

**STUDY REGARDING QUALITY TRAITS OF FRUITS IN
CHERRY CULTIVARS (*PRUNUS AVIUM* L.) UNDER THE
CONDITIONS OF THE NE AREA OF ROMANIA**

**STUDIUL ÎNSUȘIRILOR DE CALITATE A FRUCTELOR LA UNELE
SOIURI DE CIREȘ (*PRUNUS AVIUM* L.) ÎN CONDIȚIILE
ZONEI DE NE A ROMÂNIEI**

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Abstract.

The paper introduces the valuable traits of the fruits in local and international cherry cultivars under the conditions of 2021 – 2024, cultivars suitable for both fresh consumption and for processing. Considering the fruit weight (g) and its equatorial diameter (mm) as averaged across four years of study, cultivars Ludovan (9.76 g and 27.25 mm), Cociuvaș (9.70 g and 27.11 mm), Andreiaș (9.20 g and 25.87 mm), Miris (7.92 g and 25.01 mm) and Van (7.90 g and 25.05 mm) stood out statistically, showing significantly higher differences. In terms of stone size, the cultivars recorded a weight between 0,26 g (Miris) and 0,35 g (Andreiaș). The dry substance content was between 14.7 °Brix (Scorospelka) and 19.86 °Brix (Margonia), while the values for the total content of polyphenols were between 299.17 mg GAE 100 mL⁻¹ (Scorospelka) and 482.35 mg GAE 100 mL⁻¹ (Cociuvaș). As for the resistance of the fruits to cracking, all the studied cultivars showed good resistance, with recorded values under 19%, except for cultivar Van (43.9%).

Keywords: cultivars, cherries, traits, qualities, fruit

Rezumat.

Lucrarea prezintă caracterile valoroase a fructelor la unele soiuri de cireș autohtone și cosmopolite, în condițiile anilor 2021 – 2024, soiuri pretabile atât pentru consum în stare proaspătă cât și pentru procesare. Apreciind greutatea fructului (g) și diametrul ecuatorial (mm) al acestuia, prin prisma mediei celor patru ani de studiu, s-au remarcat din punct de vedere statistic cu diferențe semnificative mai mari soiurile Ludovan (9.76 g și 27.25 mm), Cociuvaș (9.70 g și 27.11 mm), Andreiaș (9.20 g cu 25.87 mm), Miris (7.92 g cu 25.01 mm) și Van (7.90 g cu 25.05 mm). Ca

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mărime a sămburelui, soiurile au înregistrat o greutate cuprinsă între 0,26 g (Miris) și 0,35 g (Andreiaș). Conținutul în substanță uscată a fost cuprins între 14.7 °Brix (Scorospelka) și 19.86 °Brix (Margonia), iar la conținutul total de polifenoli valorile au fost cuprinse între 299.17 mg GAE 100 mL⁻¹ (Scorospelka) și 482.35 mg GAE 100 mL⁻¹ (Cociuvaș). Referitor la rezistența fructelor la crăpare, toate soiurile luate în studiu au manifestat o rezistență bună, valorile înregistrate fiind sub 19%, excepție făcând soiul Van (43.9%).

Cuvinte cheie: soiuri, cireșe, însușiri, caracteristici, fruct.

INTRODUCTION

The cherry tree is a fruit-growing tree species of significant economic importance, due to its nutritional, technological and commercial traits of its fruits, that finds optimal conditions for expressing its agrobiological potential in Romania, except for certain years when natural calamities have occurred [Grădinariu and Istrate, 2003]. Cherries are the first fruits that reach maturity (2nd part of May until mid-June) during a time when other fruits are missing in the market [Ghena and Braniște, 2003]. These fruits surpass almost all other fruit-growing species in terms of total sugar average content, tanoide substances, crude proteins, mineral substances and vitamin C.

On the fresh fruits market, cultivars with “bigarreau” type fruits, bright red in colour, resistance to cracking, transportation and temporary storage and a weight higher than 7g are preferred [Budan and Grădinariu, 2000].

As the cultivar approaches commercial maturity, the fruit’s size and its soluble substance content increase [Rudi, 1992], while the fruit colour parameter determines the optimal harvest time [Webster and Looney, 1996; Tudela *et al.*, 2005].

The paper introduces the valuable traits of the fruits in local and international cherry cultivars, under the conditions of 2021 – 2024, cultivars suitable both for fresh consumption and processing.

MATERIAL AND METHOD

The research was conducted between 2021-2024, using seven cherry cultivars as research material: five Romanian cultivars (Andreiaș, Ludovan, Cociuvaș, Miris, Margonia) and two international cultivars (Van, Scorospelka). Out of the seven cultivars, Scorospelka is an early cultivar, Margonia is a late cultivar and the rest show medium maturity.

The trees are planted at a distance of 5 x 4 m and pruned to form a free flattened palmette crown without support and irrigation systems.

