

THE ASSESSMENT OF POMOLOGICAL PARAMETERS IN SOUR CHERRY TREES (*PRUNUS CERASUS* L) UNDER THE CONDITIONS FROM THE N-E OF ROMANIA

EVALUAREA UNOR PARAMETRI POMOLOGICI LA VIȘIN (*PRUNUS CERASUS* L) ÎN CONDIȚIILE ZONEI DE N-E A ROMÂNIEI

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Abstract: *The paper presents aspects about the influence of the environment factors between 2018-2020 on growth and fructification in sour cherry cultivars. In 2018 (530.5 mm), 2019 (415.0 mm) and 2020 (245.2 mm in the first seven months of the year), the quantities recorded were below the multiannual limit (562.6 mm). The largest surface of the trunk was recorded for Erdi Bibor (14.8 cm²) with positively significant distinct difference in comparison with the variants average (8.9 cm²), while the smallest surface was for Erdi Ipari (3.7 cm²) with negatively significant distinct difference. The highest number of twigs was recorded for the Rival (41.5 cm) and Erdi Kedves (47.7 cm) cultivars. The average weight and equatorial diameter of the fruit was between 2.9 g with 16.1 mm for the Stelar cultivar and 6.3 g with 22.4 mm for the Erdi Bibor cultivar.*

Keywords: measurements, shoots, cultivars, trunk, sour cherry tree

Rezumat: *Lucrarea prezintă unele aspecte privind influența factorilor de mediu din anii 2018 – 2020 asupra creșterii și fructificării unor soiuri de vișin. În anii 2018 (530,5 mm), 2019 (451,0 mm) și 2020 (245,2 mm în primele șapte luni ale anului) s-au înregistrat cantități sub limita multianualei (562,6 mm). Cea mai mare suprafață a trunchiului s-a înregistrat la soiul Erdi Bibor (14,8 cm²) cu diferență distinct semnificativ pozitivă în comparație cu media variantelor (8,9 cm²), iar cea mai scăzută la soiul Erdi Ipari (3,7 cm²) cu diferență distinct semnificativă negativ. Cel mai mare număr de creșteri anuale pe pom s-au înregistrat la soiurile Erdi Bibor (28 buc), Erdi Kordi (21 buc) și Rival (21 buc). Cele mai scurte creșteri s-au înregistrat la soiurile Rival (41,5 cm) și Erdi Kedves (47,7 cm). Greutatea medie și diametrul ecuatorial al fructului a fost cuprinsă între 2,9 g cu 16,1 mm la soiul Stelar și 6,3 g cu 22,4 mm la soiul Erdi Bibor.*

Cuvinte cheie: determinări, lăstari, soiuri, trunchi, vișin

INTRODUCTION

The sour cherry tree crops have an old tradition in Romania. The various amount of cultivars and local populations of sour cherry represent the evidence. Among them, we mention the old cultivars Mocănești and Crișane (Grădinariu and Istrate, 2003; Sestraș, 2004). This species is important economically due to their nutritive, technological and commercial traits of the fruits and the biological

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properties of the trees, capitalising a large diversity of pedoclimatic conditions in fields, hilly and even submountaneous areas (Parnie *et al.*, 1985; Parnia *et al.*, 1995; Istrate, 2007).

Fruits are highly demanded for consumption as they reach maturity when there are no other fruits on the market. They are targeted both for fresh consumption and industrial processing (Ghena and Braniște, 2003).

The sour cherry is a species with moderate claims for water and temperature. However, the lack or insufficiency of water in the soil determines the deterioration of the chemical and agrobiological processes with important negative consequences in trees growth and fructification. Hence, the critical phases from the vegetation period when the water consumption is at its peak are: shoots growth and fruits bloom and growth (Milică *et al.*, 1982; Toma and Robu, 2000; Ghena and Braniște, 2003).

In 2018 (530.5 mm), 2019 (451.0 mm) and 2020 (245.2 mm in the first seven months of the year), quantities below the multiannual limit (562.6 mm) were recorded, achieving a deficit of 32.1 mm in 2018, 111.6 mm in 2019 and 163.5 mm between January-July 2020 (this climate variability influenced the biometric growth and trees production negatively for this area).

The paper presents aspects concerning the influence of the environment factors between 2018-2020 on growth and fructification in sour cherry cultivars.

MATERIAL AND METHOD

The research was led between 2018-2020, using eight sour cherry cultivars as research material: three autochthonous cultivar (De Botoșani, Stelar and Rival) and five cultivars originating from Hungary (Erdi Ipari, Erdi Kedves, Erdi Bibor, Erdi Kordi and Dukat), grafted on mahaleb.

