

## STUDY ON THE ACCUMULATION OF NUTRITIOUS SUBSTANCES IN GOOSEBERRY FRUITS

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### *Abstract*

*In the article it were presented the results of our investigations during 2011-2013 about the substances accumulation and fruit quality appreciation of the 10 gooseberry varieties introduced in Republic of Moldova on the new soil and climatic conditions.*

**Key words:** *gooseberry, varieties, substances, fruits*

### INTRODUCTION

Fruits and berries are particularly important in human nutrition as the richest source of biologically active substances. New cultivars must comply not only to commercial quality, taste and technology, but also with the increased content of precious substances including biologically active substances (Jdanova, 2002).

Presence of pectin substances in fruits of gooseberry (1.06 to 2.35%) attributes to them anti radiant qualities. However, the accumulation of pectin substances occurs until the technical maturity, and later on the extent of ripening of fruits, this process start reducing (Strelinikova, 1971).

Assessment criteria maturity apart from external qualities as: size, color, density and taste of fruits should be the content of soluble dry substances. The dry substances reach the maximum amount in a certain amount of time. The sudden rise of the dry substances further may be related to overripe and wilting berries as a result of reducing the amount of water in them (Franciuk; Strelinikova, 1983).

### MATERIAL AND METHODS

Research conducted during the years 2011 - 2013 on the gooseberry cultivars studied in the Republic of Moldova allowed the appreciation for the quality and fruit weight, the amount of accumulated nutrients, according to the

methods established for trees shrubs. Cultivars studied: 'Colobok', 'Sadko', 'Severnoy capitan', 'Smena', 'Slivovy', 'Captivator', 'Resistent de Cluj', 'Zenit', 'Somesh', 'Grushenka'.

### RESULTS AND DISCUSSIONS

Studying the formation of fruit, evaluating the quality and accumulation of organic matter in their growth and maturation process determines the optimal terms of harvest and provides the ability to compare varieties by their qualities and chemical composition of the fruit.

Harvesting of gooseberry during biological maturity, allows increasing the yield and improving the quality of fruit from the account accumulation of substances soluble sugars and acidity decrease. Extension of harvesting period and transportation over long distances requires harvesting the fruit in the close biological maturity period when the accumulation of substances in fruits stabilizes.

Fruit mass increase occurs until reaching the biological maturity and therefore their harvest even in technical adulthood is lost about 30-40% of the harvest, which is 6.0 to 8.0 t/ha at harvest 20t/ha (Franciuk, Strelinikova 1983).

The content of vitamin C in gooseberry fruits is greater in a rainy summer than in one dry and over the years varies from 16.25 to 35.2 mg /%. Biochemical characteristics of gooseberry fruit are of great importance in assessing and comparing cultivars (Sava, 2000). Knowledge of the chemical composition of gooseberries

allow correct assessment of cropping period output destination when substances accumulated reaches a high level. Chemical composition of gooseberry fruit for the studied varieties emphasizes their quality. Biochemical characteristics of gooseberry fruit are of great

importance in assessing the quality of the berries and to the comparison of varieties. The results obtained on the nutrient content of the fruits of gooseberry are shown in Table 1.

Table 1. The amount of accumulated nutrients and weight of gooseberry fruits, years 2011-2013

Nr. Variety name	Fruit weight, g	Dry substances, %	The content of sugars, %	Titrateable acidity, %	Tanning and coloring substances, mg %	Vitamin C, mg %	Coefficient sugar / acid
Colobok	2.57	13.29	10.57	2.42	90.07	30.87	4.67
Sadko	2.67	16.13	10.58	2.58	88.72	36.07	4.50
Severny capitan	1.33	16.22	10.61	3.38	120.56	25.08	3.13
Smena	2.63	14.80	9.39	2.68	69.28	27.13	3.53
Slivovy	1.70	16.49	10.61	3.02	93.54	28.49	4.22
Captivator	2.75	17.49	10.18	3.43	48.50	30.07	3.20
Resistent of Cluj	2.03	21.74	11.02	2.55	43.06	47.01	4.99
Zenit	1.47	19.89	12.52	2.50	27.81	49.79	4.98
Somesh	1.73	22.45	11.57	2.08	33.26	43.18	5.81
Grushenka	1.77	13.55	9.82	4.05	39.49	37.29	3.45
Average	2.07	17.21	10.69	2.87	65.43	35.50	4.25
Limit of variation	1.33-2.75	13.29-22.45	9.39-12.52	2.08-4.05	27.81-120.56	25.08-49.79	3.13-5.81

Fruit weight is an important feature in assessing the quality of the fruit. The larger fruits are and look more attractive, their quality is higher.

According to data obtained and presented in Table 1 average gooseberry fruit weight ranged from 1.33 g of cultivar 'Severny kapitan' and 2.75 g of cultivar 'Captivator'. Large fruits are good for use in fresh and smaller and sour fruits are good for processing, obtaining various products such as sauce, jam, juice, jelly, marinades, dried, frozen, etc. Evolution of gooseberry fruit weight for the varieties studied is shown in Figure 1. Cultivars 'Captivator', 'Sadko', 'Smena', 'Colobok' had the largest fruit and lowest for 'Severny capitan' and 'Zenit'.