The land plot on which the plantation was established is located in the Jijia-Bahlui depression, where the multiannual average temperature is 10.2 °C, oscillating during the research period between 10.1 °C in 2021 and 12.5 °C in 2024.

To describe the fruits, descriptors used for the *Prunus avium* L. genus were used, according to the UPOV TG/35/7, ^{xxx}, 2006 questionnaire.

To determine the average weight of the fruit, stone and peduncle (g), 50 fruits, 50 stones and 50 peduncles were weighted in three repetitions using the electronic precision scale 0.01G type Radwag; the equatorial diameter (D) of the fruit (mm) was determined using the digital callipers Luumytools for 50 fruits in three repetitions; pulp firmness, pulp adherence to stone and the intensity of the sweet taste of the fruits were evaluated using sensorial assessment (Table 3).

To determine the soluble dry substance content in the fruit, the portable digital Zeiss refratometer (°Brix) was used; the titratable acidity of the fruits was determined through the potentiometric method [Ghimicescu, 1977]; the total content in polyphenols was measured using the Folin-Ciocalteu method [Jayaprakasha *et al.*, 2001]; the resistance of fruits to cracking was determined using the Cristensen method, counting the cracked fruits after being immersed in distilled water at 20 °C for six hours [Webster and Looney, 1996].

The experimental data was statistically interpreted using the multiple comparisons method (Duncan test, with P 5%).

RESULTS AND DISCUSSIONS

Maglakelidze *et al.*, [2015], claim that the hereditary traits of the cherry, together with climatic and technological factors, act simultaneously on the biological processes.

Analysing the fruit's weight (g) and its equatorial diameter (mm) as averaged across the four years of study, cultivars Ludovan (9.76 g and 27.25 mm), Cociuvaș (9.70 g and 27.11 mm), Andreiaș (9.20 g and 25.87 mm), Miris (7.92 g and 25.01 mm) and Van (7.90 g and 25.05 mm) stood out statistically, showing significantly higher differences, followed by Margonia (6.72 g and 23.02 mm) and Scorospelka (5.75 g and 21.22 mm) that recorded significantly lower differences (Table 1).

Table 1

The fruit's physical characteristics in cherry cultivars
(RSFG Iași; average of 2021-2024; n=4)

Cultivars	Traits								
	Average weight of the fruit (g) ¹	Fruit's equatorial diameter (mm)	Stone's average weight (g) ²	Fruit/stone ratio	Stone in the fruit's weight (%)	Peduncle average weight (g)	Total weight of the waste (g)	Ratio between pulp and waste (%)	
								Pulp	Waste
Andreiaș	9.20 ^a	25.87 ^{ab}	0.35 ^a	27.15 ^{ab}	3.89 ^{ab}	0.0913 ^c	0.4413 ^a	95.203	4.797
Ludovan	9.76 ^a	27.25 ^a	0.31 ^{ab}	32.38 ^a	3.27 ^b	0.1020 ^{ab}	0.4120 ^a	95.779	4.221
Cociuvaș	9.70 ^a	27.11 ^a	0.31 ^{ab}	31.53 ^a	3.25 ^b	0.1018 ^b	0.4118 ^a	95.755	4.245
Miris	7.92 ^{ab}	25.01 ^b	0.26 ^b	31.75 ^a	3.33 ^b	0.0728 ^d	0.3328 ^b	95.798	4.202
Van	7.90 ^b	25.05 ^b	0.30 ^{ab}	26.55 ^b	3.79 ^b	0.0880 ^{cd}	0.3880 ^{ab}	95.089	4.911
Margonia	6.72 ^{bc}	23.02 ^{bc}	0.34 ^a	19.17 ^c	5.11 ^a	0.0933 ^{bc}	0.4333 ^a	93.552	6.448
Scorospelka	5.75 ^c	21.22 ^c	0.27 ^b	20.78 ^{bc}	4.85 ^a	0.1155 ^a	0.3855 ^b	93.296	6.704

DS 5%	0.30	0.47	0.017	2.32	0.26	0.0071	0.0206		
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¹- different letters correspond with the significant statistical difference for $P \leq 5\%$ Duncan test;

²- Stone weight: small = up to 0.26 g; medium = 0.27-0.40 g; high = 0.41 – 0,55 g; very high= more than 0.56 g (***, 2006).

In terms of stone weight, cultivars Miris (0.26 g) and Scorospelka (0.27 g) have a small stone, all the other genotypes having a medium size stone (0.30-0.35 g). Assessing the ratio (%) between pulp and waste (stone and peduncle) it was noticed that the pulp recorded values between 93.296 % (Scorospelka) and 95.798 % (Miris) (Table 1).

The dry substance content is extremely important in cherries as it directly influences the taste of the fruits [Kappel *et al.*, 1996]. According to our results, this parameter was between 14.7 °Brix for the early cultivar Scorospelka and 19.86 °Brix for Margonia. The ratio between the soluble dry substance and titratable acidity is the parameter that reflects the balance between the sweet and sour taste of the fruits, influencing the quality of the taste [Vangdal, 1985].

