

## FRUITS OF ARONIA MELANOCARPA (MICHX.) ELLIOT AS OBJECT OF DRYING

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**Abstract:** In this paper is presented the biochemical content of the fruits of Aronia melanocarpa (Michx.) Elliot and the influence of storage duration on the quantity of soluble vitamins (C and P) of product. The processing methods of Aronia melanocarpa (Michx.) Elliot are shown and the influence of different factors on the quality and quantity of the finished product. It is also shown the nutritional value of the fruits of Aronia melanocarpa (Michx.) Elliot for human health and the therapeutic properties which they possess.

**Keywords:** Black chokeberry, anthocyanins, vitamin C, vitamin P, biologically active substances.

### Introduction

In the last decades has raised the question of finding alternative sources of the biologically active substances that generate an increase in interest towards natural fruits rich in useful compounds.

Unlike the chemical synthesis of the biologically active substances, natural, useful compounds contained in plant material have a number of advantages, as for their growth no need the creation of special conditions, these substances are also found in sufficient quantities for their removal under the industrial conditions.

Currently the resources of this type either are processed for a limited circle of products or they are not used at all. The cause of these things is the lack of advanced technologies of complex processing of these materials. This situation leads to the fact that a very large amount of valuable substances remain untapped. In this connection it comes to the creation and implementation of new technologies that allow processing of plant materials resources.

As a matter of this kind can be studied Aronia melanocarpa (Michx.) Elliot, whose fruits are the subject of research in this article.

Introduction into the productive cycle of fruits of this crop is very effective, because they contain in their composition a wide spectrum of the biologically active substances, which have a positive influence on the biochemical processes resulting in the human body.

The fruits of Aronia, thanks to the content of phenolic compounds, are known as medicinal products by valuable therapeutic virtue P-vitamin activity, hypertensive, antioxidant [1] chemopreventive, anti-inflammatory, antiarteriosclerotic, gastroprotective, antimutagenic [2] etc. Today the fruits of Aronia, due to phenols with the antioxidant action are applied on the world market as a dietic product, welcome to the daily diet to strengthen the body and promote healthy lifestyles.

In terms of origin and the range of this crop is a native plant from the North of America that due to the curative taste properties of its fruits was cultivated over large areas of European and Asian countries. In the Republic of Moldova Aronia plantations occupy an area of 157,8 hectares of forest in the detours.

### Materials and methods

As the product has been studied the fruits of *Aronia melanocarpa* (Michx.) Elliot taken from the territory of the Republic of Moldova in the month of September, on the dry time, at the achieving complete maturity of fruits. The fruits are harvested manually. After the harvest are removed spoiled fruits and other impurities. In fruits are determined the content of biologically active substances as a percentage in 100g of the product.

Freshly harvested fruits are kept at the temperature of  $-20 \pm 2$  °C [3]. During storage is determined by the content of vitamin C and vitamin P.

Frozen fruits, stored at the temperature of  $-20 \pm 2$  °C, remove from the freezer and place in the refrigerator in which are stored 24 hours at the temperature of  $-5 \pm 2$  °C.

The moisture of fruits was determined by GOST 28561-90 [4];

The amount of vitamin C has been determined by the iodometric titration method with the pointer in the presence of starch  $KIO_3 = 1$  %. [5]

Summary quantity of substances with activity P-vitamin was determined by spectrophotometric method.

### Results and discussions

Fruits of *Aronia melanocarpa* (Michx.) Elliot are grown in the territory of the Republic of Moldova and contain a wide spectrum of the biologically active substances, in which case they represent a raw material with a high potential for production use of foods with high nutritional value.

Data written in the specialized literature, show a dependency of the biochemical content of fruits quantity depending on the region and the meteorological factors in which they are grown, however the quality of the composition of the biologically active substances does not change. In this connection, the researches content of valuable substances from fruits must be carried out taking into account the growth in each concrete case, which causes need to be searched.

