BLUEHONEYSUCKLE (*LONICERA CAERULEA* VAR. *KAMTSCHATICA* (SEVAST.POJARK.*)* A VALUABLE SPECIES FOR FRUITS GROWING AND HUMAN HEALTH

LONICERA CAERULEA VAR. KAMTSCHATICA (SEVAST.POJARK) O SPECIE IMPORTANTĂ PENTRU CULTURĂ ŞI SĂNĂTATEA UMANĂ

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Abstract. *Blue honeysuckle (Lonicera caerulea var. kamtschatica (Sevast.Pojark.) introduced in Romania in 1998, proved to be a special plant for its fruit biochemical content (polyphenols, anthocyanins, vitamine C, etc. with strong antioxidant action), earliness of ripening and plant rusticity. For this species a breeding program has been launched to improve the fruits quality, productivity and growth habit. The objective of this work was the evaluation of the morphological and agronomic characteristics for 10 new elites, (resulted of the selection in the hybrids field) compared with Loni and Cera varieties, in order to select the most valuable ones and placing them into assortment. The results of these elites evaluation under phenology, yield capacity, berries physical - tasty qualities and biochemical compounds level will be presented.*

Key words: selection, phenology, berries physical-chemical properties

Rezumat. *Lonicera caerulea var. kamtschatica (Sevast.Pojark.) introdusă în ţara noastră în anul 1998 s-a dovedit a fi o plantă deosebit de valoroasă pentru conţinutul biochimic al fructelor (polifenoli, antociani, vitamina C, etc. cu efect puternic antioxidant) , timpurietatea coacerii şi rusticitatea plantelor. Pentru această specie s-a demarat un program de ameliorare pentru îmbunătăţirea calităţii fructelor, productivităţii şi habitusului de creştere. Cercetările de faţă au avut ca obiectiv evaluarea caracteristicilor morfologice şi agronomice a unor elite obţinute în urma selecţiei în câmpul de hibrizi, comparativ cu soiurile noi Loni şi Cera , în scopul selectării celor mai valoroase şi introducerii lor în sortiment. Sunt prezentate rezultatele privind evaluarea a 10 elite sub următoarele aspecte: fenologic, potenţial bioproductiv, însuşiri fizice şi organoleptice şi nivelul compuşilor biochimici din fructe.*

Cuvinte cheie: selecţie, fenologie, însuşiri fizico-chimice ale bacelor

INTRODUCTION

Blue honeysuckle originated in the eastern Russian territory, Peninsula Kamtschatka, where locals used it as a medicinal plant with a beneficial effect on the cardiovascular system and capillaries (MN Plekhanova 1994 Atalinkova M, et all, 2007). In our country it has been introduced since 1988, in the form of seeds, which

formed the basis for starting the process of breeding by hybridization followed by successive individual clonal selections (Gh. Mladin, 1977). Some of the blue honeysuckle selections were subjected to identification and determination the biochemical content of the berry fruits, such as the flavonoids and anthocyanosides (Oprea, E., et al., 2002). The paper presents the results of the behavior of 2 blue honeysuckle varieties and 10 selections under the hilly Sub-Southern Carpathians, in terms of yield, phenology and morphology of the plants and berries.

MATERIAL AND METHOD

The research was conducted at RIFG Pitesti, during 2000-2009 on a biological material consisting of two new varieties, Loni and Cera and 10 selections. There were determined the growth and fructification phases, in relation to climatic factors, the common phyto-nutrients of the fruits and the yielding potential. The experience was organized in randomized blocks, each plot with four plants in three repetitions, with total of 12 plants per variant. Location of experimental variants was a podsolic soil type, clay-textured, poorly supplied in organic matter, nitrogen, phosphorus and potassium.

RESULTS AND DISCUSSIONS

During 10 years of evaluation of the blue honeysuckle varieties and selections, it was found that the growth and fructification phases occurred with a variation of 3-8 days from one year to another, in correlation with the variation of the temperatures. Generally speaking, the onset of vegetation occurred in late February and early March, and the cessation of the shoots has occurred very early, in the last decade of June. The bloom started at the end of the second decade of April and ended in the early days of the first decade of May. Fruit maturation took place over a period of 5-6 days, in the second decade of May. Vegetation period showed a greater variation from one genotype to another, ranging between 218 and 325 days (table 1). Plants showed slow growth, with differences from one genotype to another, with a volume of the bushes ranging between 1.12 m^3 (24-SL) and 3.04 m^3 (15 SL) - (table 2). Yielding potential, during 10 years, ranged between 398 g and 1,474 g $plant^{-1}$, in direct correlation with the vigour of the plant. Loni and Cera varieties and selections SL 57, SL 43 and SL 15 have had a steady upward trend of fruit production recorded over 10 years (fig. 1).

