

# STUDY OF BIOLOGICAL FEATURES OF SOME NEW SWEET CHERRY CULTIVARS

## STUDIUL PARTICULARITĂȚILOR BIOLOGICE LA UNELE SOIURI NOI DE CIREȘ

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**Abstract.** *Biological properties of 4 new sweet cherry cultivars ('Alex', 'Andrei', 'Ludovic' and 'Mihai', homologated in 2011), grafted on Prunus mahaleb L. rootstock, were studied in the North Eastern Romania region during a five-years period (2007-2011). Investigation has included phenological properties (flowering and ripening time), pomological properties and biochemical composition of fruits. The highest fruit weight was found in 'Alex' (over 10 g). 'Alex' is also the earliest as the flowering time, whereas 'Mihai' is the latest flowering cultivar. All cultivar taken under study has a medium ripening time (8-25 June). The soluble solids content ranged from 16,8 °Brix ('Ludovic') and 17,9 °Brix ('Andrei'). The highest reducing sugars content was found in 'Alex' and 'Andrei' (16 g/100 g fruit weight) and the lowest in 'Ludovic' (14 g/100 g fruit weight). The research performed and results obtained suggest that new studied sweet cherry cultivars have shown good results in agroecological conditions of Iași area and could have significant place in the structure of assortment of sweet cherry in the region of North Eastern Romania.*

**Key words:** sweet cherry, cultivar, phenological properties, fruit quality.

**Rezumat.** *Particularitățile biologice la 4 soiuri noi de cireș (Alex, Andrei, Ludovic și Mihai, omologate în anul 2011), altoite pe mahaleb (Prunus mahaleb L.) au fost studiate în NE României, pe o perioadă de 5 ani (2007-2011). Investigațiile au inclus stadii fenologice (perioada înfloritului și perioada de maturare a fructelor), particularitățile pomologice și compoziția biochimică a fructelor. Cea mai mare greutate a fructului s-a înregistrat la soiul Alex (10,36 g). Soiul Alex este și cel mai timpuriu (ca perioadă de înflorire), în timp ce soiul Mihai are o perioadă de înflorire mai târzie. Toate soiurile au perioada medie de maturare a fructelor (8-25 iunie). Conținutul în substanță uscată solubilă a fost între 16,8 °Brix (Ludovic) și 17,9 °Brix (Andrei), iar conținutul în zaharuri reducătoare a înregistrat valorile cele mai mari la Alex și Andrei (16 g/100 g fruct) și cel mai redus la Ludovic (14 g/100 g fruct). Cercetările realizate și rezultatele obținute arată că soiurile luate în studiu au demonstrat bune rezultate în condițiile ecologice din zona Iași și pot ocupa un loc bun în structura sortimentului de cireș din zona de NE a României.*

**Cuvinte cheie:** cireș, soi, proprietăți fenologice, calitatea fructului.

### INTRODUCTION

In the last three decades the sweet cherry quality criteria have changed, special accent were to obtaining cultivars with large fruits (Albertini et al., 2001; Apostol, 2005; Beceanu and Sîrbu, 2007).

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In Europe, there have been many new sweet cherry cultivars in countries with tradition in the culture of this species (Edin, 1996, Godin et al., 1996, Millan and Charlot, 2005; Nikolić and al., 1996, Saunier, 1996). Also, Canada and United States are permanent sources of new sweet cherry cultivars (Lugli, 2006; Kappel and MacDonald, 2000).

Breeding program at sweet cherry began to SCDP Iasi in 1981 and was initiated by PhD. eng. Ioachim Bodi, then continued by PhD. eng. Ludovic Petre and now by PhD. eng. Sorina Sirbu and PhD. stud. Eng. Elena Iurea.

The main method used were controlled hybridization (Cociu and Oprea, 1989) and the aim was to obtain new sweet cherry cultivars with high quality features (Webster and Looney, 1996; Budan and Gradinariu, 2000) and promoted them into assortment.

Following the breeding works carried out during 1980 - 2000 were obtained 24 new sweet cherry cultivars at SCDP Iasi. This paper presents four new sweet cherry cultivars obtained at SCDP Iasi and approved during 2010-2011.