As can be seen, generally among the biologically active substances in fruits of *Aronia melanocarpa* (Michx.) Elliot, the most attention of researchers is directed towards the presence in fruits of the following groups of substances: vitamin C (ascorbic acid); Vitamin P; flavonoids; anthocyanins; tanning substances and sugars. Therefore, as the indicators for the characterisation of the object of research was taken the content of vitamin C and vitamin P.

In table 1. (in percent from 100 g of product) are shown the results of studying the content of the biologically active substances in fruits of *Aronia melanocarpa* (Michx.) Elliot which grows in the territory of the Republic of Moldova.

The fruits are harvested in mid-September on the dry time and are used for various research throughout the year. Immediately after harvesting, in fruits are determined: moisture, vitamin C, vitamin P, flavanoids, anthocyanins, tanning substances, sugars. The data obtained have been compared with those in the specialized literature [6,7]. In table 1 are given different values of the biologically active substances in the composition of fruits of *Aronia* depending on the harvesting region.

**Table 1.** The chemical composition of the *Aronia melanocarpa* fruit (Michx.) Elliot.

Index	Growth area			Data from the literature
	Sud	Centru	Nord	
Vitamin C, mg%/100g	11,3	12,8	15,2	9,0-264
Vitamin P, mg%/100g	2315,1	2410,3	2720,6	1200-4977
Flavanoide, mg%/100g	458,2	478,1	556,4	363-3000
Anthocyan, mg%/100g	680,5	818,3	954,5	600-5976
Sugars, %/100g	9,8	8,3	7,1	6,6-10,8

As shown, the content of vitamin C varies depending on the place of harvest, thus: the minimum data for fruits are recorded in the southern regions, - 11.3 mg% 100g and the maximum data are recorded in the northern regions - 15.2 mg%/100g. However, regardless of the place of harvesting, the content of vitamin C in fruits are within the limits of literature data. You can also notice that any data obtained in a vitamin C content is not less than the minimum limit of literature, - 9 mg%/100g.

A large amount of substances with P-vitamin activity is recorded in fruits from the northern region, where their amount is 2720,6 mg%/100g. The smallest quantity of substances with P-vitamin activity is recorded in the southern areas, - 2315,1 mg%/100g.

So after analyzing the data, we can say that after this index the fruits of aronia are grown in Moldova does not yield fruits that grow on the territories of European countries.

According to the flavanoide content the largest quantity is recorded in the northern regions which is 556,4 mg%/100g. And the smallest in the southern region which is 458,2 mg%/100g.

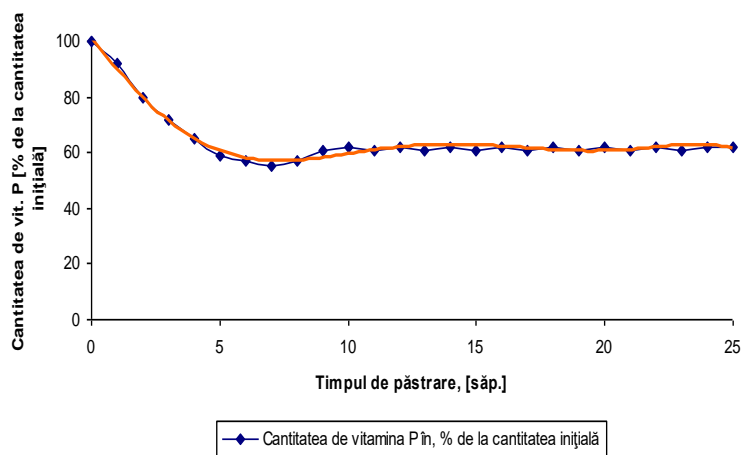
The range of variation of anthocyanin content is from 954,5 up to 680,5 mg%/100g. As for flavanoide, the largest quantity is recorded in the North regions. At the same time the smallest value is recorded in the South regions - 680,5 mg%/100g, however this value is higher than the lowest value stipulated in literature.

As regards the content of sugars is totally reverse its variation. The smallest quantity of sugars is recorded in the northern regions which is 7,1 mg%/100g at the same time the largest quantity is recorded in the southern regions, which is 9,8 which is close to the maximum value of data in the literature.

