

REZULTATE OBȚINUTE ÎN AMELIORAREA SORTIMENTULUI DE CIREȘ CU COACERE TIMPURIE LA SCDP IAȘI

RESULTS IN BREEDING OF EARLY RIPENING SWEET CHERRY ASSORTMENT OBTAINED AT RSFG IAȘI

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Abstract

The aim of this paper is to present the valuable features of some sweet cherry genotypes obtained at RSFG Iasi, that improve the autochthonous early ripening sweet cherry assortment. On the fresh fruit market, the preference is for the cultivars with “bigarreau” fruits, with shiny red colour, resistant to cracking, weighting over 7 g. Analyzing the values of the fertility index during the three years of study, three new cultivars are highly productive as the recorded values were between 30.3–62.7%. In terms of fruit weight (g) and of the equatorial diameter (mm), the cultivar with the largest fruit is 'Cătălina' with an average fruit weight of 7.7 g and an equatorial diameter of 24 mm, while the smallest fruit belongs to 'Cetățuia' with an average fruit weight of 6.3 g and an equatorial diameter of 21.8 mm. The content in dry substance varied between 14.7% ('Cetățuia' cv.) and 21.1% ('Cătălina' cv.). All the studied genotypes displayed a superior resistance to fruits' cracking, the recorded values being below 17%.

Cuvinte cheie: cireș, genotipuri, fruct, însușiri, maturare timpurie.

Key words: cherry, genotypes, fruit, traits, early maturation.

1. Introduction

Sweet cherry is a fruit growing species with high economic importance, given by the nutritive, technological and commercial features of the fruits, found in Romania under optimal conditions of showing their agrobiologic potential (Budan and Gradinariu, 2000).

Due to having an earlier ripening age than the other fruit growing trees species (starting with May), the sweet cherry represents the first ring in the annual chain of fruits' production (Ghena and Braniste, 2003; Iurea, 2015; Sansavini and Lugli, 2008; Milatović, 2011).

The sweet cherry breeding program from the Research Station for Fruit Growing Iasi, began in 1981. The main objective in sweet cherry breeding is to obtain new cultivars with improved features, superior to the existent ones and with ripening ages at the extremities of the fruits' ripening season, respectively early and late cultivars (Grădinariu & Istrate, 2004; Kazantzis et al., 2011; Lichev et al., 2004).

The research aimed is to present the valuable features of some sweet cherry genotypes obtained at RSFG Iasi, which improve the autochthonous sweet cherry assortment with cultivars with early maturation.

2. Material and methods

The studies were performed during 2017 – 2019, using as research material three sweet cherry genotypes with early maturation as research material ('Cetățuia', 'Cătălina' and 'HC 930208'). The comparison of the genotypes was performed against the variants' average.

The method of creating new cultivars was the classic one, performing controlled sexual hybridizations, harvesting the hybrid stones, obtaining hybrid saplings, selecting the hybrids based on the established objectives and testing the hybrids (Cociu and Oprea, 1989).

To create the three studied sweet cherry genotypes, the cultivars 'Van', 'Boambe de Cotnari' and 'Germesdorf' have been used as genitors. The genotypes have been grafted on 'Mahaleb' rootstock, being afterwards planted in competition micro crops at 4 x 5 m. The trees have been led as flattened free palmet, without a support system and without irrigation system. On the row with trees, the soil has been worked with the lateral disk with palpation, while in between the rows with trees, the soil is grassed. The control of diseases and pests was done in accordance with the received warnings, phytosanitary treatments being performed.

The meteorological factors (during the three years) have been analyzed and in order to appreciate the cultivars values. The following elements have been determined: trees' vigour, resistance to anthracnose and monilinia (Cociu and Oprea, 1989); the main fructification phenophases (Fleckinger J., 1960); the physical features (fruit's and stone's weight, the fruit's equatorial diameter, the fruit/stone ratio, % of stone from the fruit's weight, epidermis colour) (UPOV questionnaire TG/35/7, 2006), the fruit's physical and quality features (SUS%, pulp firmness, fruit's shape, stone's adherence to the pulp, fruits' resistance to cracking); the productivity was determined according to the fertility index which represents % of resulted fruits at 25-30 days after the fall of petals and the cultivars that are considered highly productive recorded values above 30-35% (Cociu and Oprea, 1989).

