

NEW SWEET CHERRY CULTIVARS FOR ROMANIAN ORCHARDS

NOI SOIURI DE CIREȘ PENTRU PLANTAȚIILE POMICOLE DIN ROMÂNIA

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Abstract. *In the last ten years was been introduced into the orchards of Romania new autochthonous sweet cherry cultivars or from the foreign assortment. Research was conducted during 2014-2016 at three Romanian new obtained cultivars as 'Andreias', 'Alexus' and 'Mihailis' and two introduced sweet cherry cultivars as 'Kordia' (Czech Republic) and 'Van' (Canada). An other cultivar, 'Boambe de Cotnari' (Romania) was evaluated. 'Boambe de Cotnari' is an old cultivar very spread in Romania but still demanded by producers. Some parameters related to phenological stages and fruit characteristics were determined. Sweet cherry cultivars taken into study registered fruit weight value as 7.72 g (as average 2014-2016) and soluble solids content as 14.53 Brix.*

Keywords: sweet cherry, cultivar, phenology, fruit, soluble solids content

Rezumat. *În ultimii zece ani, au fost introduse în livezile românești noi soiuri autohtone de cireș sau provenite din sortimentul internațional. Cercetările a fost realizate în perioada 2014-2016 la trei noi soiuri românești 'Andreias', 'Alexus' și 'Mihailis' și două soiuri de cireș introduse 'Kordia și 'Van (Canada). A fost evaluat și soiul 'Boambe de Cotnari' (România) care este un soi vechi foarte răspândit în România și cerut în continuare de producători. S-au determinat parametri privind stadiile fenologice și caracteristicile fructului. Soiurile de cireș luate în studiu au înregistrat o valoare a greutateii fructelor de 7,72 g (media 2014-2016) și conținut în substanță uscată solubilă de 14,53 Brix.*

Cuvintecheie: cireș, soi, fenologie, fruct, substanță uscată solubilă.

INTRODUCTION

In Romania sweet cherry tree (*Prunus avium* L.) is a wild or cultivated species (Ciocârlan, 2000). In 2014 in Romania the harvest area was 6,446 ha with 12.8 tonnes/ha fruits production (FAOSTAT data). Of total orchards 44% are in decline and just seven percent are young plantations (Chitu and Coman, 2014). The main cultivars in orchards are still 'Stella', 'Van', 'Germersdorf', 'Boambe de Cotnari' and 'Hedelfinger' grafted on seedlings rootstocks *Prunus mahaleb* L. or *Prunus avium* L. In the last ten years by a National Programme for renewing local fruit growing, new cultivars were introduced in plantations but also grafted on vegetative rootstocks, especially on Gisela 5, these being suitable

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for high density orchards (Usenik *et al.*, 2017; Radunić *et al.*, 2011). This paper aims to assess six sweet cherry cultivars which are preferred by growers and that can be planted in orchards.

MATERIAL AND METHOD

Research was conducted during 2014-2016 at three Romanian new obtained cultivars as 'Andreiaș', 'Alexus' and 'Mihailis' and two introduced sweet cherry cultivars as 'Kordia' (Czech Republic) and 'Van' (Canada). An other cultivar, 'Boambe de Cotnari' (Romania) was evaluated these being an old cultivar very spread in Romania but still demanded by producers and produced in nurseries. The fruit growing trees can be found in the experimental plot, grafted on *P. mahaleb* as seedlings rootstock and planted at a distance of 5 x 4 m, with free flattened palmette crown on the direction of the trees row, without a sustaining system and without irrigation system. On the row with trees, the cultivar was worked with the lateral disk with feeler and between the trees rows the soil was heated.

Some parameters related to phenological stages, tree and fruit characteristics were determined. Phenological data were determined through the Fleckinger system (Fleckinger, 1960): F₁ - the beginning of the flowering: the flowers are open for 5%; G - the end of the flowering: the petal of flowers have fallen for 90%. Characteristics of fruit, stone and stalk were determined on a sample of 30 fruits for each cultivar using a digital caliper Loomytools for dimensions determinations and an high precision balance (Radwag, 0.01 sensivity) for weight determinations. Index of the fruit and stone shape was calculated by formula: $\text{length}^2/\text{width} \times \text{thickness}$ (Stojanovic, 2012). Soluble solids content was determined using a refractometer Zeiss on samples of 15 fruits in three repetitions.