The range of variation in the content of the biologically active substances in the fruits of Aronia, which grow in various regions of the Republic of Moldova, is explained by different quantity of precipitation for different regions, soil quality.

The organization works with plant material it is necessary to take into account that the period of harvesting Aronia fruits is very short (up to 1 month) and the period of processing is going on throughout the year. So there is a need to form conditions which would ensure over a long period the preservation of biologically active substances in the plant product, its resistance to physiological diseases and braking the degradation processes of macromolecular substances, without lowering the quality of plant material.

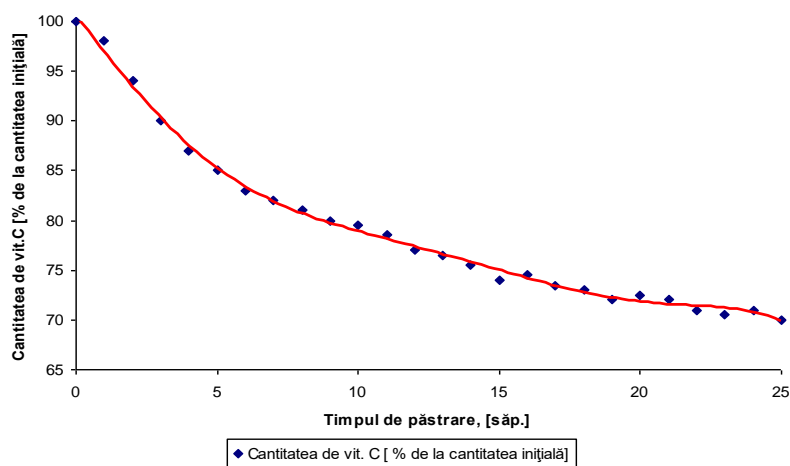
On the vitamin P considerably influences the storage life as in Figure 1 is shown the content changing of the vitamin P during the storage at the temperature of - 20 °C [8].



**Fig. 1.** Dynamic storage of vitamin P in the fruits of *Aronia melanocarpa* (Michx.) Elliot to preserve them at the temperature of  $-20^{\circ}\text{C}$ .

Curve variations of preserving vitamin P consists of three zones. The first zone is to decrease the levels of vitamin P up to 55% compared to the initial quantity of fruits. After this follows the second zone when the quantity of vitamin P grows to 61% as compared to the initial quantity of fruits. In the third zone, the content of vitamin P remains constant.

As to the content of vitamin P, vitamin C an increased influence has a storage life in Fig. 2 is shown the dynamic variation of vitamin C content in the fruits of Aronia in time to preserve them at the temperature of  $-20^{\circ}\text{C}$ .



**Fig. 2.** Dynamics of preserving vitamin C in the fruits of *Aronia melanocarpa* (Michx.) Elliot to preserve them at the temperature of  $-20^{\circ}\text{C}$ .

Of Aronia fruits can be obtained the following products:

- ✓ dried fruits of Aronia at the temperature of - 20 to 80 °C for 2 hours up to several days.
- ✓ Aronia with ugar
- ✓ compotes from Aronia
- ✓ jelly from Aronia
- ✓ marmalade from Aronia
- ✓ wine from Aronia
- ✓ juice from Aronia

### Conclusions

It has been established that the fruits of Aronia which grow in Moldova, present a perspective raw material for the producing of the enriched productions with the biologically active substances.

The data obtained, we can affirm that the fruits grown in the northern regions of the country have a higher content of the biologically active substances such as flavanoids, anthocyanins, vitamin P, vitamin C and those grown in the southern regions are richer in sugars.

It has been shown that it is necessary to process the raw material in a range of 10-32 weeks from the harvest time because of long lasting storage influences negatively on the content of vitamins.

Watching the assortment of products which can be obtained from the fruits of Aronia we can affirm that in our Republic the fruits of Aronia are considered partially, and most of them are dry or used to make jams, compotes.

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