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Biological properties and fruit quality of sweet cherry (*Prunus avium* L.) cultivars from Romanian assortment

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Abstract. The paper presents a 4-year study of the valuable characteristics in 15 autochthonous and cosmopolitan sweet cherry cultivars grown in northeastern Romania, named Moldavia area. Tree's vigour, resistance to frost and anthracnosis, the fructification phenophases, epidermis colour, organoleptic and quality traits of fruits and also fruit's and stone's size were evaluated. Weak tree vigour was find at 'Tereza', 'Ştefan' and 'Golia' cultivars. From end of flowering to harvesting time were determined 39–40 days for the early cultivars ('Scorospelka', 'Cătălina'), while for the late cultivars as 'Marina' and 'George' were identified 71–83 days. Eight cultivars have presented fruits' resistance to cracking with low values between 1.3–9.3% fruits cracked. Fruit's weight have varied between 5.9 g ('Scorospelka') and 9.2 g ('Andreiaş'), while fruit's equatorial diameter have varied between 22.4 mm ('George') and 25.8 mm ('Paulică'). The cultivars with the largest fruit's size were 'Andreiaş', 'Bucium', 'Ştefan', 'Paulică', 'Golia', 'Van' and 'Stella'. The values of the soluble solids content range between 14.4°Brix ('Scorospelka') to 20.0°Brix ('Bucium'), the titratable acidity has been between 0.39 ('Andreiaş') and 0.87 ('Cătălina') mg malic acid 100^{-1} mL juice and the total content of polyphenols has recorded values between 314.93–584.95 mg GAE 100^{-1} mL of fruit juice. The studied sweet cherry cultivars showed high variability but some got remarked through earliness, low vigour of the tree, large fruit's size or fruit's resistance to cracking.

Key words: cherries, features, fruit, quality, resistance, vigour.

INTRODUCTION

Sweet cherry tree (*Prunus avium* L.) is a fruit growing species very important given by the nutraceutical features of the fruits (Höfer & Giovannini, 2017; Quero-Garcia et al., 2017; Ganopoulos et al., 2018). Also, the price of sweet cherries is higher having early ripening time when other fruits are missing on market (Grădinariu & Istrate, 2003). In the last years new cultivars suitable for constant production, with low vigour of the trees, self-fertile with resistance to biotic or abiotic factors and ripening time at the extremities of the cherries' maturation season were approved (Sansavini & Lugli, 2008; Kazantzis et al., 2011; Schuster et al., 2014). Although this species is distinguished by a rather high ecological plasticity, the novelty of the assortment and the claims regarding the intensification of the trees' crop made it necessary to put experiments that would respond to the behaviour of the cultivars under the ecological conditions (Istrate & Petre, 2003).

In Romania, the surface of cherries increased in the last five years with about 1,000 ha being now at 7,058 ha with 90,837 tonnes as total production (FAO, 2018). The new orchards were established with very different cultivars, the farmers being interested by quality of fruits, but also for good resistance at climate conditions from the area (Hedhly et al., 2007; Asănică et al., 2013). Climate changes are subject to the recent research on plants having great influence in the development of phenological stages (Ansari & Davarynejad, 2008). Salazar-Gutierrez et al., 2014 observed that the damages due to the low temperatures from early springs is highly dependent on the stages of development of the flower buds at sweet cherry cultivars.

The trees vigour of sweet cherry is an important feature for decide the growing systems of the orchards but is high influenced by genotype (Chatzicharissis et al., 2013; Di Matteo et al., 2017) and also by the rootstock used for grafting (Hrotkó et al., 2009; Bujdosó & Hrotkó, 2019; Zhang et al., 2019). Also, the resistance of the diseases of new sweet cherry cultivars have influence in recommendations for introducing in orchards (Damianov et al., 2011).

Bujdosó et al., 2020 showed that the consumers from many countries prefer sweet cherries with fruits not very sweet taste, large size with more than 25.6 mm diameter, red color, reniform shape and medium long stalk. Olmstead et al., 2007 showed that fruit size is depending by cell length which was significantly influenced by the environment.