The statistical analysis was performed with the XLSTAT programme, the differences between cultivars being determined by the Duncan's test ($p \leq 0.05$).

RESULTS AND DISCUSSIONS

During 2014 - 2016 it has been observed a great variability of the number of days from end of flowering to the harvesting time according to the sweet cherry tree cultivars and climatic conditions of the year. During the study the values ranged between 47 days at 'Andreiaș' and 61 days at 'Boambe de Cotnari' (tab. 1). Beginning flowering (stage B₁) started at April 4 at 'Van' in 2016 these data being the earliest from entire study and range until April 21 at 'Alexus' and 'Mihailis' in 2015. For stage G 'Boambe de Cotnari' registered April 12 in 2016 but were recorded until April 28 at 'Alexus' in 2018 conditions.

Fruit ripening time at sweet cherry cultivars during between June 5 ('Mihailis' in 2016) to June 23 ('Alexus' in 2016) (tab. 1).

As period from the end of flowering to the harvesting time 'Mihailis' was the earliest with 47 days in 2016 but 'Boambe de Cotnari' recorded 61 days in 2016. Radicevic *et al.*, 2011 studied 23 sweet cherry cultivars for combination in commercial orchards and recorded flowering onset time at April 4 at 'Van' and

April 5 for 'Kordia' as average between 1999 to 2006, that being in according with our data (tab. 1).

Table 1

**Phenological data of sweet cherry cultivars
(average 2014 – 2016, RSFG Iasi, Romania)**

Cultivar	The beginning of the flowering (stage B ₁)	The end of the flowering (stage G)	Fruit ripening time	Duration from end of flowering to harvesting period (days)
Andreias	6-19.04	14-23.04	6-11.06	49-53
Alexus	8-21.04	14-28.04	11-23.06	53-58
Boambe de Cotnari	5-17.04	12-22.04	12-22.06	60-61
Mihailis	5-21.04	13-26.04	5-12.06	47-53
Kordia	8-20.04	14-24.04	12-21.06	58-59
Van	4-16.04	14-26.04	11-16.06	51-58

Stojanovic *et al.* (2012) find flowering time of 'Kordia' between April 17 to April 30 besides ripening time was at June 21 in Sarajevo climate conditions, these data being almost like ours results.

Some fruit characteristics are presented in table 2. As fruit mass the bigger was 'Alexus' with 9.56 g as average of all three years of study. Also good size recorded 'Andreias', 'Mihailis' and 'Van' with 8.86 g, 7.44 g and 7.62 g respectively.

Fruit width is a value with great importance for evaluated the sweet cherry quality. Great dimensions recorded 'Alexus' with 26.35 mm and 'Andreias' with 25.32 mm as average during 2014 to 2016, but with great variability year by year.

Table 2

**The fruits characteristics at six sweet cherry cultivars
(average 2014-2016, RSFG Iasi, Romania)**

Cultivar	Fruit weight (g)*	Fruit dimensions (mm)			Fruit shape index
		Width D	Thickness d	Length H	
Andreias	8.86 ^{ab}	25.32 ^c	22.11 ^a	24.11 ^a	1.04 ^{ab}
Alexus	9.56 ^a	26.35 ^{ab}	22.33 ^a	24.25 ^a	1.00 ^{ab}
Boambe de Cotnari	6.79 ^{bc}	22.62 ^{abc}	21.98 ^{ab}	21.26 ^b	0.93 ^b
Mihailis	7.44 ^{abc}	23.24 ^{abc}	20.26 ^{ab}	22.51 ^{ab}	1.08 ^a
Kordia	6.03 ^c	22.39 ^a	19.55 ^b	22.43 ^{ab}	1.11 ^a
Van	7.62 ^{abc}	24.67 ^{bc}	21.35 ^{ab}	20.64 ^b	0.78 ^b

* - Different letters after the number corresponds with statistically significant differences for P 5% - Duncan test.

