

RESEARCH ON THE BEHAVIOR OF SOME SWEET CHERRY CULTIVARS IN IASI AREA

CERCETĂRI PRIVIND COMPORTAREA UNOR SOIURI DE CIREȘ ÎN ZONA IAȘI

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Abstract. *The aim of the paper is to present the valuable features of sweet cherry cultivars obtained at RSFG Iasi but also of some foreign cultivars which improve the range with different fruit ripening period throughout during entire harvest season. Regarding on the three years average yield (2015-2017) it is reported statistically that all the cultivars recorded insignificant differences compared to the average of cultivars (20.3 kg/tree) with values between 16.7 kg/tree (Cătălina) and 24.3 kg/tree (Marina). In terms of weight and equatorial diameter of fruits, Cetățuia (5.0 g respectively 21.07 mm) recorded significant negative differences compared to the average of the variants (6.9 g and 23.53 mm) and all cultivars taken in the study registered insignificant differences compared with control.*

Key words: assortment, sweet cherry, cultivars, fruit, quality

Rezumat. *Scopul lucrării este de a prezenta caracterile valoroase ale unor soiuri de cireș create la SCDP Iași și ale unor soiuri cosmopolite care îmbunătățesc sortimentul autohton cu soiuri cu diferite epoci de maturare a fructelor eșalonate pe tot parcursul sezonului de recoltare. Referitor la producțiile medii pe trei ani (2015-2017), din punct de vedere statistic, se constată că toate soiurile luate în studiu au înregistrat diferențe nesemnificative față de media soiurilor (20,3 kg/pom), valorile fiind cuprinse între 16,7 kg/pom (Cătălina) și 24,3 kg/pom (Marina). Sub aspectul greutatei fructelor și a diametrului ecuatorial, soiul Cetățuia (5,0 g și 21,07 mm) a înregistrat diferențe semnificativ negative față de media variantelor (6,9 g și 23,53 mm), iar celelalte soiuri luate în studiu au înregistrat diferențe nesemnificative.*

Cuvinte cheie: sortiment, cireș, soiuri, fruct, calitate

INTRODUCTION

The soil and climate conditions from the NE area of Romania are favourable to grow sweet cherry trees, excepting a few years when natural calamities occurred (on the 19th of April 2017 when the sweet cherry tree was in bloom, the minimum temperature got to -2.5°C, affecting the flower's pistil and compromising the production of fruits).

The promoting of a sweet cherry assortment that can make production every year, having low vigour trees, with valuable self-fertile cultivars that are productive, resistant to biotic and abiotic factors and have ripening time at the

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extremities of the sweet cherries season is a permanent work of the researchers (Budan *et al.*, 1997; Budan and Grădinariu, 2000; Cociu, 1990; Petre, 2006).

Although the sweet cherry tree is characterised as having a high ecological plasticity, the novelty of the assortment and the claims that refer to the intensification of this species' crops imposed the necessity to place comparative crops responsible to respond at the behaviour of the cultivars to the ecological conditions from the Iași area and at the trees' density per surface unit (Istrate and Petre, 2003).

The aim of the paper is to present the valuable features of sweet cherry cultivars obtained at RSFG Iasi but also of some foreign cultivars which improve the range with different fruit ripening period throughout during entire harvest season.

MATERIAL AND METHOD

The studies have been performed during 2015-2017, using as research material, six sweet cherry cultivars created at SCDP Iași, homologated during 1999 - 2007 (Cetățuia, Cătălina, Maria, Bucium, Marina and George) and three cosmopolitan cultivars (Stella, Van and Kordia), each grafted on mahaleb.

Competition comparative crops have been placed linearly, in three repetitions of 3 trees, at a distance of 5 x 4 m and they have been trained as free flattened palmette canopy without sustaining system or irrigations system. On the row with trees, the soil has been prepared using the lateral disk with palpation and between the rows with trees, the soil has been grassed. The control of diseases and pests has been done in regard to the received warnings, phytosanitary treatments being performed.

In the experimental plantation, observations and measurements concerning the trees' vigour, main growing phenophases and fructification (Fleckinger, 1960) and concerning resistance to anthracnosis and monilia have been performed.

The experimental data have been statistically interpreted by analysing the variance.

RESULTS AND DISCUSSIONS

The cultivars chosen for study have medium vigour and concerning the resistance to diseases, as 2016 has been a rainy year (with an excess of 173 mm), a year that was favourable for pathogenic evolution (monilia and anthracnosis), they manifested a slight sensibility both to anthracnosis (the attack frequency being between 1.8-3.8%) and to monilia (the attack frequency being between 1.8-3.3%) (tab. 1). This fact, associated with the degree of attack which was reduced for aphids (0.09-5.00%), gives the possibility to assure an economical harvesting volume with healthy trees during the entire year by applying 5-6 chemical treatments at the optimal moments.