The paper presents the sweet cherry tree's valuable features of some autochthonous and cosmopolitan cultivars that improve the assortment with cultivars that have various maturation stages of the fruits sequenced during the entire cherries' maturation season.

MATERIALS AND METHODS

The studies were performed during 2015–2018, the research material consisted of 11 sweet cherry cultivars which were approved by Research Station for Fruit Growing (RSFG) Iaşi ('Cătălina', 'Ştefan', 'Golia', 'Tereza', 'Paulică', 'Maria', 'Iaşirom', 'Bucium', 'Andreiaş', 'Marina', 'George') and four cosmopolitan cultivars ('Scorospelka', 'Van', 'Stella', 'Kordia'). There were a total of 15 cultivars. Among them, two cultivars ('Scorospelka', 'Cătălina') were early fruiting cultivars followed by nine cultivars ('Ştefan', 'Golia', 'Tereza', 'Paulică', 'Maria', 'Iaşirom', 'Bucium', 'Andreiaş', 'Van', 'Stella', 'Kordia') and two late fruiting cultivars ('Marina', 'George'). The experimental area is located in the Northeastern part of Romania, near of Iași city (6 km distance), from the climate point of view being distinguished by the average multiannual temperature of 10.5 °C and 560.8 mm multiannual rain fall, with the maximum absolute temperature during the study period reaching 37.7 °C (2017) and the minimum absolute reaching -18.5 °C (2015). The soil was on chernozem, eroded, on löess and clay tiles, with loose and sandy texture, with pH 6.3–6.9, index N 3.21, mobile phosphorus content 47–75 (ppm) and mobile potassium content 175–500 (ppm).

The studied cultivars were grafted on *Prunus mahaleb* L. seedlings as rootstock and planted in the experimental plot in RSFG Iaşi. Distances were 4×5 m, the fruit trees were trained as palmette crown shape limited in height and on the row's direction, without sustaining and irrigation system. Nine trees (3 replications × 3 trees) per cultivar for 4 years were evaluated. On the trees' row, the soil has been worked with the lateral disk with filler and between the rows, the soil has been grassed.

Procedure the data recording

To estimate the blooming and fructification phenophases, the Flekinger and BBCH systems has been used as follows: stage E (61) - when the first flowers (5%) are open; stage g (67) - when 75% of the petals of the flowers fall off (Fleckinger, 1960; Meier, 2001). Fertility index was determined by percentage of resulted fruits after 25–30 days by petals' fall; cultivars with more 30–35% are considered highly productive (Cociu & Oprea, 1989). The tree vigour and some fruits parameters as taste, epidermis colour, pulp firmness and fruit's shape were describe in accordance with UPOV questionnaire TG/35/7, 2006 (UPOV, 2006).

To estimate the resistance to anthracnosis, 300 leaves were observed, determining the frequency of the attack (F% = number of attacked leaves from the total of observed leaves), the intensity of the attack (I% = it has been represented in percentage of the number of attacked leaves (n) and the attack degree (AD) that represents the leaf attack in percentages as: AD% = F × I/100 (Roşca et al., 2011).

To estimate the resistance to frost, 100 flowers per cultivar, from each third of the crown (down, up and the medium third) were analysed for the pistil's viability (ovaries, style and stigma) (Szabó et al., 1996).

To determine the average weight of the fruit and stone (g), 30 fruits and 30 stones have been weighed in three repetitions with the electronical balance Radwag; the fruit's equatorial diameter (D) has been determined with the digital calliper Luumytools for 30 fruits in three repetitions. The pulp firmness, the pulp's adherence to the stone and the fruit's taste have been estimated through tasting with marks from 1 to 9 (UPOV test). The resistance of fruits to cracking was determined by counting the cracked fruits after six hours immersed in distilled water with temperature of 20 °C (Cristensen method described by Webster & Looney, 1996).

