ACUMULAREA SUBSTANŢELOR NUTRITIVE ÎN FRUCTELE DE MUR ÎN CONDIŢIILE REPUBLICII MOLDOVA

NUTRIENTS ACCUMULATION ON BLACKBERRY FRUITS IN REPUBLIC OF MOLDOVA CONDITIONS

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Abstract

The paper presents the results of studying the varieties of blackberry 'Darrow', 'Thornfree', 'Smoothstem'. According to research conducted in assessing biochemical composition of fruits in the Republic of Moldova, to determine the content of dry matter, sugars, acidity, vitamin C, tannins and coloring substances in blackberry fruit for the years 2010-2011 and 2013. Of the varieties mentioned, on can noted 'Smoothstem' variety with a rich medium dry matter (12.67%) and a high coefficient of sugar / acidity (3.18). The variety 'Darrow' recorded the lowest average results of these indicators (10.67% 2.57%), but higher average values manifested by the content of vitamin C and tannins and coloring substances, reaching respective values of 26.05 mg% and 48.50 mg%.

Cuvinte cheie: soiuri, conditii climatice, fruct, nutrienti
Keywords: variety, climatic conditions, fruit, nutrients

1. Introduction

Due to rich biochemical composition of blackberry fruits, taste and nutritional qualities of outstanding and high productivity, in recent years increased the interest of fruit producers and processing firms for blackberry varieties. The world annually produces about 320 tons of this fruit crops (FAO). Number of cultivated blackberry varieties and hybrids obtained from crossing blackberry and raspberry together constitute about 300 (Serdiuc, Silenco, 2010).

Therapeutic value of food and fruits, in fact, is similar to the raspberry, but ripen later and longer. Most varieties are of U.S. origin, with black or red - dark fruits (Babuc, V., 2012).

Berries contain sugar (5-6%), organic acids (1.0 to 1.7% malic acid and citric acid), minerals (K, Na, Ca, Fe, P, S), tannins (0.15 %), aromatics and vitamins (Julea, 1973).

After Sapiro (1984), the amount of malic acid in the blackberry fruits compared to that prevailing in Vinica acid, citric acid, salicylic acid. After failing blackberry raspberry sugar content, sucrose glucose and fructose beyond. Its berries contain a large number of vitamins (in mg per 100 g fresh weight): carotene (provitamin A) - 0.5-0.8, vitamin C, 5.0 to 38.0; 0.033 Vitamin B1, B2 - 0.03, nicotinic acid, 1.6 (after the last index exceeds numerous blackberry fruit species).

Blackberries are consumed fresh, frozen, dried and as raw material for the preparation of sweetness, marmalade, jam, juice, wine, stewed(Colesnicov, 1973, Julea, 1973 Babuc, V., 2012).

2. Material and methods

The research was conducted during 2010-2011 and 2013 at the Scientifical-Practical Institute of Horticulture and Food Technology, Chişinauexperimental fields. As research objects served varieties of American, 'Spiked-Darrow' and without thorns – 'Thornfree', 'Smoothstem'. Observation records and analyzes performed to study the blackberry varieties were conducted in accordance with the accepted methods for shrubs. Chernozem soil type had a loamy texture. Year of planting was 2008. Planting scheme: 3x1.5 m on the varieties 'Thornfree' and 3x1m for 'Smoothstem' and 'Darrow'.

3. Results and discussions

One of the main objectives is to study plant blackberry fruit quality assessment by determining the biochemical composition, to highlight the ability to accumulate nutrients in the fruits of varieties without thorns - redness group (Figure 1), compared to varieties with thorns - Cumana group (Fig. 2).

Blackberry fruits are prized not only for its nutritional qualities, herbal, but also for its attractive appearance.

The 'Darrow' variety fruits are smaller in size, not so fragrant; the pulp is stronger, more suitable for processing and freezing, while varieties without thorns 'Smoothstem' and 'Thornfree' have juicy flesh , firm and are good for both the consumer fresh as well as processed. 'Darrow' varietal fruit after its shape is conical - elongated and black - brilliant, which is similar to the variety 'Thornfree' fruits and berries as the variety 'Smoothstem' is conical - round. (Mladin Gh., Mladin P., 1992).

According to phenological observations made, the earliest varieties investigated was ‘Darrow’, in which fruit maturation in the Republic of Moldova begins in the third decade of June - I decade of July, and at ‘Thornfree’ and ‘Smoothstem’ - varieties ripens late, early maturation occurs in the second decade - her third decade of July. Conducting phenological phases of plant development and nutrient accumulation in fruits is directly influenced by the variety and capabilities climatic conditions established during research. The data obtained as a result of the biochemical analysis are included in Table 1.