The experimental data has been statistically processed by analyzing the variance and calculating the variation coefficient (S%) for which the following arbitrary values are set: 0–10% - small variation coefficient; 10-20% - average variation coefficient; 20-30 % - big variation coefficient.

3. Results and discussions

During the three years of study, the average annual temperature was 13°C in 2017, 10.7°C in 2018 and 10.7°C in the first seven months of 2019 (the multiannual average being 10.2°C).

Regarding the resistance to diseases, 2017 being a rainy year (with a surplus of 483.2 mm), favorable to pathogens (monilinia and anthracnose), all tested genotypes recorded a slight sensitivity to anthracnose (the attack frequency was between 1.9–2.7%) and monilinia (the attack frequency was between 1.8–2.4%). The studied genotypes have a middle vigour (Table 1).

The beginning of blooming in the sweet cherry genotypes studied during 2017-2019 was recorded between the 3rd and 12th of April and the end of blooming was recorded between 14th and 19th of April, without big difference among the cultivars. In 2017, the triggering of blooming was earlier by 6-9 days in comparison with 2018 and 2019. The duration of blooming was between 6-15 days, during which the three cherry cultivars reciprocally pollinated each other.

The results recorded for natural fertility in the three genotypes were between 30.3% ('Cătălina' cv.) and 62.7% ('Cetățuia' cv.), recording a big variation coefficient (28.0%) and being classified as highly productive because the fertility index recorded values above 30% (Table 2).

The harvesting maturity was recorded in the 2nd and 3rd decades of May, the number of days between end of blooming and maturation was between 29-42 days, presenting differences of 3–6 days among genotypes; therefore, the variation coefficient was average to low (15.49–7.44 %) (Table 2, Fig.1).

The order in which the cherry genotypes get to maturity is always constant, the only difference being the time span between two successive genotypes that can be longer or shorter following the climatic conditions that can be more or less favorable for the maturation of fruits (Darbyshire et al., 2012).

To estimate the size of the fruits, both the fruit's weight (g) and equatorial diameter (mm) are considered. Thus, the cultivar with the biggest fruit is 'Cătălina' with an average weight of the fruit of 7.7 g and an equatorial diameter of 24 mm, while the smallest fruit belongs to 'Cetățuia' with an average weight of the fruit of 6.3 g and an equatorial diameter of 21.8 mm, statistically being non-significant in comparison with the variants' average (Table 3).

In terms of stone size, the genotypes recorded a weight between 0.31–0.45 g, being of average size according the UPOV questionnaire and statistically non-significant in comparison with the variants average. The ratio fruit/stone was between 16.8 (HC. 930208) and 23.3 ('Cetățuia') and the genotypes 'Cătălina' and the hybrid selection HC. 930208 recorded distinct significant negative differences in comparison with the variants' average. The percentage of the stone from the fruit's weight recorded values between 4.76% ('Cetățuia') and 5.96% (HC. 930208), being non-significant in comparison with the variants average (Table 3).

For cherries, the fruit's colour influences decisively the commercial aspect and the pulp firmness is an important element of quality, especially for the fruits targeted for fresh consumption (Kappel et al., 2000). All the studied sweet cherry genotypes have a dark red fruit (fig. 2), semi-firm pulp, with genotype HC. 930208 as an exception with firm pulp and concerning the stone's adherence to pulp, the genotypes 'Cătălina' and HC 930208 are non-adherent and 'Cetățuia' is semi-adherent. The shape of the fruit for the genotypes 'Cetățuia' and HC. 930208 is kidney-shaped and for 'Cătălina' is heart-shaped (Table 4).

The content in soluble solids varied between 14.7% ('Cetățuia') and 21.1% ('Cătălina'), statistically 'Cetățuia' cv. recording very non-significantly negative differences in comparison with the variants' average, while 'Cătălina' cv. recorded very non-significantly positive differences. All the studied genotypes manifested a superior resistance to the phenomenon of fruits' cracking, the values being below 17% (Table 4).