## MATERIAL AND METHOD

In our research, we have made observations and measurements at four new sweet cherry cultivars ('Alex', 'Andrei', 'Ludovic' and 'Mihai') approved during 2010 - 2011 compared with 'Van' which is a very extensive cultivar in orchards (table 1). Trees are planted in 2002, on *Prunus mahaleb* L. as rootstock, at a distance of 3.5 x 4m, with free palmata shaped crown without support and irrigation system in the experimental polygon of SCDP Iasi.

Table 1

Sources of biological material used

Cultivar	Authors	Homologation year	Hybrid combination
Alex	Corneanu Margareta, Petre Ludovic, Corneanu Gelu	2010	Open pollination of Lijana
Andrei	Corneanu Margareta, Petre Ludovic, Corneanu Gelu	2011	HC27/4 x Boambe de Cotnari
Ludovic	Petre Ludovic, Iurea Elena	2010	Van x Boambe de Cotnari
Mihai	Corneanu Margareta, Petre Ludovic, Corneanu Gelu, Sirbu Sorina	2011	Pietroase de Geoagiu x NY 9801
Van (control)	A.J. Mann	1944	Open pollination of Empress Eugenia

We made observations and measurements on: phenology and abundance of flowering, fruit ripening period, fruit mass (g) and fruit width (mm), percentage of stone. As the main biochemical properties were determined soluble solids content (%) by refractometry, reducing sugar content by the Luff-Schoorl method, titratable acidity (%) by titration with 0.1 N NaOH until the equivalence point and soluble solids content and titratable acidity ratio.

## RESULTS AND DISCUSSIONS

Flowering period at studied sweet cherry cultivars was variable during 2007-2011, ranging between April 1 at 'Ludovic' and May 6 at 'Alex'. As average over the studied period, the cultivars 'Andrei', 'Van' and 'Ludovic' has the earlier flowering period than 'Alex' and 'Mihai', which the start of flowering period occurs later (tab. 2). Flowering abundance recorded maximum values at 'Ludovic', which are the cultivar most valuable in this regard compared with the all others studied cultivars.

Table 2

**Phenology and abundance of flowering of some sweet cherry cultivars**  
(average 2007-2011)

Cultivar	Phenology			Maturation period	Days between end of bloom until	Flowering abundance*
	Beginning of bloom	Full bloom	End of bloom			
Alex	12- 24 IV	15 -27 IV	24 IV- 6 V	8 - 20 VI	51	4.5
Andrei	8 - 23 IV	10 - 20 IV	16 IV- 4V	8 - 20VI	50	4.5
Ludovic	1- 22 IV	3 - 20 IV	16 IV- 4 V	10 - 25VI	53	5
Mihai	10-23 IV	12 - 22 IV	21 IV -3 V	8 - 16VI	48	4.5
Van	3-22 IV	10 - 20 IV	18-26 IV	9 - 15VI	51	4.5

Note: excellent (5), very good (4), good (3), poor (2), bad (1), without flowers (0)  
(Radicevic et al., 2011 a)

**Maturation period** was different at studied cultivar and depending on climatic conditions during the growing season and during 2007 - 2011 ranged from June 8 to 'Mihai', 'Alex' and 'Andrei' and June 25 at 'Ludovic' (tab. 2).

**Tree vigor** has not been different values from one cultivar to another, all five of studied sweet cherry cultivars being medium (tab. 3).

**Fruit production** recorded as average during 2007-2011 ranged between 12.8 kg / tree at 'Mihai' and 14.6 kg / tree at 'Ludovic' (table 3). Average yield in t / ha recorded the highest value to the cultivar 'Ludovic' with 10.43 t / ha. Compared with 'Van', the cultivar 'Mihai', 'Alex', 'Andrei' and 'Ludovic' are more productive, but these values should be verified in the next years, those being cultivated only in experimental plantations currently.

**Fruit mass** recorded high values to 'Alex' (10.4 g), 'Andrei' (9 g) and 'Ludovic' (10 g), values which expressing a very valuable dimension of the sweet cherry fruits that being according with the latest international trends in quality. 'Andrei' showed the highest values of the fruit's width (26.5 mm) but the percentage of mesocarp ratio of 'Van' proved to be the most valuable (95.89%) (table 4 ). Cultivar 'Van' showed the lowest peduncle length (25 mm) while the new sweet cherry cultivars created at SCDP Iasi have stalk length ranging from

28 to 31 mm. When using fruits for processing into syrup or jams, mechanical work of stalk remove are difficult at cultivars with short stalks (Sirbu, 2011).