The soluble dry substance of the fruit has been determined using the portable digital refractometer Zeiss (Brix degrees); titratable acidity of the fruits has been determined using the potentiometric method (Ghimicescu, 1977); the total content of polyphenols has been performed by the Folin-Ciocâlteu method (Jayaprakasha et al., 2001). The experimental data was statistically interpreted by ANOVA using Microsoft Office Excel package by the multiple comparisons method (Duncan test, with *P* 5%).

RESULTS AND DISCUSSION

Among 15 sweet cherry cultivars, three cultivars registered weak tree vigour as follows 'Tereza', 'Ştefan' and 'Golia' (Table 1). Regarding resistance to frost, during 19th - 21st of April 2017, time period when the sweet cherry tree is in the phase of complete bloom, there were recorded minimum temperatures of -2.5 °C and the branches of the trees were covered with a snow layer of approx. 10 cm for a time period longer than 24 hours, amplifying the effect of frost. Thus, the effect of extremely low temperatures on the pistil of the sweet cherry flowers in the given conditions was between 49% for 'George' (calculated through the pistil's degree of damage) and 75% for 'Ştefan'. Hence, the most affected cultivars have been 'Ştefan' (75%), 'Golia' (69%) 'Scorospelka' (68%) and 'Cătălina' (66%) and the least affected ones have been 'George' (49%), 'Tereza' (54.5%) and 'Maria' (54.8%) (Table 1). The sweet cherry tree blooms quite early and it is frequently caught by frost or hoar-frost that compromise largely the fruits' production of the year, so the resistance to frost is an extremely

important trait in cultivars (García et al., 2014). Under these conditions, the recently pollinated ovary was affected and at the same time, the production of fruits was largely compromised. These phenomenon were presented from others research too, so Prskavec & Kloutvor (1986) presented that the thermal limit of damages for cherry blossom was similar for different areas. Others researches showed that the cherry flowers are more affected by frost on bottom of the crown than the top (Iacobuţă, 1989; Budan & Grădinariu, 2000).

For the studied cultivars, the bloom phenological stage overlaps, allowing pollination even for the incompatible groups. García et al. (2014) has noticed that for the early and middle blooming types, it is important to produce enough flowers to have a normal production of sweet cherries. But, the phenological periods for the same sweet cherry cultivars are different and depending on the climatic conditions of each year (Darbyshire et al., 2012; Moghaddam et al., 2013). The order in which the sweet cherry cultivars grow into maturity is always kept the same, but the time interval between two sequencing cultivars can be longer or shorter. Also, Milić et al. (2015) showed that the fruit set could be different according with cultivar but Stepulaitienė et al. (2013) observed that generative organs of plants are most susceptible to spring frost and if these phenological phases are short, the damages will be lower.

Table 1. Tree's vigour, resistance to frost and anthracnosis in sweet cherry cultivars (RSFG Iasi; 2015–2018)

Cultivars	Tree's vigour[1]	Resistance to frost in the phenophase of full bloom (% affected ovaries)[2]	Resistance to anthracnosis (*Coccomyces hiemalis* Higg.)		
			F (%)	I (%)[3]	G.A. (%)
'Andreiaş'	5	58.3^{e}	3.6	4	0.14
'Bucium'	5	57.8^{e}	3.1	4	0.12
'Cătălina'	5	66.0^{d}	3.5	4	0.14
'George'	5	49.0^{f}	2.9	4	0.11
'Golia'	3	69.0^{b}	3.7	4	0.15
'Iaşirom'	5	60.0^{e}	2.9	4	0.11
'Kordia'	5	63.0^{d}	3.7	4	0.15
'Maria'	5	54.8^{f}	3.1	4	0.12
'Marina'	5	65.5^{d}	3.8	4	0.15
'Paulică'	5	64.0^{d}	3.6	4	0.14
'Scorospelka'	5	68.0^{c}	3.2	4	0.13
'Stella'	5	60.8^{e}	3.7	4	0.15
'Ştefan'	3	75.0^{a}	3.6	5	0.18
'Tereza'	3	54.5^{f}	3.2	4	0.13
'Van'	5	64.0^{d}	2.5	5	0.13

[1] – UPOV test: tree's vigour mark on a scale of 1–9: 3 = weak; 5 = average (***, 2006); [2] – different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test; [3] – the attack intensity mark (1–6 scale): 1 = 1–3% attacked surface; 2 = 4–10%; 3 = 11–25%; 4 = 26–50%; 5 = 51–75%; 6 = 76–100% (Cociu & Oprea, 1989).