The trees are planted at 3,5 x 4 m guided as free flattened palmette. On the row of trees, the soil has been prepared with the rotary orchard tiller and between the rows, the soil has been grassed. The control of diseases and pests was performed in accordance with the received warnings, using phytosanitary treatments. The land for plantation is located in the Jijia-Bahlui depression, where the annual average temperature was 10.7°C in 2018, 11.4°C in 2019 and 11.7°C in the first seven months of 2020 (the multiannual average being 10.4°C).

The meteorological factors were analysed (for the three years). Measurements and biometrical determinations of the tree and shoots (trunk section area, annual twigs length and the amount of twigs per tree) were performed, the main fructification phenophases were determined (Fleckinger, 1960); measurements and determinations were performed (according to UPOV TG/230/1 questionnaire) regarding the fruit's size (the fruit's and the stone's weight (g), equatorial diameter (mm), the fruit/stone ratio and the soluble dry substance (SDS%).

The experimental data was interpreted statistically by analysing the variance.

RESULTS AND DISCUSSIONS

The thick growth of the trunk section area till the fourth year from planting was different among cultivars and for each cultivar every year (tab. 1). The annual

growth was between 2.6 cm² and 7.9 cm². The largest trunk area was recorded for cultivar Erdi Bibor (14.8 cm²) with positively distinct significant difference in comparison with the variants average and the smallest trunk area for cultivar Erdi Ipari (3.7 cm²) with negatively distinct significant difference.

Table 1

Trees' growth vigour till year IV from planting (RSFG Iași; 2018-2020)

Cultivar	Trunk section area (cm ²)				
	Trunk annual growth	Trunk section area 2020	Calculated in comparison with the variants average		
			%	Difference	Significance
Erdi Bibor	7.5	14.8	166.2	5.9	++
Stelar	7.8	11.2	125.8	2.3	
Erdi Kedves	7.4	10.6	119.1	1.7	
Erdi Kordi	7.9	10.1	113.4	1.2	
Dukat	6.3	9.7	108.9	0.8	
X (Average)		8.9	100	0	
Rival	3.7	5.9	66.2	-3.0	
De Botosani	4.3	5.7	64.0	-3.2	
Erdi Ipari	2.6	3.7	41.6	-5.2	00

LSD 5% = 3.7 cm²LSD 1% = 5.2 cm²LSD 0.1% = 7.2 cm²

In August 2018, 2019 and 2020, when the shoots growth slowed down (on top of the shoots appeared the apical bud), the annual twigs were counted and their length was measured in 8 sour cherry cultivars. The highest number of annual twigs per tree were recorded for cultivars Erdi Bibor (28 pieces), Erdi Kordi (21 pieces) and Rival (21 pieces), however, statistically non-significant in comparison with the variants average (18 pieces) and the smallest amount of annual twigs per tree were recorded for cultivars Dukat (13 pieces), De Botoșani (14 pieces), Erdi Ipari (15 pieces) (tab. 2).

Table 2

Data regarding the amount of annual twigs per tree (RSFG Iași; 2018-2020)

Cultivar	Annual twigs (pieces)			
	Average amount of annual twigs per tree -pieces-	Calculated in comparison with the variants average		
		%	Difference	Significance
Erdi Bibor	28	155.5	10	
Erdi Kordi	21	166.6	3	
Rival	21	166.6	3	
Stelar	19	105.5	1	
X (Average)	18	100	0	
Erdi Kedves	17	94.4	-1	
Erdi Ipari	15	83.3	-3	
De Botosani	14	77.7	-4	
Dukat	13	72.2	-5	

LSD 5% = 25 pieces

LSD 1% = 35 pieces

LSD 0.1% = 49 pieces

The longest annual twigs were recorded for cultivars Dukat (68 cm) and Erdi Bibor (59.4 cm), statistically non-significant and the shortest twigs were recorded for cultivars Rival (41.5 cm) and Erdi Kedves (47.7 cm) (tab. 3).

