THE EVALUATION OF FRUITS PRODUCTION AND PHYSICO-CHEMICAL FEATURES FOR SOME CHERRY CULTIVARS CREATED AT S.C.D.P. IASI

EVALUAREA PRODUCȚIEI ŞI A ÎNSUŞIRILOR FIZICO-CHIMICE ALE FRUCTELOR LA UNELE SOIURI DE CIREŞ CREATE LA S.C.D.P. IAŞI

IUREA Elena[1], SÎRBU Sorina[1], CORNEANU G.[1]
e-mail: iurea_elena@yahoo.com

Abstract: *This paper presents some aspects concerning the influence of the environment factors between 2011-2013, registered in the Iaşi area, on the productivity and fruits quality for cherry species. In 2011 (432,4 mm) and 2012 (446,6 mm) there were registered quantities below the multiannual limit (524,6 mm), getting a deficit of 92,2 mm in 2011 and 78,0 mm in 2012 (this climatic variability influences negatively the fruit's growth) and in 2013 the multiannual was exceeded, being achieved 705,4 mm (a surplus of 180,8 mm). Analyzing the average productions on three years (the years XII-XIV from plantation), from the statistic point of view, we can see that the cultivars Margo (30,9 kg/tree) and Ludovic (19,9 kg/tree) registered positive production differences compared to the cultivars average. Under the aspect of the fruits weight (g) and of the equatorial diameter (mm), there were remarked the cultivars Alex (9,6 g and 24,8 mm), Ludovic (8,8 g and 24,1 mm) with positive significant differences compared to the witness and Paul (8,0 g with 22,9 mm), being significantly positive compared to the witness.*
Key words: *cultivars, cherry, production, fruits, features.*

Rezumat: *Această lucrare prezintă unele aspecte privind influența factorilor de mediu din anii 2011 – 2013, înregistrată în zona Iaşi, asupra productivității şi calității fructelor la specia cireş. În anii 2011 (432,4 mm) şi 2012 (446,6 mm) s-au înregistrat cantități sub limita multianualei (524,6 mm), realizându-se un deficit de 92,2 mm în anul 2011 şi 78,0 mm în anul 2012 (această variabilitate climatică influențează negativ creşterea fructului), iar în 2013 multianuala a fost depăşită realizându-se 705,4 mm (un excedent de 180,8 mm). Analizând producțiile medii pe trei ani (anii XII-XIV de la plantare), din punct de vedere statistic, se constată că soiurile Margo (30,9 kg/pom) şi Ludovic (19,9 kg/pom) au înregistrat diferențe de producție pozitive față de media soiurilor. Sub aspectul greutății fructelor (g) şi a diametrului ecuatorial (mm), s-au remarcat soiurile Alex (9,6 g şi 24,8 mm), Ludovic (8,8 g şi 24,1 mm) cu diferențe semnificativ pozitive față de martor şi Paul (8,0 g cu 22,9 mm) fiind semnificativ pozitiv față de martor.*
Cuvinte cheie: *soiuri, cireş, producție, fruct, însuşiri.*

[1] Research and Development Station for Fruit Tree Growing of Iaşi, Romania

INTRODUCTION

The cherry tree is a fruit-growing species with major economic importance, given by the fruits nutritive, technological and commercial features (Budan Gradinariu, 2000; Grădinariu Istrate, 2003; Petre, 2006).

It is a species with average claims to water. Thereby, it lives in the Iaşi area, with annual rainfall under 550 mm, being grafted on mahaleb (Dumitrescu et al., 1981; Grădinariu, 2002).

In 2011 (432,4 mm) and 2012 (446,6 mm) there were registered quantities under the multiannual limit (524,6 mm), getting a deficit of 92,2 mm in 2011 and 78,0 mm in 2012 (this climatic variability influences negatively the fruit's growing) and in 2013, the multiannual was exceeded, getting 705,4 mm (a surplus of 180,8 mm).

This paper presents some aspects concerning the influence of the environment factors from 2011-2013, registered in the Iaşi area, on the fruits productivity and quality for the cherry species.

MATERIAL AND METHOD

The researches were made during 2011-2013, having as research material four new cherry cultivars (Alex, Margo, Paul and Ludovic) grafted on mahaleb.