In regards with resistance to diseases, 2016 and 2018, rainy years (with a surplus of 173 mm in 2016 and 73.5 mm in 2018), favourable for pathogens evolution, the cultivars expressed a low sensitivity to *Coccomyces hiemalis* Higg. (the attack frequency was between 2.5–3.8%) (Table 1). Bloom as the main phase of fructification takes place closely related to the evolution of the climate factors and most importantly the series of

active temperatures (temperatures above + 5 °C for sweet cherry). This phenological stage (bloom) took place during 03–28 April, between 7–12 days, crossed pollination being performed under good conditions (Table 2). During 2015–2018, the studied cultivars bloomed the earliest in 2016, at the beginning of April (2–7 April) and the latest in 2015, in the second half of April (15–18 April). All the studied cultivars are highly productive because the values of the natural fertility index are above 30% (Table 2).

The harvesting maturity was recorded in the second and third decades of May for the early cultivars ('Cătălina', 'Scorospelka'), the first and second decades of June for the cultivars with middle fruit maturation season ('Golia', 'Bucium', 'Ştefan', 'Iaşirom', 'Andreiaş', 'Stella', 'Van', 'Kordia', 'Paulică', 'Iaşirom', 'Maria') and the first and second decades of July for the late cultivars ('Marina', 'George'). The number of days from the end of bloom to the harvesting maturity has been between 39–40 days for the early cultivars ('Scorospelka', 'Cătălina'), 47–57 days for the cultivars with middle maturation season ('Golia', 'Bucium', 'Ştefan', 'Iaşirom', 'Andreiaş', 'Stella', 'Van', 'Kordia', 'Paulică', 'Iaşirom', 'Maria') and 71–83 days for the late cultivars ('Marina', 'George') (Table 2).

Table 2. The fructification phenophases running in sweet cherry cultivars (RSFG Iasi; 2015–2018)

Cultivars	Beginning of bloom (stage E; date)	End of bloom (stage G; date)	Bloom duration (no. of days[1])	Natural fertility (%)	Harvesting maturity (date)	No. of days between end of bloom and harvesting maturity[1] n = 5
	Limit data (the earliest - the latest)					
'Andreiaş'	04 IV–17 IV	14 IV–28 IV	12[a]	49.8	06 VI–10 VI	47[i]
'Bucium'	06 IV–17 IV	14 IV–24 IV	9[e]	35.3	07 VI–12 VI	51[f]
'Cătălina'	02 IV–15 IV	10 IV–22 IV	9[e]	30.1	17 V–31 V	39[j]
'George'	04 IV–18 IV	14 IV–26 IV	10[b]	32.1	06 VII–15 VII	83[a]
'Golia'	05 IV–17 IV	14 IV–24 IV	9[e]	66.1	06 VI–12 VI	51[f]
'Iaşirom'	04 IV–17 IV	12 IV–23 IV	8[e]	35.9	05 VI–10 VI	50[g]
'Kordia'	04 IV–16 IV	14 IV–19 IV	8[e]	31.0	08 VI–18 VI	57[c]
'Maria'	04 IV–17 IV	11 IV–24 IV	8[e]	42.5	06 VI–12 VI	52[e]
'Marina'	04 IV–17 IV	11 IV–26 IV	9[e]	36.8	19 VI–06 VII	71[b]
'Paulică'	03 IV–16 IV	11 IV–25 IV	10[b]	48.6	07 VI–16 VI	49[h]
'Scorospelka'	05 IV–15 IV	11 IV–21 IV	7[e]	30.2	18 V–01 VI	40[j]
'Stella'	04 IV–18 IV	14 IV–25 IV	10[b]	34.4	05 VI–16 VI	53[d]
'Ştefan'	07 IV–17 IV	14 IV–26 IV	9[e]	38.4	06 VI–10 VI	48[i]
'Tereza'	05 IV–17 IV	14 IV–24 IV	9[e]	38.5	07 VI–10 VI	50[g]
'Van'	04 IV–16 IV	14 IV–18 IV	7[e]	41.8	08 VI–16 VI	56[c]

[1] – different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test.