The tree's characteristics in two sweet cherry cultivars
(RSFG Iași; average 2015-2017)

Genotype	Tree's vigour*	Resistance to:					
		Leaves' anthracnosis** (<i>Coccomyces hiemalis</i> Higg.)			Monilia** (on fruits) (<i>Monilinia fructigena</i>)		
		F%	I%**	G.A.%	F%	I%**	G.A.%
Cetățuia	5	1.9	5	0.04	2.9	10	0.04
Cătălina	5	3.1	5	0.06	2.8	10	0.06
Bucium	5	2.9	5	0.06	3.3	10	0.07
Maria	5	2.0	5	0.04	1.8	5	0.04
Van	5	2.2	10	0.04	2.8	5	0.06
Stella	5	2.0	5	0.04	1.8	5	0.04
Kordia	5	1.8	5	0.04	2.8	10	0.06
Marina	5	2.1	5	0.04	2.2	15	0.07
George	5	3.8	5	0.08	2.1	5	0.04

*- degree of tree's vigour on a 1-9 scale: 1= very weak; 3= weak; 5 = middle; 7= strong; 9= very strong (***, 2006)

** - the degree of attack intensity on a 1-6 scale: 1 = 3% attacked area; 3 = 25%; 4 = 50%; 6 = 100% (Cociu and Oprea, 1989)

The beginning of flowering for the studied sweet cherry cultivars during 2015-2017 was recorded between the 1st and 18th of April and the end of flowering between 8th and 26th of April (tab. 2)

In 2016 the flowering was launched with 7-16 days earlier in comparison with 2015 and 2017. The duration of the flowering has been between 6-11 days, while the nine sweet cherry cultivars have pollinated each other.

The higher the temperatures, the earlier the flowering epoch takes place.

The harvesting maturity was recorded in the second (Cetățuia) and third decade (Cătălina) of May for all the early cultivars, in the first (Bucium, Maria, Stella, Kordia) and second decade (Van) of June for all the middle cultivars and in the first decade of July (Marina, George) for the late cultivars, the number of days from the end of flowering to maturation ranging between 33-84 days (tab. 2).

Regardless the climatic conditions of the year, the order in which the sweet cherry cultivars get to maturity maintains every time the same, the difference being that the time interval between two successive cultivars is longer or shorter (Darbyshire *et al.*, 2012).

The average fruits' productions obtained during the studied period (2015-2017) have been influenced by the climatic conditions (the precipitations excess in 2016, the snow and extremely slow temperatures in April 2017) and by the cultivar.

The main phenophases of fructification for the studied sweet cherry cultivars (RSFG Iași; 2015-2017)

Cultivar	Flowering			Harvesting period	The number of days from the end of flowering to the harvesting period
	Start	End	Duration (days)		
Boundary dates (earliest-latest)					
Cetățuia	1.04 – 15.04	08.04 – 20.04	6 - 8	11.05 – 22.05	33 - 34
Cătălina	2.04 – 17.04	10.04 – 22.04	6 - 9	17.05 – 31.05	38 - 40
Bucium	6.04 – 17.04	14.04 – 24.04	8 - 9	07.06 – 18.06	55 - 56
Maria	4.04 – 17.04	11.04 – 24.04	8 - 8	06.06 – 17.06	55 - 57
Van	4.04 – 16.04	14.04 – 26.04	11 - 11	11.06 – 17.06	53 - 59
Stella	4.04 – 16.04	14.04 – 25.04	10 - 11	08.06 – 16.06	53 - 56
Kordia	6.04 – 17.04	15.04 – 24.04	8 – 10	07.06 – 12.06	50 - 54
Marina	4.04 – 17.04	11.04 – 26.04	8 – 10	24.06 – 06.07	72 - 75
George	4.04 – 18.04	14.04 – 26.04	9 - 11	06.07 – 09.07	75 - 84

Analysing the average productions on three years (2015-2017), from the statistical point of view it can be observed that the cultivars recorded insignificant differences in comparison with the average of the cultivars (20.3 kg/tree) which was taken as witness, but the cultivars that recorded the highest values were Marina (24.3 kg/tree), Bucium (23.3 kg/tree), Van (22.0 kg/tree), Cetățuia (21.4 kg/tree) and Stella (21.3 kg/tree) (tab. 3).

The physical traits of the fruits vary from a cultivar to another and they also vary from a tree to another from the same cultivar, depending on the stock for grafting, trees' age, applied technology, soil and climate factors, fruits' load etc. (Beceanu and Bostaca-Sîrbu, 2007). The fruit quality is determined by the size of the fruit, the epidermis colour, the stone size and the easy detachment of the stone from the pulp.