Table 3

Fruit yield at some sweet cherry cultivars

Cultivar	Tree vigor*	Yield (average 2007-2011) (kg/tree)	Yield (average 2007-2011) (t/ha)	Differences from 'Van' (%)
Alex	5	13.77±0.71	9,83±0.50	107,55
Andrei	5	13.53±0.65	9,63±0.45	114,06
Ludovic	5	14.60±0.82	10,43±0.57	105,73
Mihai	5	13.57±1.27	9.70±0.92	105,9
Van	5	12.80±0.66	8,71±0.63	-

\*UPOV test: 1= very low; 3=low; 5=medium; 7=high; 9=very high

Also, 'Van' has the disadvantage that when are at full ripening time the stalk falls causing crop losses.

Table 4

Morphological features of some sweet cherry cultivars (average, 2007-2011)

Cultivar	Fruit dimensions				Stalk length (mm)	Stone weight (g)	Mesocarp ratio (%)
	Fruit weight (g)	Width (mm)	Thickness (mm)	Length (mm)			
Alex	10.4	24.6	19.7	23.8	28	0.6	95.23
Andrei	9	26.5	22.5	25.6	29	0.6	93.33
Ludovic	10	25.3	21.8	25.4	28	0.5	95.00
Mihai	7.3	20.7	18.1	21.6	31	0.6	91.78
Van	7.3	21.3	18.7	22.5	25	0.3	95.89

Biochemical properties of the studied new sweet cherry cultivars are presented in Table 5. Soluble solids content showed values between 16.8% ('Ludovic') and 17.9% ('Andrei') and reducing sugars content recorded values between 15% ('Mihai') and 16% ('Andrei', 'Alex' and 'Ludovic'). Total acidity recorded values between 0.52% ('Alex') and 0.74% ('Van'). The studied sweet cherry cultivars have dark red colour of fruits, with no visual differences between them.

A fruit firmness value was different for cultivars and 'Mihai' recorded the lowest, which has semi firm fruits. 'Alex' has firm fruits and cultivars 'Andrei' and 'Ludovic' has very firm same as the cultivar 'Van'.

A balance between soluble solids content and acidity is considered important for determining the sweet cherry taste (Webster et al., 1996, Apostol,

2005), therefore sugars-acidity ratio analytically describe the sweet taste and slightly tart of the fruit.

Table 5

**Biochemical and technological properties of new sweet cherry cultivars**  
(average, 2007-2011)

Cultivar	Soluble solids content (%)	Reducing sugars content (%)	Total acids (%)	Sweetness index	Fruit colour*	Fermity*
Alex	17.0	16	0.52	32.69	7	7
Andrei	17.9	16	0.65	27.54	7	9
Ludovic	16.8	16	0.63	26.67	7	9
Mihai	17.4	15	0.72	24.17	7	5
Van	16.9	15	0.74	13.64	7	9
*UPOV test: fruit firmness: 3=soft; 5=medium; 7=firm; 9= very firm; skin colour: 1=yellow; 2=half yellow half red; 5=red; 7=dark red						

Lugli et al., 2006 describes the new cultivars created at the University of Bologna, whose glucose-acidimetry index was recorded between 20.3 (at 'Durone dell'Anella tardive') and 27.5 ('Mora di Vignola') and Radicevic et al., 2011 b, describes six new sweet cherry cultivars introduced in Serbia with the values of this parameter ranging from 16.35 (at 'Burlat') and 28.3 (at 'Regina'). At the new sweet cherry cultivars taken in the study this parameter were between 24.17 (at 'Mihai') and 32.69 (at 'Alex') (tab. 5).

## CONCLUSIONS

'Ludovic', 'Andrei' and 'Alex' has been marked by valuable morphological features as follows: large size of fruit in accordance with current international requirements and high sugar - acidity ratio, destined especially for fresh consumption. 'Mihai', although the fruit is large, but is semiferm therefore particularly suitable for industrial as jams and dried.

Biochemical properties of the new sweet cherry cultivars showed a pronounced sweet, slightly acidity taste, very appreciated by consumers on fruit destined for fresh consumption.

The four new cultivars created at SCDP Iasi can be successfully promoted in the national assortment of sweet cherry cultivars along with 'Van'.

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