The fruit-growing trees are planted at a distance of 4 x 5 m with the shape of free flattened crown, being in the years XII-XIV from planting. The land where the planting was established is situated in Jijia-Bahlui depression, where the average annual temperature was of 9,8°C in 2011, of 10,6°C in 2012 and 10,2°C in 2013 (the multiannual average being of 9,6°C).

The meteorological factors were analyzed (during the three years), for each cultivar there was determined the fruits production (kg/tree), there were made measurements and determinations concerning the fruit's size (the equatorial diameter-mm), the fruit's weight (g), the soluble dry substance (SUS%), the titratable acidity (AT), the ratio between SUS and AT and the total content of polyphenols.

The fruits production and the fruit's weight was determined through weighing, the equatorial diameter of the fruit was determined by measuring with the electronic calipers, SUS was determined with the Zeiss refractometer, AT was determined with the potentiometric method and the determination of the total content of polyphenols was effectuated after the Folin-Ciocâlteu method.

The experimental data was statistically interpreted by the variance analysis and the correlation coefficient (r) was effectuated using Bravais's formula, 1978.

RESULTS AND DISCUSSIONS

For the studied cherry cultivars, the productions obtained in the XIIth year from planting were between 11,2 kg/tree (Alex) and 30,8 kg/tree (Margo), (tab. 1).

Analyzing the average production on three years (years XII-XIV from planting), from the statistical point of view, it can be said the cultivars Margo (30,9 kg/tree) and Ludovic (19,9 kg/tree) registered positive production differences in comparison with cultivars average.

Following the production in the three years of study, it can be seen that in 2011, there were registered the biggest values for the majority of the cultivars,

due to the fact that in August 2010, the rainfall quantity was sufficient (57,0 mm/m^2), thus the differentiation of the buds from fruits was performed in good conditions (tab. 1).

Table 1

The fruits production for four cherry cultivars in the years XII-XIV from planting

Cultivar	The average production kg/tree in the years:			Average production (2011-2013)		The difference in comparison with the variants average and the significance
	2011	2012	2013	kg/tree	t/ha	
Margo	30,8	30,0	32,0	30,9	15,5	+ 11,7
Ludovic	29,0	15,7	15,0	19,9	9,9	+ 0,7
Average (x)	23,7	16,7	17,0	19,2	9,6	0,0
Paul	23,7	12,6	12,0	16,1	8,1	- 3,1
Alex	11,2	8,8	9,0	9,7	4,8	- 9,5

LSD 5% = 15,2 kg/tree LSD 1% = 23,0 kg/tree LSD 0,1% = 36,9 kg/tree

The fruit's weight is a dimension that is influenced by the local climatic conditions and by each cultivar biological particularities.

From the statistical point of view, throughout the study, the Alex cultivar (9,6 g) registered very positive significant differences compared to the witness, the Ludovic cultivar registered distinct positive significant differences and the Paul cultivar registered positive significant differences compared to the witness (tab. 2).

Table 2

The fruit's weight registered during 2011-2013

Cultivar	Fruit's weight (g) in the years:			The average on the studied period (g)	The difference in comparison to the witness and the significance
	2011	2012	2013		
Alex	9,1	9,4	10,4	9,6	+ 2,9^{+++}
Ludovic	9,3	8,4	8,7	8,8	+ 2,1^{++}
Paul	8,6	7,4	8,0	8,0	+ 1,3^{+}
Margo	7,4	6,0	6,9	6,8	+ 0,1
Boambe de Cotnari (mt)	**6,5**	**6,6**	**7,0**	**6,7**	0,0

LSD 5% = 1,0 g LSD 1% = 1,5 g LSD 0,1% = 2,4 g

Under the aspect of the equatorial diameter (mm), there got remarked the cultivars Alex (24,8 mm), Ludovic (24,1 mm) and Paul (22,9 mm) with distinct positive significant differences compared to the witness (tab. 3).

Analyzing the values of the fruit's size registered in 2012, droughty year which influenced negatively the fruits growth, the Alex cultivar got remarked as being the most resistant to drought registering the biggest equatorial diameter (24,4 mm) (tab. 3).