According to the data in Table 1 it was established that the highest dry matter content in fruit of blackberry was recorded in 2011: the variety ’Darrow’ value of 11.20% , the variety ,Thornfree’ - 13.10 % and the variety ’Smoothstem’ – 13. 07 % , since the amount of rainfall in July, 2011, which coincides with the ripening of fruit varieties data, was lower compared to the years 2010, 2013, and monthly average temperatures were higher. Comparing the dry matter accumulation in the fruits of studied varieties, it was determined that in 2011, during the ripening of fruits (June), fell more precipitation (161.3 mm) and mean monthly temperature was lower (20.10 C°), which affected the accumulation of a variety ’Darrow’ small amounts (11.20 %) compared with the varieties ’Thornfree’ (13.0 %), and ’Smoothstem’ (13.7 %), which fell during the baking May less rainfall (15.5 mm) and mean monthly temperature was higher (23.00 C°).

Weather conditions in 2011 were also favourably influenced the sugar amount , especially at the varieties ’Thornfree’ and ’Smoothstem’, which reached higher values, respectively 8.10 % and 8.46%.

The variety ’Darrow’ highest amount of sugar value was recorded in 2010 - 7.47%, due to the fact that in June 2010 the monthly average temperature was higher (21.00 C°) and lower rainfall (85. 0 mm) compared to June 2011.

Accumulated fruit acidity was highest in all varieties studied in 2010, the period when they fell more rainfall compared to the other years of study: ’Darrow’ - 2.84 %, ’Thornfree’ -2.97%,; ’Smoothstem’ – 2.7 %.

It was found that in 2013 tanin and coloring substances concentration was higher for varieties ’Thornfree’ and ’Smoothstem’ - 49.88 - 62.36 mg%, and in 2010 for ’Darrow’ cultivar -74.83 mg%.

Blackberry fruit is a rich source of vitamin C. According to the results of Table 1, the amount of vitamin C in the different varieties, as well as research over the years. Regarding the vitamin C content, the ’Darrow’ variety in 2013 was emphasized with a value of 35.20 mg%. In the same year the variety ’Thornfree’ peaked 22.0 mg%. The variety ’Smoothstem’ established in 2010 gained the highest amount of Vitamin C - 28.16 mg%.

Coefficient sugar / acidity is an important indicator in assessing the qualities of blackberry fruit buds. The higher the value of this indicator, the better quality are the fruits of this cultivar (Fig.3).

Looking at Fig. 3 it was found that the studied varieties reached maximum sugar / acidity coefficient in 2011: ‘Darrow’ variety - 2.87; ‘Thornfree’ variety - 3.63; variety ‘Smoothstem’ - 4.05 and minimum results were obtained in 2010 on varieties ‘Thornfree’ and ‘Smoothstem’ with respectively values of 1.62 and 2.63, while the lowest results were obtained in 2013 from the variety ‘Darrow’ with value of 2.22. So 2011 was the best year for the accumulation of large amounts of sugars in the fruits of blackberry cultivars and a lower acid content. If the varieties ‘Smoothstem’ and ‘Thornfree’ ripens late because the weather conditions in 2010 were not favorable, then the earliest ripening variety ‘Darrow’ had a positive influence on the accumulation of sugars in fruits (sugar / acidity coefficient with a value of 2.63).

4. Conclusions

Blackberry cultivars studied in the Republic of Moldova have been noted by the ability to accumulate significant amounts of nutrients. These varieties are judged according its taste and nutritional qualities of fruits, highly satisfying consumer preferences.

Researchers conducted in the study have revealed the blackberry cultivars fruit biochemical composition:

- the best results have been obtained by ‘Smoothstem’ variety, with fruits rich in dry matter (12.67 %) and in the amount of sugars (7.63 %). The lowest results of these indicators were obtained by ‘Darrow’ variety, respectively, 10.67% and 6.41 %;
- the highest values of the content of vitamin C (26.05 mg%), tanin, coloring substances (48.50 mg%) and acidity (2.49%) were found in variety ‘Darrow’. The variety ‘Thornfree’ accumulated the smallest amounts of Vitamin C (21.41 mg %) and acidity (2.39%) and the variety ‘Smoothstem’ – of tannins and coloring (36.03 mg%);
- comparing the sugar / acidity coefficient, ‘Smoothstem’ significantly exceeds other varieties, reaching 3.18.

References

1. Serdiuc O. V., Silenco V. O., 2010. Podbor cortimenta i coberşenstvovanie tehnologhii vozdelîvania ejevichi (Rubus subg. Eubatus Focke) v Lesostepi Ucrainî. Sovremennoe sadovodstvo: №1, 2010, s 29-30.

2. Babuc V., 2012. Pomicultura.- Chişinău: Î. S.F.E.-P. „Tipografia Centrală”, p. 569.
3. Julea V., 1973. Cultura arbuştilor fructiferi. Chişinău: Ed. Cartea moldovenească, p.106.
4. Şapiro D. K., 1984. Plodî i ovoşci v pitanii celoveca. Minsc:Izd. Uradjai ,s.91.
5. Colesnicov V. A., 1973. Ciastnoe plodovodstvo. Moscva: Izd. Kolos, s. 409.
6. Dospehov B. N., 1985. Metodica polevogo opîta.Moscva: Agropromizdat, 351 s.
7. Mladin Gh., Mladin P., 1992, Cultura arbuştilor fructiferipe spaţii restrînse.- Bucureşti: Ed. Ceres, pag. 88-90.