The cultivar named Cetățuia recorded in terms of fruits' weight and equatorial diameter (5.0 g and 21.07 mm), statistical differences significantly negative in comparison with the variants average (6.9 g and 23.53 mm) (tab. 3). All the other studied cultivars recorded insignificant differences in comparison with the average of the cultivars (tab. 3).

For the stone's size, the cultivars recorded a weight between 0.23-0.36 g, classifying it as small to middle size according the UPOV questionnaire.

The report fruit/stone was between 16.6 (George) and 26.7 (Van), in comparison with the average of the cultivars (22.9). The percentage of the stone from the fruit's weight recorded values between 3.81% (Van) and 6.14% (George). From the statistical point of view, the cultivar named George recorded significant positive differences and all the other studied cultivars recorded insignificant differences in comparison with the average of the cultivars (4.55%) (tab. 3).

Table 3

Fruits' production and physical traits of the fruit for the studied sweet cherry cultivars (RSFG Iași; 2015-2017)

Genotype	Average production of fruits (kg/tree)	Average weight of the fruit (g)	Average weight of the stone (g)	Fruit/stone report	Stone from the fruit's weight (%)	Equatorial diameter of the fruit (mm)
Cetățuia	21.4	5.0 ⁰	0.23 ⁰	24.1	4.57	21.07 ⁰
Cătălina	16.7	7.3	0.33	22.2	4.50	23.08
Bucium	23.3	7.7	0.32	24.5	4.09	24.97
Maria	18.2	6.6	0.26	25.3	3.96	23.30
Van	22.0	8.0	0.30	26.7	3.81	24.33
Stella	21.3	7.5	0.30	24.8	4.11	24.17
Kordia	18.0	7.0	0.33	20.9	4.84	24.60
Marina	24.3	7.2	0.36	20.5	4.96	24.30
George	17.3	5.7	0.35	16.6	6.14 ⁺	21.20 ⁰
X (Average)	20.3	6.9	0.31	22.9	4.55	23.53
DL 5%	10.1	1.46	0.06	7.80	1.38	2.05
DL 1%	13.8	2.01	0.08	10.74	1.89	2.83
DL 0.1%	19.1	2.70	0.11	14.79	2.61	3.89

Note: - the year of plantation: 1991, planting distance 5 x 4 m

The colour of the fruits varies as follows: double coloured (Marina), shining red (Maria, Van, Stella, Bucium, George) and dark red (Cetățuia, Cătălina and Kordia) (tab. 4).

The pulp firmness is an important quality item, especially for the fruits targeted for fresh consumption (Kappel *et al.*, 2000). The two cultivars with early maturation (Cetățuia, Cătălina) have a semi firm pulp, while the cultivars with average and late maturation have a firm pulp.

Table 4

Physical-chemical and quality traits of the fruits for the studied sweet cherry cultivars (RSFG Iași; 2015-2017)

Cultivar	Epidermis colour	Pulp firmness	Fruit's shape	DM* (%)	Pulp adherence to stone	Cracking resistance (%)
Cetățuia	dark red	semi firm	kidney-shaped	15.0	semi-adherent	16.0
Cătălina	dark red	semi firm	kidney-shaped	18.5	non-adherent	6.3
Bucium	shining red	firm	heart-shaped	18.9	non-adherent	21.0
Maria	shining red	firm	heart-shaped	18.4	non-adherent	9.3
Van	shining red	firm	globular	17.4	non-adherent	45.0
Stella	shining red	firm	heart-shaped	18.7	non-adherent	29.0
Kordia	dark red	firm	heart-shaped	18.4	non-adherent	18.0
Marina	double coloured	firm	heart-shaped	17.3	non-adherent	19.3
George	shining red	firm	heart-shaped	17.9	non-adherent	4.0

*dry matter

Concerning the pulp adherence to stone, only the early cultivar Cetățuia presents semi-adherence to stone, all the other studied cultivars being non-adherent.

The content of dry substance is very important in sweet cherries as the taste of the fruits depends on it. The values of this parameter were between 15.0% (Cetățuia) and 18.9% (Bucium) (tab. 4).

Analysing the cracking phenomenon in fruits, the recorded values were between 4% and 45%, the most valuable cultivars from this point of view being George (4%), Cătălina (6.3%) and Maria (9.3%) (tab. 4).

CONCLUSIONS

1. Soil and climate factors from the Iași, Romania area assure good conditions for growing and fructification for sweet cherry trees, however, in the latest years, the excess of precipitations and very low temperatures recorded in the vegetation and fructification phenophases, especially at flowering time can act as limitation factors for the production.

2. The results that have been obtained highlight the cultivars named Bucium, Marina, Van and Stella, that got remarked from all the points of view of the parameters studied during the years of study.

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