SWEET CHERRY CULTIVARS EVALUATION IN ROMANIA

EVALUAREA SORTIMENTULUI DE CIREŞ IN ROMANIA

ZLATI Cristina[1], ISTRATE M.[1], PAŞCU Roxana[1],
BERNARDIS R.[1]*
*Corresponding author e-mail: mistrate2000@yahoo.com

Abstract. *Sweet cherry is one of the most representative culture in Romania and the North East region, is the most important production region in the country. Vegetative growth, productivity and fruit quality of nine sweet cherry cultivars 'Kordia', 'Karina', 'Regina', 'Ferrovia', 'Skeena', 'Summit', 'Sunburst', 'Canada Giant' and 'Sweetheart' were evaluated. Trees grafted on 'Gisela 5' rootstock were planted in 2010 in Iasi. The productivity of the cultivars was assessed for four production years. The productivity of early cultivars was reduced in some years due to unfavourable weather conditions in the period before or during ripening. The cultivars will be discussed in relation to the less favourable conditions for sweet cherry production in Romania due to climatic change and the suitability of rootstock 'Gisela 5'.*
Key words: *Prunus avium* L., vigour, yield efficiency, fruit quality, Gisela 5

Rezumat. *Cireşul este una dintre cele mai reprezentative culturi din România şi regiunea Nord-Est, este cea mai importantă regiune de producţie din ţară. Creşterea vegetativă, productivitatea şi calitatea fructelor au fost evaluate, la nouă soiuri de cireşe 'Kordia', 'Karina', 'Regina', 'Ferrovia', 'Skeena', 'Summit', 'Sunburst', 'Canada Giant' şi 'Sweetheart'. Pomii altoiţi pe portaltoiul 'Gisela 5' au fost plantaţi în 2010 la Iaşi. Productivitatea cultivarilor a fost evaluată timp de patru ani de producţie. Productivitatea cultivarilor timpurii a fost redusă în unii ani datorită condiţiilor meteorologice nefavorabile din perioada anterioară sau în timpul maturării fructelor. Soiurile vor fi evaluate în legătură cu condiţiile mai puţin favorabile pentru producţia de cireşe în România, din cauza schimbărilor climatice şi a compatibilităţii portaltoiului 'Gisela 5'.*
Cuvinte cheie: Prunus avium L., vigoare, eficienţa recoltelor, calitatea fructelor, Gisela 5

INTRODUCTION

Sweet cherry (*Prunus avium* L.) culture is one of the most representative culture in Romania but the production has been decreasing over the last two decades, reaching 6020 ha in 2017, compared with 12302 ha in 1997 (tab. 1). Even so the production has been more or less constant wich drove us to the conclusion that the now orchards are more effcient.

The introduction of new local cultivars together with foreign cultivars is the main method of attempting to improve the sweet cherry assortment. The

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[1]University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

geographic diversity, production practice traditions and implementation of modern technologies demand the use of a variety of rootstocks, which also requires testing different cultivar-rootstock combinations (Usenik *et al.,* 2006).

The priorities for sweet cherry breeders are increased fruit quality, such as size, appearance, firmness, flavor, and shelf life, and extending seasonality, self-fertility, abiotic and biotic stress resistance, (Sansavini and Lugli, 2008; Budan and Petre, 2006).

In the last years many new cultivars have been released and due to the introduction of dward and semi-dwarf rootstocks (Franken-Bembenek, 2010), there is also a demand for cultivars with specific characteristics, such as productivity for sufficient tree growth and large fruit size.

Table 1

Acreage (ha) and production (t) of sweet cherries in Romania (FAOStat, 2019)

Specification	Sweet cherry							
	2017	**2016**	**2015**	**2014**	**2013**	**2012**	**2007**	**1997**
Acreage (ha)	6020	6127	6308	6446	7079	6829	7688	12302
Production (t)	55490	73834	75503	82808	80477	70542	65163	73837

The proper variety-rootstock combination is always the key to a successful orchard. Evaluation and testing varieties and also variety -rootstock combinations in local conditions is crucial, since the results of testing greatly depend on local pedo-climatic conditions (Iurea *et al.,* 2017; Milatović *et al.*, 2013; Usenik and Fajt, 2019; Whiting *et al.,* 2005).