Table 3

The equatorial diameter of the fruit registered during 2011-2013

Cultivar	The fruit's equatorial diameter (mm) in the years:			The average on the studied period (mm)	The difference compared to the witness and the significance
	2011	2012	2013		
Alex	22,7	24,4	27,3	24,8	+ 3,6^{++}
Ludovic	23,8	22,2	26,3	24,1	+ 2,9^{++}
Paul	23,1	21,9	23,8	22,9	+ 1,7^{++}
Margo	21,1	20,2	23,2	21,5	+ 0,3
Boambe de Cotnari (mt)	**20,5**	**20,2**	**23,0**	**21,2**	0,0

LSD 5% = 1,0 mm **LSD 1% = 1,5 mm** **LSD 0,1% = 4,7 mm**

A continuous growing of the fruit's weight determines a correspondent growth of the equatorial diameter (D) (fig. 1).

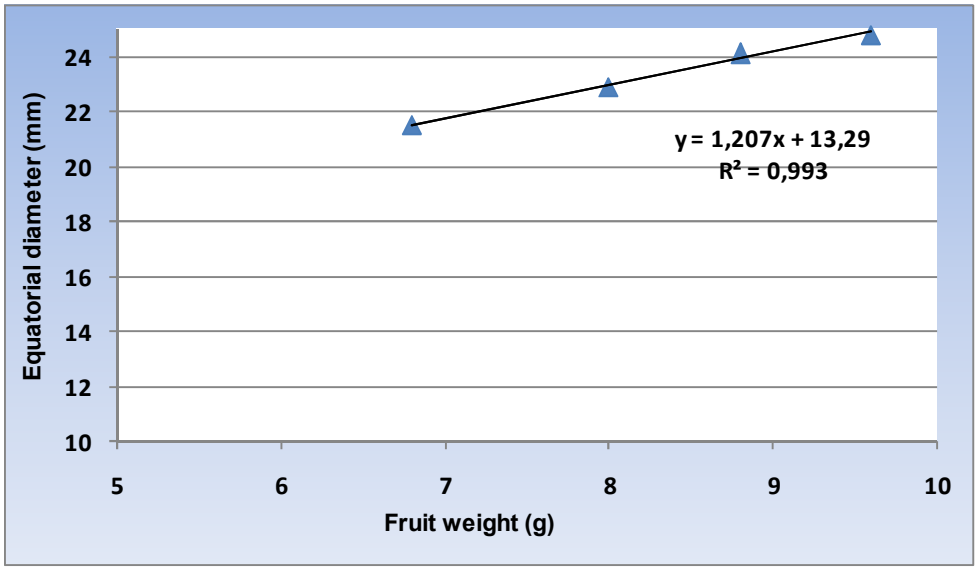

Fig. 1 – The correlation between the weight and the equatorial diameter of the fruit for the cherry cultivars taken in study

The cherries are characterized through a specific organoleptic harmony and that is why the taste and flavor remain the tangible effects of the moment when the fruits are consumed (Tomás-Barberán et. al., 2001; Crisosto et al., 2002).

In the studied genotypes, the SUS values were between 14,8% (Paul) and 17,6% (Alex), the titratable acidity (AT) of the fruits varied in a wide range with values between 0,4 - 0,7 mg malic acid/100 ml juice, with a ratio between SUS and AT framed in the interval 20-39%. Also the values of the total polyphenols

varied from a genotype to another, this index being situated in the interval 104,93 – 336,28 mg galic acid/100 ml fresh juice (tab. 4).

Table 4

Physical and biochemical features of the fruits for the cherry cultivars

Cultivar	The epidermis color	The biochemical features of the fruits			
		SUS -%-	AT - mg Malic acid/100 ml -	Ratio SUS and AT -%-	The total content of - mg GAE/100 ml-
Alex	Dark red	17,6	0,447	39,328	336,28
Ludovic	Dark red	16,4	0,497	32,951	205,36
Paul	Double colored	14,8	0,722	20,458	104,93
Margo	Whitish yellow	15,8	0,643	24,513	326,88

A high content of polyphenols is associated with an intense color of the fruits, with a big content of dry substance, but also with a more intense flavor (fig. 2).