High dry substance content, sugars, acidity, vitamin C contributes to improving the gooseberry berries. The amount of accumulated dry substances reached values between 13.29%, of cultivar 'Colobok', and 22.45% of cultivar 'Somesh', the average being 17.21%.

Gooseberry fruits are prized for high sugar content (Zotova; Inozemtsev, 1987), and according to data presented in Table 1 the accumulated amount varied between 9.39% at

'Smena' and 12.52% at 'Zenit', the average being 10.69%.

The amount of titrateable acidity, gooseberry fruit is influenced by climatic conditions. If the annual average temperature is low, the acidity increases (Gherghi, A., Burzo, I., Bibicu, M. et al., 2001). Gooseberry fruit acidity accumulated during the period of investigation ranged between 2.08%, of cultivar 'Somesh' and 4.05%, at 'Grushenka', the average being 2.87%.

A valuable feature of gooseberry is sustainable conservation of vitamin P and ascorbic acid in fruit overripe (Zotova, Inozemtsev, 1987), and according to the obtained data the amount of vitamin C varies from 25.08 to 49.79 mg%, the average being 35.50 mg%.

The content of tanning and coloring substances accumulated in gooseberry fruits for the varieties studied ranged between 27.81 mg%, cultivar 'Zenit', and 120.56 mg% at cultivar 'Severny capitan', the average being 65.43 mg%.

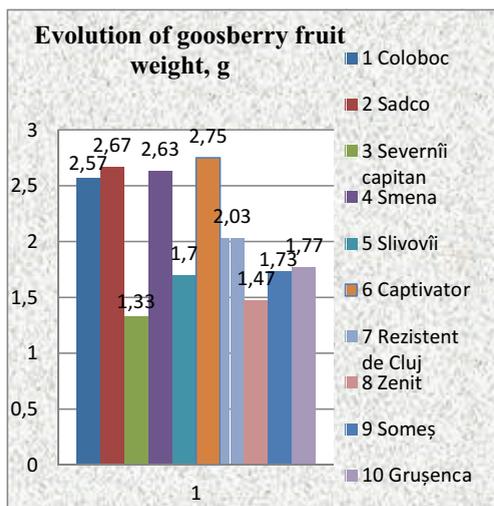


Figure 1. Evolution of gooseberry fruit weight

Fruit quality is determined by the ratio of the accumulated contents of sugars and acid. The higher the ratio of these indices is, the higher is their quality. Evolution of the coefficient sugar/acid certifying the quality of gooseberry fruits for the varieties studied is shown in Figure 2. The highest values of the coefficient sugar / acid of 5.81, 4.99, and 4.98 have been accordingly registered for the cultivars 'Someș', 'Rezistent de Cluj' and 'Zenit' and the lowest value of 3.13 was established for 'Severnii capitan', with an average value of 4.25.

## CONCLUSIONS

Accumulation of nutrients in fruits depends largely on the cultivar and climatic conditions of the year of the formation of the harvest.

As a result of the conducted research on the capabilities that were introduced varieties of gooseberries reveal the amount of nutrients accumulated, based on which certifies the high quality of fruit was determined that:

- The average weight of the fruit reached maximum values of 2.75 g for the 'Captivator' cultivar.
- Highest amount of dry substances accumulated highlighted the 'Someș' cultivar with 22.45%.
- Sugar content was accumulated in maximum amount of 12.52% at 'Zenit' cultivar.

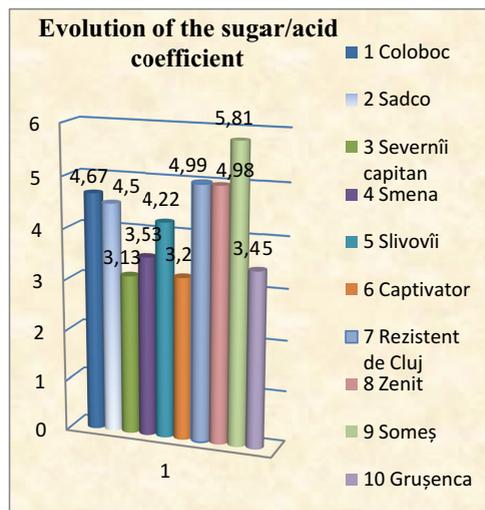


Figure 2. Evolution of the sugar / acid coefficient

- The highest acidity of the fruit of gooseberries in the amount of 4.05% was established for 'Grushenka'.
- The content of tanning and coloring substances accumulated - 120.56 mg% were recorded for 'Severnii capitan'.
- The content of vitamin C in the largest amount of 49.79 mg% was accumulated in fruits of 'Zenit'.
- The value of the coefficient sugar/acid of 5.8 and high taste qualities of the fruit was recorded in cultivar 'Someș'.

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