The aim of this research was to evaluate the growth, productivity and quality parameters of nine varieties grafted 'Gisela 5' (*P. cerasus* L. × *P. canescens* Bois.) rootstock.

MATERIAL AND METHOD

The screening of the varieties involved five trees of each variety grafted on 'Gisela 5'. All varieties were followed for at least 4 production years. The Cherry Descriptor List of the International Board for Plant Genetic Resources (IBPGR) was used for the evaluation.

Production and fruit charateristics were determined each year.

Spring frost tolerance was noted. Harvesting date and yield were recorded. The fruits weight and size were measured and led us to classify the cultivars. Fruit weights were calculated on a sample of 50 fruits. Sugar levels were determined with a digital refractometer using the juice of a mixed sample (20 fruits). The fruit quality was determined based on weight, diameter (mm) and organoleptic characteristics (Perez-Sanchez *et al.,* 2010**;** Milatović D., *et al.,* 2013).

Other parameters measured were the percentage of cracked fruits on the tree.

Most cultivars were included in a taste panel with 6 judges. A maximum of three cultivars were evaluated by each panel using a scale from 1 to 9, in which 1 corresponds to very poor flavour, 5 is moderate and 9 is very good.

All the data will contribute to the choice of an update sweet cherry assortment more convenient for modern training methods (Istrate *et al.,* 2016; Gjamovski V. *et al.,* 2016).

RESULTS AND DISCUSSIONS

Sweet cherry actual assortment offers a large interval for fresh consumption, on average 75 days, since second decade of May till the first decade of August. George is a Romanian late ripening variety obtained at Iasi Fruit Growing Research Station (Sirbu *et al.,* 2017).

All sweet cherry varieties taken into study ripened after 'Bigareau Burlat' in the following order: 'Summit', 'Canada Giant', 'Kordia', 'Ferrovia', 'Skeena', 'Karina', 'Regina', 'Sunburst', 'Sweetheart' (fig. 1) (Stehr, 2005; Vercammen *et al.,* 2014).
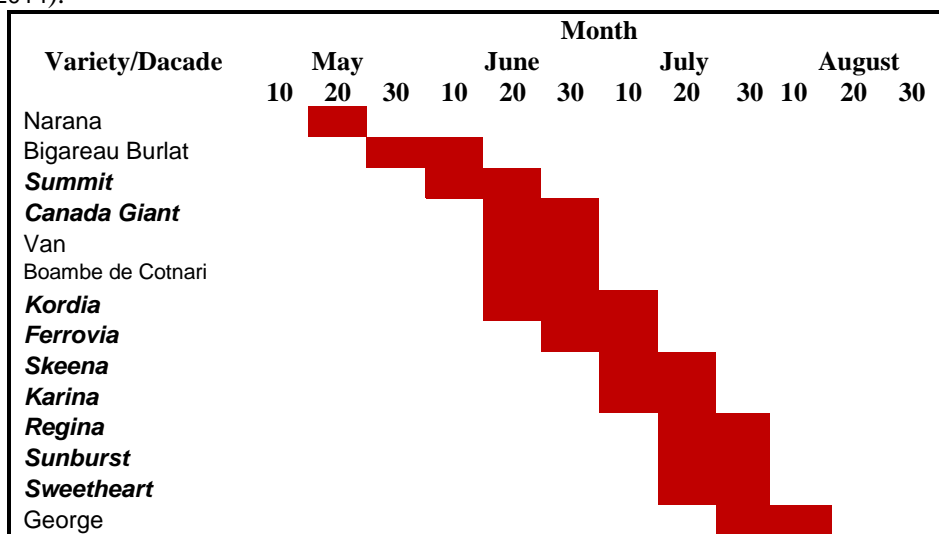

Fig. 1 Average ripening time of different sweet cherry varieties in Romania

Fig. 2 Aspects from the experimental field

Nine of the most promising selections obtained in the last years breeding programs and most cultivated in Romania (Musacchi *et al.,* 2015) were screened on

Gisela 5 rootstock, for their adaptability to new intensive high density orchards and for fruit characteristics.

