.72-29.04 mg%.

Regarding the sugar content, the highest values obtained were presented by Șișchina, 1973. Differences in the quantity of biologically active substances are explained by the different amounts of rainfall and soil quality, the particularities of the variety and the climatic conditions of the year.

The dry substances accumulated in the chokeberry fruit during the period 2013-2014 varied between 17.30 and 18.74% and their accumulation during the period 2015-2017 exceeded the values given by 1.2 -1.5 times (20.6-27.83%).

4. Conclusions

It has been established that chokeberry fruits presents a prospective raw material for the production of products enriched with biologically active substances.

Following the assortment of products that can be obtained from the chokeberry fruits, we can say that the fruits of the chokeberry are partially utilized and most of them are dried or used for processing (sweets, compotes, juices).

According to all quality indicators, chokeberry fruits have a different nutrient content depending on the variety, plantation location, pedoclimatic conditions, applied technology, etc.

From the data obtained we can say that the fruits of chokeberry have a rich content of biologically active substances such as: dry substances - 20.6%, sum of sugars - 4.90%, acidity - 2.42%, tanning substances and pigments - 182.92 mg%, vitamin C - 17.6 mg%.

It also shows the nutritional value of chokeberry fruit for human health and its therapeutic properties and fruit quality expressed by the sugar / acid ratio ranging from 2.02 to 3.45.

References

1. Balan, V., Sava, Parascovia, Calalb, Tatiana et al., 2017, Manual. Cultura arbuștilor fructiferi și căpșunului. Chișinău, p.224-256.
2. Ghendov-Moșanu, Aliona, Dmitri Dabija, Olga Boeștean, Andrei Lupașco, Galina Dicusar, 2012, Analiza compoziției chimice a fructelor de *Aronia melanocarpa* (michx.) Elliot. Conf. UAMS, publicații, vol 2. p. 161-164.
3. Шишкина Е.Е. 1973. Химический состав плодов рябины черноплодной и некоторых продуктов ее переработки// Научн. чтения памяти акад. М.А. Лисавенко. М., №4., с.25 -29.

4. Sava, Parascovia, Calaraş Cristina, Tcaci Valentina, Gherasimova Elena, Crivaia Parascovia, Vişelaru Olga. Nutrients accumulation in fruits of berry species. 2015, Fruit Growing Research, Vol. XXXI, Piteşti, România, p.30-33.

5. <https://prodieta.ro/aronia-proprietati-si-beneficii-pret-fructe-suc-gem-aronia-original>
<http://www.sadyk.ru/kalina-i-ryabina>

Tables and figures

Table 1. The nutrient content of chokeberry fruits in Republic of Moldova

| Component/ Year | Dry substances, (%) | Sugar content, (%) | | | Titratable acidity, (%) | Tanning and colouring substances, mg % | Vitamin C, mg % | Sugar/acid ratio |
|------------------------|---------------------|--------------------|------------------|----------|-------------------------|--|--------------------|------------------|
| | | sum | mono | sucrose | | | | |
| 2015 | 27,83 | 8,05 | 8,05 | 0 | 2,52 | 137,18 | 29,04 | 3,19 |
| 2016 | 23,13 | 7,17 | 7,17 | 0 | 2,08 | - | 16,72 | 3,45 |
| 2017 | 20,6 | 4,90 | 4,90 | 0 | 2,42 | 182,9 | 17,6 | 2,02 |
| Average | 23,85 | 6,71 | 6,71 | 0 | 2,34 | 160,04 | 21,12 | 2,87 |
| Variation limit | 20,6-27,83 | 4,90-8,05 | 4,90-8,05 | 0 | 2,08-2,52 | 137,18-160,04 | 16,72-29,04 | 2,02-3,45 |

Table 2. The amount of nutrients in chokeberry fruits in different regions

| Source | Indices, mg/100g, | | |
|---|-------------------|-----------|------------------|
| | Vitamin C, mg% | Sugars, % | Dry substances % |
| Data Şişchina, 1973 | 9,0-26,4 | 6,6-10,8 | - |
| Data Sava et al., 2015; (2013 - 2014 years) | 17,3-18,74 | 6,22-7,69 | 17,30 -18,74 |
| Data of 2015 - 2017 years | 16,72-29,04 | 4,90-8,05 | 20,6-27,83 |



Fig.1. The ripe chokeberry fruits