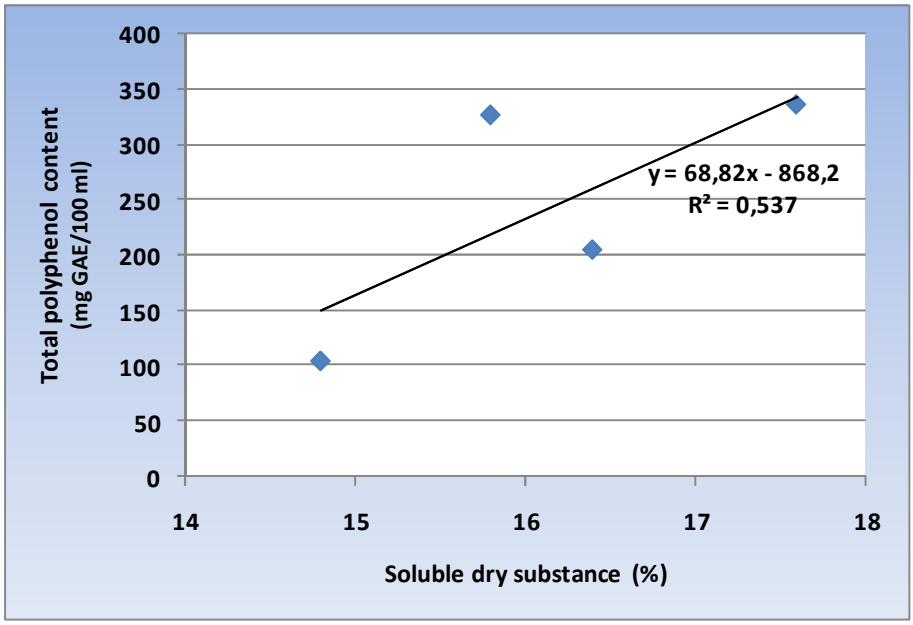

Fig. 2 – The correlation between SUS and the total content of polyphenols for the cherry cultivars taken in study

Following the obtained results, the Paul cultivar registered the lowest values for SUS (14,8%), for the ratio SUS and AT (20,458%) as well as for the total content of polyphenols (104,93 mg GAE/100 ml of fresh juice) (tab. 4).

CONCLUSIONS

1. In the conditions of the years 2011, 2012 (droughty years) and 2013(rainy year), in the Iaşi area, under the productivity aspect, there got remarked the cultivars Margo and Ludovic, registering the biggest annual productions.

2. Analyzing the values of the fruit's size, registered in 2012, droughty year that influenced negatively the fruits growth, the Alex cultivar got remarked as the most resistant to drought, registering the biggest equatorial diameter (24,4 mm) followed then by the Ludovic cultivar (22,2 mm).

3. The fruits of the cultivars Alex, Ludovic and Margo can be considered as having a very appreciated taste by the consumers because there exists a balance between the sweet taste (the content of SUS) and sour (AT) and it presents a high content of polyphenols, giving them a more intense flavor.

REFERENCES

1. **Budan S., Grădinariu G., 2000 –** *Cireşul*, Editura Ion Ionescu de la Brad, Iaşi, 262 p.
2. **Crisosto C.H., Crisosto G.M., Ritenour M.A., 2002 –** *Testing the reliability of skin color as an indicator of quality forearly season 'Brooks' (Prunus avium L) cherry*. Postharv est Biol. Technol, 24, pp. 147-154.
3. **Dumitrescu Gh., Hrițcu C., Frunză P., Bazgan C., 1981** – *Studiu privind cultura cireşului şi vişinului în județul Iaşi,* Cercetări Agronimice în Moldova, vol. 3, Iaşi., pp. 77-82.
4. **Grădinariu G., Istrate M., 2003** - *Pomicultură Generală şi Specială*, Editura Moldova Iasi, 627 p.
5. **Petre L., 2006 –** *Rezultate obținute în ameliorarea sortimentului de cireş, vişin şi nuc la SCDP Iaşi,* Lucr. Şt. ICDP Piteşti-Mărăcineni, vol. XXII, Piteşti, pp. 45-49.
6. **Tomás-Barberán F.A., Espin J.C., 2001 –** *Phenolic compounds and related enzymes as determinants of quality in friuts and vegetables,* Journal of Science and Food Agricultural, 81, pp. 853-876.