Among quality characteristics fruit aspect is very important since it is the initial sensory attribute that can determine a consumer's choice. It is considered that there are three important characteristics associated with the appearance of fruit: color, size and shape, and surface texture. Fruit size is an important characteristic for commercial value.

Data for the fruit quality characteristics of evaluated varieties, in 2019 are shown in table 2. In terms of fruit weight, the following varieties were noted: 'Regina' (11.0 g) and 'Kordia' (10.4 g).

Table 2

Quality characteristics of the analyzed sweet cherry varieties, data for year 2019

Variety	Fruit characteristics				
	Fruit Weight (g)	Sugar content (°Brix)	Flavour (1-9)	Cracked fruits (%)	Cracking resistance
Summit	9.4	17.8	7	28	Good
Canada Giant	10.0	18.6	7	35	Good
Kordia	10.4	20.5	8	15	Very good
Ferrovia	10.1	19.7	7	32	Good
Skeena	9.2	20.0	8	63	Poor
Karina	9.6	20.1	8	18	Very good
Regina	11.0	20.7	8	17	Very good
Sunburst	10.2	19.8	7	38	Good
Sweetheart	9.2	21.2	8	59	Poor

The skin color is relatively similar to all nine varieties, with different shades from red to dark red, with high organoleptic characteristics.

'Skeena' has good productivity, flavour, and firmness and also it is self-fertile. The fact that it is highly susceptible to cracking is a big disadvantage. Because of its many positive qualities, it may have potential as a cultivar grown under plastic cover. Without plastic covering 'Sweetheart' and 'Skeena' are not the best option in our cultivation conditions.

Data on the varieties productivity are given in table 3. Analyzing production evolution in the last three years can be observed a very significant increase in 2018 and 2019 mainly due to the high percentage of flower buds

differentiation and thus, the large number of fruits/bunch. In last two years there was used additional pollination (two bumble bee colonies/hectare).

Regarding fruit production, we found that the most productive is 'Regina' (23.4 t/ha), followed by 'Karina', 'Ferrovia', 'Sweetheart' and 'Kordia'.

Table 3

Evolution of the production (t/ha), between 2016-2019

Variety	2016	2017	2018	2019
Summit	7.8	10.2	15.0	17.0
Canada Giant	8.6	11.5	16.0	18.0
Kordia	12.1	15.9	20.0	21.0
Ferrovia	10.0	13.5	20.0	21.5
Skeena	9.5	12.0	17.0	19.0
Karina	10.2	14.0	20.0	21.8
Regina	10.2	13.7	22.0	23.4
Sunburst	9.2	12.9	18.0	20.0
Sweetheart	9.9	13.0	19.0	21.1
Average	*9.73*	*12.97*	*18.56*	*20.32*

Fig. 3. Damages caused by late frost

In the last years the change of climatic conditions are affecting trees growing and development, resulting early flowering seasons, followed in some years by lack of rain or rainy periods and extreme temperature fluctuations during fruit development or. The impact of unfavourable conditions is most evident in early ripening cultivars, due to high fruit drop and fruit cracking or the fruits may remain small in size.

Low damage was also recorded in early-ripening cultivars in spring 2019 (fig. 3), when late frost (3rd of April) caused pistil browning.

CONCLUSIONS

The following conclusions can be drawn from this study:

1. Early ripening varieties are 'Summit' and 'Canada Giant', middle ripening are 'Kordia', 'Ferrovia' 'Skeena', 'Karina' and the late ripening are 'Regina', 'Sunburst' and 'Sweetheart'.

2. Fructification phenophases are determined by the climatic factor. Climate change will increase the need for more robust varieties that tolerate environmental stresses.

3. Regarding fruit production, the most productive is 'Regina' (23.4 t/ha), followed by 'Karina', 'Ferrovia', 'Sweetheart' and 'Kordia'.

4. In terms of fruit weight, the following varieties were noted: 'Regina' (11.0 g) and 'Kordia' (10.4 g).

5. The ideal sweet cherry variety would be self-fertile that is not susceptible to frost or cracking, productive, early or late ripening, low in vigour and have good fruit quality (firm and large) and a good flavour.

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