Tables and Figures

Table 1. Blackberry fruit quality considering nutrient content in the period 2010 -2011, 2013

Variety	Dry substance%	Sugars,%			Titratable acidity (%)	Tannins and coloring mg%	Vitamin C, mg % amount	Coefficient sugar/acid
		amount	mono	sucrose				
Darrow								
2010	10.00	7.47	7.47	0	2.84	74.83	21.82	2.63
2011	11.20	6.41	5.77	0.64	2.23	29.10	21.12	2.87
2013	10.80	5.34	5.34	0	2.40	41.57	35.20	2.22
Mean	**10.67**	**6.41**	**6.19**	**0.21**	**2.49**	**48.50**	**26.05**	**2.57**
Thornfree								
2010	9.27	4.82	4.82	0	2.97	62.35	21.12	1.62
2011	13.0	8.10	7.90	0.20	2.23	20.79	21.12	3.63
2013	11.3	6.70	6.70	0	1.98	62.36	22.00	3.38
Mean	**11.3**	**6.54**	**6.47**	**0.07**	**2.39**	**48.50**	**21.41**	**2.74**
Smoothstem	13.7	7.10	7.10	0	2.70	41.57	28.16	2.63
2010	13.7	8.46	7.20	1.26	2.09	16.63	23.76	4.05
2011	11.7	7.32	6.37	0.95	2.40	49.88	17.51	3.05
2013								
Mean	**12.7**	**7.63**	**6.89**	**0.74**	**2.40**	**36.03**	**23.14**	**3.18**
Limite of variation	**9.27-13.10**	**4.82-8.46**	**4.82-7.90**	**0-1.26**	**1.98-2.97**	**16.63-74.83**	**17.51-35.20**	**1.62-4.05**

Fig.1. Varieties without thorns, Thornfree

Fig.2. Varieties without thorns, Darrow

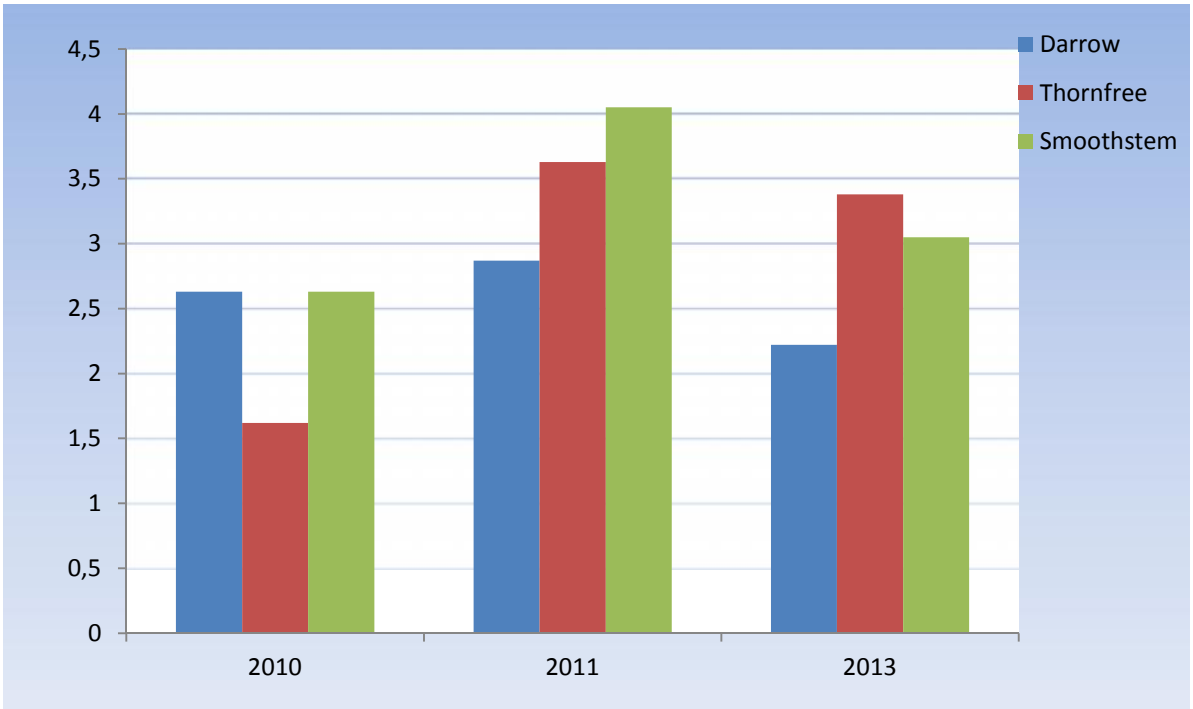

Fig. 3. Variation of sugar / acidity coefficient