From this point of view, the cherry cultivars recorded values between 18.00 (Scorospelka, early cultivar) and 45.53 (Andreiaș, medium-maturity cultivar), all being considered highly appreciated (including cultivar Scorospelka, early cultivar, despite its lower dry substance content).

All the cultivars stood out with a high content of polyphenols, with values between 299.17 mg GAE 100 mL⁻¹ (Scorospelka) and 482.35 mg GAE 100 mL⁻¹ (Cociuvaș), recording statistical differences (Table 2).

Table 2

**Chemical composition of fruits in cherry cultivars
(RSFG Iași; average of 2021-2024; n=4)**

Cultivars	The soluble dry substance (°Brix) ¹	Titratable acidity (mg malic acid/100 mL ⁻¹)	SDS/TA ²	Total content of polyphenols (mg GAE 100mL ⁻¹)
Andreiaș	18.67 ^a	0.41 ^{cd}	45.53 ^a	322.14 ^c
Ludovan	18.04 ^a	0.49 ^c	36.81 ^{ab}	380.66 ^{ab}
Cociuvaș	18.41 ^a	0.52 ^c	35.40 ^b	482.35 ^a
Miris	17.09 ^b	0.55 ^{bc}	31.07 ^c	349.15 ^{bc}
Van	17.19 ^{ab}	0.60 ^{ab}	28.65 ^c	377.25 ^b
Margonia	19.86 ^a	0.59 ^b	33.66 ^{bc}	301.55 ^c
Scorospelka	14.70 ^b	0.78 ^a	18.84 ^{cd}	299.17 ^c
DS 5%	1.03	0.02	1.20	10.20

¹- different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test;

²- SDS/TA= the ratio between the soluble dry substance and titratable acidity.

In terms of certain physical traits of the fruits in the seven cherry cultivars, the fruit's taste is sweet and the epidermis colour ranged between yellow (Margonia) and dark red (Andreiaș, Ludovan, Cociuvaș, Miris, Van, Scorospelka). In cultivars Andreiaș, Ludovan, Margonia and Scorospelka, the fruit shape was heart-shaped, in cultivars Cociuvaș and Miris, the shape is kidney-shaped and in

cultivar Van, it is circular. In all the studied cultivars, the adherence of the pulp to the stone is absent and the pulp is firm, except for cultivar Scorospelka (early maturation cultivar), which has medium pulp firmness and shows adherence to the stone (Table 3). This parameter (pulp firmness) is an important quality trait, especially in fruits intended for fresh consumption [Kappel *et al.*, 2000].

In terms of the presence of the cork layer between the peduncle and fruit, it is absent only in Scorospelka, while in the other cultivars it is present (table 3). The presence of the cork layer is a positive characteristic as suberin is a component of the cork and it helps seal the peduncular cavity when the peduncle detaches, preventing juice loss and oxidation [Lugli, 2003].

Regarding the fruits resistance to cracking, all the studied cultivars showed a good resistance with recorded values under 19%, except for cultivar Van (43.9%) (Table 3).

Resistance to the fruit cracking phenomenon is very important as it helps avoid a reduction in economic efficiency [Milatović, 2011].

Table 3

**Physical, organoleptic and quality traits of the fruits in cherry cultivars
(RSFG Iași; average of 2021-2024; n=4)**

Cultivars	Epidermis Colour	Fruit' s shape	Pulp firmness	Pulp adherence to stone	Taste	Presence of the cork layer between peduncle and fruit ²	Fruit' s resistance to cracking (%) ¹
Andreiaș	Dark red	Heart-shaped	Firm	non-adherent	Very sweet	present	8.3 ^b
Ludovan	Dark red	Heart-shaped	Firm	non-adherent	Very sweet	present	3.5 ^{bc}
Cociuvaș	Dark red	Kidney-shaped	Firm	non-adherent	Very sweet	present	2.9 ^c
Miris	Dark red	Kidney-shaped	Firm	non-adherent	Very sweet	present	6.7 ^b
Van	Dark red	Circular	Firm	non-adherent	Very sweet	present	43.9 ^a
Margonia	Yellow	Heart-shaped	Firm	non-adherent	Sweet	present	2.1 ^c
Scorospelka	Bright red	Heart-shaped	medium	adherent	Sweet	absent	18.9 ^{ab}
DS 5%	-	-	-	-	-	-	1.0

¹- different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test;

All the traits of the studied fruits in this paper are very important for the marketing of cherries.

CONCLUSIONS

The analysis of the quality traits evaluated in the seven studied cherry cultivars showed statistical differences in all the determined parameters.

The cultivars stood out due to the exceptional quality of the fruits (size, sweet taste and fruit's colour, pulp firmness, it's non-adherence to the stone, the presence of the cork layer between the peduncle and fruit, high content in the most important chemical traits, representing a major source of antioxidant compounds) and a good resistance to the fruit's cracking phenomenon (Margonia, Cociuvaș, Ludovan, Miris, Andreiaș, Scorospelka).

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