The sequencing of fruits maturation for the studied sweet cherry cultivars ensure a varietal range for a period of 46–51 days, ensuring continuous market supply. To highlight the cultivars, there have been measurements concerning physical traits (epidermis colour, pulp firmness, fruit's shape, pulp adherence to stone), organoleptic traits (taste) and quality traits (fruits' resistance to cracking), average weight of fruit and stone, percentage of the stone from the fruit's weight, fruit's dimensions (equatorial

diameter), chemical composition of fruits (content in soluble dry substance, titratable acidity, ration between soluble dry substance and titratable acidity, total content of polyphenols). In terms of physical and organoleptic traits of the fruits, the epidermis colour was from bi-coloured ('Paulică', 'Marina'), bright red ('Scorospelka'), shiny red ('Maria', 'Stella', 'George') to dark red ('Bucium', 'Van', 'Kordia', 'Ştefan', 'Golia', 'Tereza', 'Andreiaş', 'Cătălina', 'Iaşirom'). For the 'Scorospelka', 'Cătălina' and 'Stella' cultivars, the pulp firmness was medium, while, for the rest of the cultivars, it was firm. All the cultivars have a sweet taste and are deficient in pulp adherence to stone.

Regarding the resistance of fruits to cracking, eight cultivars have presented superior qualities with low values of cracked fruits between 1.3–9.3% (Table 3). The fruits' cracking is a phenomenon particular to cherry and can making to lose up to 90% from the fruits production (Milatović, 2011). Our results showed a good resistance to fruit cracking at 'Iaşirom' and 'Paulică' with just 1.3% and respectively 3.3% fruits cracked compared with 'Stella' or 'Van' with 74% and respectively 46.8%. Balbontin et al., 2013 showed that sweet cherry cultivars have considerable differences in cracking susceptibility but no one cultivar totally tolerant to the problem.

Table 3. Epidermis colour, organoleptic and quality traits of fruits in sweet cherry cultivars (RSFG Iasi; 2015–2018)

Cultivars	Epidermis colour[1]	Pulp firmness[2]	Fruit's shape[3]	Pulp adherence to stone	Taste[4]	Fruit's resistance to cracking (%)[5]
'Andreiaş'	7	7	1	non-adherent	7	5.5[g]
'Bucium'	7	7	1	non-adherent	7	17.8[d]
'Cătălina'	7	5	1	non-adherent	7	6.0[g]
'George'	5	7	1	non-adherent	7	5.8[g]
'Golia'	7	7	1	non-adherent	7	7.5[g]
'Iaşirom'	7	7	1	non-adherent	7	1.3[g]
'Kordia'	7	7	1	non-adherent	7	22.1[c]
'Maria'	5	7	1	non-adherent	7	9.3[g]
'Marina'	2	7	1	non-adherent	7	13.3[f]
'Paulică'	2	7	2	non-adherent	7	3.3[g]
'Scorospelka'	4	5	3	adherent	5	17.5[d]
'Stella'	5	5	1	non-adherent	7	74.0[a]
'Ştefan'	7	7	1	non-adherent	7	15.8[e]
'Tereza'	7	7	1	non-adherent	7	6.3[g]
'Van'	7	7	4	non-adherent	7	46.8[b]

[1] – UPOV test: mark for epidermis colour on the scale 1–8: 1 = yellow; 2 = yellow with red (bi-coloured); [4] = bright red; 5 = shiny red; 7 = dark red (***, 2006); [2] – UPOV test: mark for pulp firmness on the scale 3–9: 3 = soft; 5 = average; 7 = firm (***, 2006); [3] – UPOV test: mark for the fruit's shape on the scale 1–5: 1 = heart-shaped; 2 = kidney-shaped; 3 = oblong; [4] = circular (***, 2006); [4] – UPOV test: mark for fruit's taste on the scale 3–7: 5 = average sweet; 7 = very sweet (***, 2006); [5] – different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test.