Morphological and organoleptic characteristics of the fruits shown in the table 3, highlighted the fact that fruit had a more or less elongated cylinder shape and their taste varied from intensely bitter to sweet-tart flavor. The fruits of Loni and Cera varieties and of the SL 15, SL 57, SL 22 and SL 28 selections are suitable for fresh consumption. The main phytochemical compounds of the fruits showed a variation from one genotype to another, with significant differences in the vitamin C content (from 39.6 to 93.8 mg%), total sugars (from 6.37 to 10.32%) and total solids (from 13.54 to 19.43%) (table 4).

Table 1

Unfolding of the growth and fructification phases of the honeysuckle genotypes

No.	Genotype	Bud break	Leafing	Start of shoots growth	Cessation of growth	Blooming start	Blooming end	Fruit ripening	Physiological fall of the leaves	Duration of vegetation
1	Loni	25II-3III	12-15III	29III-5IV	24-28VI	20-28IV	26IV-2V	12-17V	29IX-5X	218-320
2	Cera	25II-4III	13-17III	30III-7IV	23-28VI	22-26IV	28IV-2V	13-17V	30IX-2X	234-320
3	SL-43	3-7III	20-24III	25III-3IV	18-22VI	20-25IV	30IV-10V	22-25V	2-6X	240-324
4	SL-46	2-6III	14-18III	27III-2IV	19-26VI	21-27IV	30IV-8V	17-22V	3-7X	235-325
5	SL-62	2-6III	13-17III	26III-2IV	20-26VI	21-27IV	28IV-5V	17-23V	2-6X	239-324
6	SL-55	26II-5III	11-16III	25-31III	19-25VI	21-27IV	27IV-4V	18-24V	2-6X	242-324
7	SL-57	25II-4III	11-15III	25-30III	18-26VI	18-26IV	27IV-3V	16-20V	30IX-3X	243-321
8	SL-15	28II-5III	13-17III	26-31III	20-27VI	26-30IV	2-5V	17-21V	3-7X	241-324
9	SL-24	26II-4III	14-19III	27III-3IV	22-29VI	19-26IV	26IV-2V	12-18V	28IX-1X	242-319
10	SL-34	27II-3III	14-18III	27III-3IV	18-25VI	18-25IV	26IV-5V	12-18V	28IX-1X	241-319
11	SL-28	1-4III	15-19III	28III-4IV	21-28VI	21-28IV	29IV-6V	18-24V	30IX-3X	240-321
12	SL-22	2-5III	16-19III	27III-5IV	24-30VI	2027IV	28IV-5V	17-23V	30IX-2X	235-320

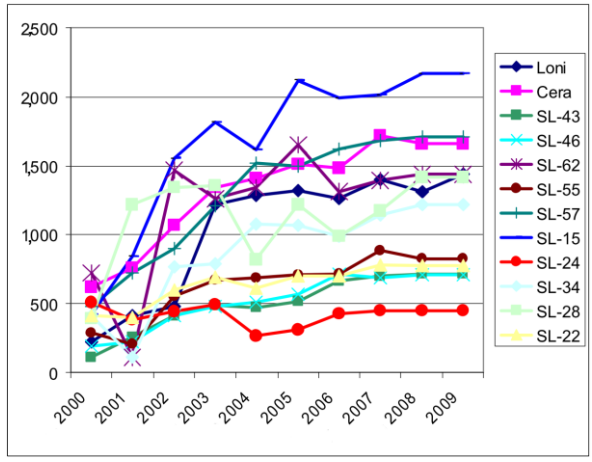

Fig. 1. Evolution of the bio-yielding potential of 12 *Lonicera caerulea* var. *kamtschatica* genotypes

Table 2

The vigour of the 14 years old bushes blue honeysuckle genotypes

No.	Genotype	Mean diameters of bush (cm)	Mean height of bush (cm)	Volume of bush (m^3)*)
1	Loni	110	140	1.82 NS
2	Cera	120	160	2.32**
3	SL-43	90	125	1.42^{0}
4	SL-46	90	130	1.50 NS
5	SL-62	110	140	1.82 NS
6	SL-55	90	140	1.68 NS
7	SL-57	120	160	2.32**
8	SL-15	150	180	3.04***
9	SL-24	80	110	1.12^{000}
10	SL-34	90	120	1.34^{00}
11	SL-28	110	160	2.23 NS
12	SL-22	110	130	1.64 NS
Mean		105.83	141.25	1.85