Maglakelidze *et al.* (2017) showed data of nine sweet cherry cultivars for the same period 2014 to 2016 and 'Van' recorded average width value as 25.9 mm being similar with our data (24.67 mm) as fruit characteristics. Fruit shape index range between 0.78 ('Van') to 1.11 ('Kordia'). Differences in the fruit form are important and seems to be more tempting a flattened sweet cherry than a lengthened one (Perez-Sanchez *et al.*, 2010). 'Kordia' and 'Mihailis' were lengthened since all others sweet cherry cultivars studied were flattened heart shape.

Table 3

**The stone characteristics of six sweet cherry cultivars
(average 2014-2016, RSFG Iași, Romania)**

Cultivar	Stone weight (g)	Stone dimension (mm)			Stone shape index
		Width D	Thickness d	Length H	
Andreias	0.34 ^{ab}	9.08 ^{ab}	7.07 ^b	10.79 ^{ab}	1.83 ^{bc}
Alexus	0.36 ^{ab}	9.42 ^a	7.79 ^a	10.67 ^{ab}	1.55 ^d
Boambe de Cotnari	0.43 ^a	9.01 ^{ab}	7.27 ^{bc}	10.29 ^b	1.62 ^{cd}
Mihailis	0.33 ^{ab}	8.91 ^{ab}	7.20 ^{bc}	11.10 ^{ab}	1.92 ^b
Kordia	0.31 ^c	8.68 ^b	6.63 ^c	11.75 ^a	2.40 ^a
Van	0.32 ^{bc}	9.18 ^{ab}	7.49 ^{ab}	9.27 ^b	1.26 ^e

* - Different letters after the number corresponds with statistically significant differences for P 5% - Duncan test.

The stone characteristics were showed in table 3. The greatest size of stone recorded 'Boambe de Cotnari' that being the most reason for replace the cultivar in orchards in the future.

Table 4

The fruit stalk characteristics and soluble solids content of six sweet cherry cultivars (average 2014-2016, RSFG Iași, Romania)

Cultivar	Stalk length (mm)	Stalk weight (g)	Soluble solids content (%)
Andreias	31.33 ^d	0.09 ^b	16.57 ^a
Alexus	35.6 ^c	0.11 ^{ab}	17.03 ^a
Boambe de Cotnari	39.53 ^b	0.10 ^{ab}	17.93 ^a
Mihailis	43.47 ^a	0.11 ^{ab}	17.64 ^a
Kordia	41.67 ^{ab}	0.12 ^a	17.3 ^a
Van	26.67 ^e	0.10 ^{ab}	17.5 ^a

* - Different letters after the number corresponds with statistically significant differences for P 5% - Duncan test.

But no significant statistically differences between them and ‘Andreias’, ‘Alexus’ or ‘Mihailis’ recorded (tab. 3). As stone shape index at ‘Kordia’ and ‘Van’ were observed statistically significant differences than all sweet cherry cultivars taken in the study (tab. 3).

The fruit stalk characteristics are presented in table 4. Fruit stalk length is an important parameter in cultivar determination, the longer being better for easier picking (Stojanovic *et al.*, 2012). In our study were recorded longer stalk at ‘Mihailis’ and ‘Kordia’ with values 43.47 mm and respectively 41.67 mm. Stalk weight range between 0.09 g (‘Andreias’) to 0.12 g (‘Kordia’). Soluble solids content range between 16.57% to 17.93% at sweet cherry cultivars taken in study. ‘Boambe de Cotnari’ recorded greatest value (17.93%) of soluble solids content but no significant statistically differences recorded between them and all sweet cherry cultivars taken in study.

CONCLUSIONS

1. The climate conditions have influenced the duration of the phenological stages of different cultivars of sweet cherry.

2. ‘Alexus’ and ‘Andreias’ showed great fruit size being suitable for establishing new commercial orchards.

3. ‘Boambe de Cotnari’ showed greatest values of soluble solids content being a very good choice for production fruits destined processing as compote but also for fresh consumption.

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