The average weight of the fruit and the equatorial diameter range between 5.9 g ('Scorospelka') and 9.2 g ('Andreiaş') and 22.4 mm ('George') and 25.8 mm ('Paulică'). Therefore, the cultivars with the highest fruit's dimensions have been 'Andreiaş', 'Bucium', 'Ştefan', 'Paulică', 'Golia', 'Van' and 'Stella' (Table 4). The weight and the equatorial diameter of the fruit are traits influenced by the climatic conditions, the applied

technology, rootstock or the biological particularities of each cultivar (Ballistreri et al., 2013; Zeman et al., 2013; Maglakelidze et al., 2015). Our results are consistent with other research regarding the pomological characteristics of some sweet cherry cultivars (Radicevic et al., 2008; Faniadis et al., 2010; Kask et al., 2010; Fotirić Akšić & Nikolić, 2013; Pal et al., 2017). Bieniek et al. (2011) showed that the average over three years of the sweet cherry fruits' weight has ranged between 3.78 g and 6.45 g under the soil and climate conditions from Lithuania.

The small proportion (%) that the stone has for the studied cultivars is noteworthy (3.60–5.64%) (Table 4).

Table 4. Physical features of the fruit in sweet cherry cultivars (RSFG Iasi; average 2015–2018)

Cultivar	Fruit's average weight (g)[1]	Fruit's equatorial diameter (mm)[1]	Stone's average weight (g)[1]	Stone from the weight of the fruit (%)[1]
'Andreiaş'	9.2[a]	24.6[b]	0.33[b]	3.61[d]
'Bucium'	8.7[b]	24.9[b]	0.31[f]	3.60[d]
'Cătălina'	7.3[f]	23.6[c]	0.32[e]	4.36[d]
'George'	6.1[f]	22.4[c]	0.34[a]	5.64[a]
'Golia'	7.8[d]	24.2[b]	0.30[g]	3.86[d]
'Iaşirom'	6.4[f]	23.3[c]	0.27[i]	4.27[d]
'Kordia'	6.7[f]	23.4[c]	0.32[c]	4.89[b]
'Maria'	7.0[f]	23.8[c]	0.25[j]	3.63[d]
'Marina'	7.2[f]	23.8[c]	0.32[e]	4.56[c]
'Paulică'	7.8[d]	25.8[a]	0.32[d]	4.15[d]
'Scorospelka'	5.9[f]	22.4[c]	0.24[k]	3.96[d]
'Stella'	7.5[e]	24.6[b]	0.30[g]	3.82[d]
'Ştefan'	8.2[c]	24.6[b]	0.34[a]	4.12[d]
'Tereza'	7.0[f]	24.2[b]	0.27[i]	3.86[d]
'Van'	7.8[d]	24.7[b]	0.28[h]	3.73[d]

[1] – different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test.

The chemical composition of the fruits represents a major source of antioxidant compounds (Coşofreţ et al., 2006; Beceanu, 2008; Usenik et al., 2008). The recorded data for the chemical composition of the fruits highlights the values for all the parameters studied for each cultivar (Table 5). The content in dry substance is extremely important in sweet cherries as the taste of the fruits depends highly on it. The soluble dry substance was between 14.4 °Brix ('Scorospelka') and 20.0 °Brix ('Bucium'). The values recorded in the soluble dry substance content of the fruits are according with other similar studies (Vursavus et al., 2006; Jänes et al., 2010; Papapetros et al., 2018). The titratable acidity range in large limits, the values being between 0.39% ('Andreiaş') and 0.87% ('Cătălina') (Table 5). The ratio between the soluble dry substance and the titratable acidity is considered important to determine the fruit taste, reflecting the balance between the sweet and the sour taste of fruits (Crisosto et al., 2002).