**) DL 5% = 0.401; DL 1% =0.545; DL 0.1% = 0.730

*) Volume = $\frac{(D+d)^2}{2}$ x h x 0.416

Table 3

Fruits characteristics of some blue honeysuckle genotypes

No.	Genotype	Fruit shape			Fruit taste (organoleptic panel test)
		Height (mm)	Thickness (mm)	Shape index*)	
1	Loni	12.8	7.9	1.62	Slightly tart-sweet flavor
2	Cera	17.4	9.8	1.77	Sweet-sour-flavored
3	SL-43	19.3	7.9	2.44	Sweet-sour
4	SL-46	17.2	6.6	2.60	Bitter-almond-sour
5	SL-62	16.3	8.1	2.01	Intensely bitter
6	SL-55	14.3	6.1	2.34	Bitter-almond-sour
7	SL-57	22.3	7.0	3.18	Slightly tart-sweet flavor
8	SL-15	19.5	6.7	2.91	Slightly tart-sweet flavor
9	SL-24	15.9	7.4	2.14	Bitter intensively
10	SL-34	21.2	8.1	2.61	Bitter intensively
11	SL-28	18.1	10.2	1.77	Sweet-tart
12	SL-22	17.8	7.7	2.31	Sweet-tart

*)DL5%=0.087; DL1%=0.118; DL0.1%=0.158

Table 4

Level of phytochemical compounds in fruits of blue honeysuckle genotypes

No.	Genotype	Vitamin C mg %*)	Total sugars g%	Total acidity g%	Tanoide substances g %	Pectic substances g %	Mineral substances g %	Dry matter g%
1	Loni	60.08	6.70	1.84	0.254	0.328	0.697	16.20
2	Cera	55.70	6.37	1.79	0.301	0.337	0.706	12.90
3	SL-43	61.20	8.79	1.96	0.478	0.330	0.684	18.10
4	SL-46	56.40	9.69	2.02	0.852	0.342	0.701	19.43
5	SL-62	62.30	10.32	2.50	0.640	0.327	0.694	17.40
6	SL-55	44.00	8.40	2.06	0.192	0.376	0.730	14.55
7	SL-57	61.00	7.09	2.02	0.258	0.350	0.680	14.27
8	SL-15	93.80	6.72	1.88	0.300	0.340	0.679	14.60
9	SL-24	44.00	7.81	2.46	0.558	0.290	0.680	14.70
10	SL-34	78.60	7.11	1.91	0.248	0.296	0.637	16.90
11	SL-28	44.00	7.41	2.46	0.218	0.597	0.570	13.54
12	SL-22	39.60	7.52	2.71	0.236	0.467	0.800	17.07
	Mean	58.36	7.82	2.13	0.378	0.365	0.688	15.55
	DL 5%	1.291	0,308					0.117
	DL1%	1.754	0.418					0.158
	DL0.1%	2.349	0.560					0.212

Table 5

Level of the anthocyanins in fruits of *Lonicera caerulea* var. *kamtschatica*

No.	Genotype	Total anthocyanins (mg kg^{-1})	Of which:		
			Fruit flesh (mg kg^{-1})	Fruit skin (mg kg^{-1})	Fresh juice (mg kg^{-1})
1	Loni	5,534	542	4,870	122
2	Cera	5,132	732	4,274	126
3	SL-43	5,243	751	4,376	116
4	SL-46	5,158	652	4,388	118
5	SL-62	5,442	556	4,765	121
6	SL-55	2,199	309	1,780	110
7	SL-57	4,643	715	3,812	116
8	SL-15	4,881	585	4,176	120
9	SL-24	3,910	791	3,001	118
10	SL-34	2,825	754	1,960	111
11	SL-28	3,747	673	2,960	114
12	SL-22	4,562	744	3,955	118
	Mean (total)	4,439	650.35	3,693.08	117.50
		DL 5%	20.256	52.009	4.615
		DL 1%	27.532	70.692	6.273
		DL 0.1%	36.873	94.677	8.401

Anthocyanins level was the highest in the skin of the fruit, with variation from 1,960 mg kg^{-1} (SL 34) to 4,870 mg kg^{-1} (Loni) and lower in the flesh of the fruit (309-791 mg kg^{-1}) and in fresh juice (110 - 126 mg l^{-1}), with statistically assured differences between variants (table 5).

CONCLUSIONS

1. Blue honeysuckle genotypes showed an early starting of the vegetation and an earliest cessation of the shoots growth.

2. Plant vigor was influenced by genotype and bushes had a slow growth tendency over the 10 years.

3. Bio-yielding potential of the blue honeysuckle genotypes was intensively correlated with plants vigor and showed a high variation from year to year, depending on the adaptability of genotypes to the climatic conditions.

4. Size, shape and taste of berry-fruits were different from one genotype to other, generally being of cylindrical shape, more or less elongated, with bitter taste to a sweet-tart flavor.

5. For the fresh consumption the following genotypes: Loni, Cera, SL 15, SL 57, SL 22 and SL 28 are suitable.

6. Genotypes SL 15, SL 34, SL 62 and SL 43 have noted a higher content of vitamin C, sugars and total solids.

7. The skin of the fruit accumulated the highest amount of anthocyanins with a powerful antioxidant action that will be taken into account for the extraction of these compounds.

8. Alongside Loni and Cera varieties, SL 15 and SL 57 selections were highlighted to be approved and extended in production for both fresh consumption and for food and pharmaceutical processing.

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