Table 3

Data regarding shoots' length (RSFG Iași; 2018-2020)

Cultivar	Average length of the shoots (cm)			
	Average length of the shoots -cm-	Calculated in comparison with the variants average		
		%	Difference	Significance
Dukat	68.0	126.6	14.3	
Erdi Bibor	59.4	110.6	5.7	
Erdi Kordi	55.3	102.9	1.6	
Erdi Ipari	55.2	102.8	1.5	
X (Average)	53.7	100	0	
Stelar	51.5	95.9	-2.2	
De Botosani	51.2	95.3	-2.5	
Erdi Kedves	47.7	88.8	-6.0	
Rival	41.5	77.3	-12.2	

LSD 5% = 18.4 cm

LSD 1% % = 25.6 cm

LSD 0.1% % = 35.6 cm

From the phenological observations that took place between 2018-2020, it can be noticed that most of the cultivars go in the bloom age around the same time (tab. 4). The beginning of bloom for the studied cultivars took place between the 10th and the 21th of April and the end of bloom took place between the 19th of April and the 01th of May, with bloom duration between 5-15 days, when the cultivars pollinated each other.

In terms of fruits ripening, they take place on a 30 days period, beginning with the early cultivars Erdi Ipari, Stelar and Erdi Kordi (2.06) and ending with cultivar De Botoșani (1.07) and the number of days from the end of bloom to maturation was between 37-74 (tab. 4).

Table 4

The main fructification phases for the studied sour cherry cultivars (RSFG Iași; 2018-2020)

Cultivar	Beginning of bloom (phase E)	End of bloom (phase G)	Bloom duration (no. of days)	Fruits maturation date	No. of days from end of bloom to maturation
Limit dates (the earliest-the latest):					
Dukat	15.04-21.04	19.04-1.05	5-11	15.06	56-58
Erdi Bibor	10.04-15.04	19.04-26.04	9-12	15.06	51-58
Erdi Kordi	15.04-19.04	19.04-28.04	5-10	2.06	36-45
Erdi Ipari	10.04-15.04	19.04-23.04	9-10	2.06	41-45
Stelar	10.04-16.04	19.04-27.04	10-12	2.06	37-45
De Botosani	11.04-13.04	19.04-27.04	9-15	1.07	66-74
Erdi Kedves	10.04-18.04	19.4-26.04	9-10	-	-
Rival	13.04-20.04	19.04-30.04	7-11	15.06	47-58

The small age of the trees (4 years from planting) only allows a limited amount of estimations concerning the studied cultivars' behaviour, after the first year of fructification (tab. 5).

The fruit's weight is a size influenced by the local climate conditions and by the biological particularities of each cultivar. Thus, the average weight and equatorial diameter of the fruit was between 2.9 g with 16.1 mm for cultivar Stelar and 6.3 g with 22.4 mm for cultivar Erdi Bibor.

In terms of stone's size, the genotypes recorded a weight between 0.20-0.43 g, representing a small to middle size according to the UPOV questionnaire. The fruit/stone ratio was between 12.3 (Rival) and 21.3 (Dukat).

Table 5

The physical-chemical traits recorded in year IV from planting in sour cherry cultivars (RSFG Iași; 2018-2020)

Cultivar	Fruit's average weight -g-	Stone's average weight -g-	Fruit/stone ratio	Fruit's equatorial diameter -mm-	SDS %
Dukat	4.9	0.23	21.3	20.0	15.7
Erdi Bibor	6.3	0.32	19.7	22.4	17.1
Erdi Kordi	5.9	0.28	21.1	22.0	13.9
Erdi Ipari	3.3	0.20	16.5	17.0	15.9
Stelar	2.9	0.23	12.6	16.1	20.1
De Botoșani	4.9	0.30	16.3	20.0	15.2
Rival	5.3	0.43	12.3	20.3	14.1

The content in dry substance varied between 13.9% (Erdi Kordi) and 20.1% (Stelar) (tab. 5).

CONCLUSIONS

1. The lack of water determines a low vigour of the trees, disorders in fruits' development, it reduces the number and the growth of annual shoots, it reduces the photosynthesis and the transport of substances inside the plant and it decreases the cells turgor pressure.

2. In terms of rainfall, years 2018, 2019 and 2020 were droughty years, with a deficit of 32.1 mm in 2018, 111.6 mm in 2019 and 163.5 mm between January-July 2020.

3. Analysing the trunk section area it was noticed that cultivars Erdi Ipari, Rival and De Botoșani had the lowest vigour.

4. In terms of annual twigs length, cultivars Dukat, Erdi Bibor, Erdi Kordi and Erdi Ipari got highlighted with values between 55.2 cm and 68.0 cm and the cultivars with the highest number of annual twigs per tree that got highlighted were Erdi Bibor, Erdi Kordi and Rival with values between 21 and 28 pieces.

5. Analysing the values of fruit's size, cultivars Erdi Bibor (6.3 g and 22.4 mm), Erdi Kordi (5.9 g and 22.0 mm), Rival (5.3 g and 20.3 mm), De Botoșani and Dukat (4.9 g and 20.0 mm) got highlighted.

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