4. Conclusions

The studied genotypes, created at RSFG Iasi got highlighted through extra earliness ('Cetățuia' and HC. 930208), earliness ('Cătălina' cv.), particular quality of the fruits (big fruits for the early cultivars, small fruit/stone ratio, semi-firm-firm pulp, the pulp does not present adherence to stone), all of them manifesting precocity and a good resistance to the cherry specific diseases (anthracnose and monilinia).

The genotypes fit the current objectives regarding the trees' vigour, fruits' resistance to cracking, productivity, fruits' quality and colour and early ripening of the cherries.

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Tables and figures

Table 1. Tree's vigour and resistance to diseases (RSFG Iasi; 2017-2019)

Genotype	Tree's vigour*	Resistance to:					
		Leaves' anthracnose ** (<i>Coccomyces hiemalis</i> Higg.)			Fruits' monilinia ** (<i>Monilinia fructigena</i> Pers)		
		F%	I%**	GA%	F%	I%**	GA%
Cetățuia	5	2.0	5	0.10	2.4	3	0.07
Cătălina	5	2.7	5	0.13	1.8	3	0.05
HC. 930208	5	1.9	5	0.09	2.0	5	0.10

*tree's vigour mark (1-9 scale): 1= very weak; 3= weak; 5 = middle; 7= strong; 9= very strong (UPOV, 2006);

**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 and Oprea, 1989).

Table 2. The progress of the fructification phenophases in the investigated cherry genotypes (RSFG Iasi; 2017-2019)

Genotype/ Phenophase	Beginning of blooming (phase E)	End of blooming (phase G)	Blooming duration (no. of days)	Natural fertility (%)	Fruits' maturation date	No of days between end of blooming and maturation
Limit dates (earliest - latest):						
Cetățuia	03.IV - 09.IV	16.IV - 17.IV	9 - 15	62.7	15.V – 24.V	29 - 39
Cătălina	03.IV - 10.IV	14.IV – 19.IV	10 - 12	30.3	22.V – 28.V	34 - 42
HC. 930208	03.IV - 12.IV	14.IV – 19.IV	6 - 13	52.1	20.V – 24.V	32 - 41
Standard deviation	0.00 – 1.25	0.94 – 0.94	1.70 – 1.25	13.49	2.94 – 1.89	2.05 – 1.25
Variation coefficient (%)	0.00 – 0.12	6.43 – 5.14	20.40 – 9.35	28.0	15.49 – 7.44	6.49 – 0.07

Table 3. Physical features for the studied cherry cultivars (RSFG Iasi; 2017-2019)

Genotype	Fruit's average weight (g)	Fruit's equatorial diameter (mm)	Stone's average weight (g)	Fruit/stone ratio	Stone from the fruit's weight (%)
Cetățuia	6.3	21.8	0.31	23.3 ⁺⁺⁺	4.76
Cătălina	7.7	24.0	0.45	17.0 ⁰⁰	5.86
HC. 930208	7.1	22.6	0.42	16.8 ⁰⁰	5.96
Media (Mt)	7.1	22.8	0.40	19.0	5.53
DL 5%	1.2	2.14	1.02	1.02	2.78
DL 1%	2.0	3.50	1.70	1.70	4.61
DL 0,1%	3.7	6.50	3.14	3.14	8.51

Table 4. The physical-chemical and quality features of the fruits (RSFG Iasi; 2017-2019)

Genotype	Epidermis colour	Pulp firmness	Fruit's shape	Pulp adherence to stone	SUS%	% of cracked fruits after 6 hours
Cetățuia	dark red	semi-firm	kidney- shaped	semi- adherent	14,7 ⁰⁰⁰	16,0
Cătălina	dark red	semi-firm	heart- shaped	non-adherent	21,1 ⁺⁺⁺	6,5
HC. 930208	dark red	firm	kidney- shaped	non-adherent	16,0	13,0
Average (Mt)					17,3	11,8
DL 5%					2,5	8,5
DL 1%					4,2	14,1
DL 0,1%					7,9	26,2

Genotype	Decades II - III of MAY													
	15.05	16.05	17.05	18.05	19.05	20.05	21.05	22.05	23.05	24.05	25.05	26.05	27.05	28.05
Cetățuia														
HC. 930208														
Cătălina														

Fig. 1. Scheduling of fruits' maturation for the studied cherry genotypes



Fig. 2. The epidermis colour for the studied cherry cultivars