In this regard, the sweet cherry cultivars have recorded values between 18.00 at 'Scorospelka', an early cultivar and 43.59 at 'Andreiaş', an average ripening time cultivar being very appreciated. The total content of polyphenols is an important trait for determining the taste and the flavour of cherries and it has an antioxidant role with

anticancer effect (Chaovanalikit & Wrolstad, 2004; Melicháčová et al., 2010; Skrzyński et al., 2016; Hallmann & Rozpara, 2017; Nizioł-Łukaszewska, 2019).

Table 5. Bio-chemical traits of the fruits in sweet cherry cultivars (RSFG Iasi; average 2015–2018)

Genotype	SDS (°Brix)[2]	Titratable acidity (mg malic acid 100^{-1} mL fruit juice)[3]	SDS: TA[4]	Total content of polyphenols (mg GAE 100^{-1} mL fruit juice)
'Andreiaş'	17.0[c]	0.39[n]	43.59[a]	362.55[g]
'Bucium'	20.0[a1]	0.57[k]	35.09[c]	424.43[b]
'Cătălina'	18.3[b]	0.87[a]	21.03[h]	378.21[f]
'George'	17.7[b]	0.42[m]	42.14[b]	324.12[i]
'Golia'	18.7[b]	0.61[i]	30.66[e]	410.79[c]
'Iaşirom'	19.4[b]	0.47[l]	41.27[b]	584.95[a]
'Kordia'	18.3[b]	0.69f	26.52[f]	400.12[d]
'Maria'	19.9[a]	0.65[h]	30.61[e]	404.36[d]
'Marina'	16.3[c]	0.75[d]	21.73[h]	369.85[g]
'Paulică'	17.2[c]	0.72[e]	23.80[g]	314.93[j]
'Scorospelka'	14.4[c]	0.80[c]	18.00[i]	343.27[h]
'Stella'	18.7[b]	0.81[b]	23.09[g]	335.18[h]
'Ştefan'	19.1[b]	0.72[e]	26.53[f]	381.46[e]
'Tereza'	19.2[b]	0.58[j]	33.10[d]	372.46[f]
'Van'	17.5[b]	0.66[g]	26.52[f]	398.22[d]

[1] – different letters correspond with the significant statistical difference for $P \leq 5\%$, Duncan test; [2] – SDS = the soluble dry substance; [3] – TA = the titratable acidity; [4] – SDS/AT = the ratio between the soluble dry substance and titratable acidity.

All the cultivars got noted with a high content of polyphenols, the values being between 314.93 mg GAE 100^{-1} mL fruit juice ('Paulică') and 584.95 mg GAE 100^{-1} mL fruit juice ('Iaşirom'), recording statistical differences (Table 5). All the studied cultivars have a sweet taste and a pleasant flavour.

CONCLUSIONS

The studied sweet cherry cultivars ('Scorospelka', 'Cătălina', 'Ştefan', 'Golia', 'Tereza', 'Paulică', 'Maria', 'Iaşirom', 'Bucium', 'Andreiaş', 'Van', 'Stella', 'Kordia', 'Marina' and 'George') showed high variability of all the determined and analysed parameters.

The cultivars were remarked through earliness ('Scorospelka' and 'Cătălina') or lateness ('Marina' and 'George') with fruits production at the extremities of the harvesting time and then with good prices on market.

Cultivars with low vigour of the trees ('Ştefan', 'Golia' and 'Tereza') are suitable for the establishing the new orchards with high density of the trees.

Cultivars with high quality of fruits and fruits' resistance to cracking ('Iaşirom', 'Paulică', 'Andreiaş', 'George', 'Cătălina', 'Tereza', 'Golia', 'Maria', 'Marina' and 'Ştefan') can be recommended to be cropped in the Northeast areas of Romania and also for others areas with similar climate conditions.

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