BEHAVIOUR OF SOME INTRODUCED CHERRY VARIETIES IN R. OF MACEDONIA GRAFTED ON GISELA 5

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Abstract

In this paper results of evaluation on yield and pomological characteristics of 9 cherry varieties (Sylvia, Stark Hardy Giant, Kordia, Regina, Sunburst, Octavia, Van, Sum and Summit) including local cherry vatiety Dolga siska, grafted on dwarfing rootstock Gisela 5 are presented.

The researches were conducted in experimental orchard located in v. Kosel in the Ohrid region. The orchard was established in 2009 with a planting distance 3.8 x 2 m. Training system of the trees is central leader. In the orchard intensive agricultural techniques are implemented. The orchard is under drip irrigation system. The study has been performed during two consecutive years 2011 and 2012. The following parameters were investigated: diameter of the rootstock and scion, trunk cross section area, yield and yield efficiency and quality characteristics of the fruits.

All cultivars have good compatibility with the rootstock.

According to the diameter of the stem, variety Octavia is most vigorous. Sylvia has the lowest vigorousness among evaluated varieties.

The highest cumulative yield and yield efficiency is registered at variety Sum (12.66 kg, 0.15 kg/cm2), and the lowest at Summit (3.93 kg, 0.05 kg/cm2). Fruits from Dolga siska have highest fruit weight (13.27 g) while fruits from Sylvia have lowest value for this parameter (7.63 g). All varieties have very height randman of the fruits. It ranges from 94.07% at Regina to 97.21% at Summit.

Most of the studied varieties show positive characteristic and can be recommended for mass growing in the Ohrid region.

Keywords: cherry, varieties, productivity, fruit quality,

Introduction

The choice of cherry rootstock depends on several key factors such as variety to be used, the soil texture, the depth to water table, and the training system. We don't yet know the best rootstocks to use for new, high-density training systems, but a dwarfing rootstock is likely crucial.

In modern cherry production there is no longer a place for very tall trees. As was the case for apple and pear, the demand for less vigorous trees, that are easier to control increased at the end of the seventies and beginning of eighties (Vercammen et al., 2006).

Vigorous sweet cherry trees are still common in Macedonian fruit orchards. Seedlings of *Prunus mahaleb* L. and *P. avium* L. are the major rootstocks used for sweet cherry production. These rootstocks are vigorous and difficult to maintain, especially during harvesting. *P. mahaleb* seedlings slightly reduce tree growth vigor but perform poorly in heavier soils (Gyeviki et al. 2008). Furthermore, compatibility of different sweet cherry cultivars grafted on *P. mahaleb* is unpredictable (Perry 1987).

In the last year's farmers in Macedonia have shown increased interest for new high density cherry orchards established on dwarfing rootstock. Gisela 5 cherry rootstock is among the best dwarfing, precocious and productive rootstocks for modern, intensive sweet cherry growing (Zimmermann, 1994) and start to replace *Prunus mahaleb* and *P. avium* rootstocks in Macedonia because of their ability to produce dwarfing and precocity trees. Preliminary observations of this rootstock show very good adaptation to Ohrid region soil and climatic conditions.

On the other hand it is thought there are several hundred varieties of sweet cherry grown commercially world-wide but most of these are simply cultivated and marketed locally. Only a select few of these several hundred varieties are suitable for wide-scale production and sale on the global market, due to their quality attributes matching market and grower requirements (Revell, 2008). However, the trees growth and productions is depended by climatic conditions like chilling hours (Mahmood *et al.* 2000), light intensity, rain and temperature during blossom (Roversi and Ughini, 1996) etc.

The aim of this work was to provide information about trees growth, period of blossom, and fruit quality characteristics under local climatic conditions of a number of promising cherry cultivars grafted on Gisela 5 rootstock.

Material and methods

Nine sweet cherry cultivars (table 1), was established in the experimental orchard in v. Kosel, Ohrid in 2009. The local variety Dolga siska an old and well adapted to the local conditions was used as a control. The orchard contains two rows, 50 trees per row, 5 different varieties in the row with 10 trees of each specified variety. All variety was grafted on Gisela 5 rootstock. The planting distances were 3.8 x 2 m, while trees ware trained to central leader canopy. The research was conducted during period 2011 and 2012. The orchard has been established on a fertile loam soil. Agroclimatic conditions registered in the area are shown in Table 2.

Table 1. Evaluated sweet cherry cultivars

Sweet cherry cultivars	
Sylvia	Octavia
Stark Hardy Giant	Van
Kordia	Sum
Regina	Summit
Sunburst	Dolga siska

Table 2. Agroclimatic conditions registered in the period 2000-2011

Parameter	Months													
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		Veg.
Mean air temperature,°C	1.9	2.8	6.5				22				7.7	3.4	11.7	16.9
Rainy, mm														
Mean air humidity, %	78	71	68	67	67	63	58	59	67	74	76	79	69	65

Following parameters have been evaluated: blossom period, diameter of the rootstock and scion, yield per tree, yield efficiency and fruit quality.

Observations concerning plant growth characteristics (diameter of the trunk and scion and TCSA) and blossom period were taken in accordance to international standards.Yield per tree and cumulative yield per tree were computed from the harvest data. Yield efficiency was calculated as kg/cm2 TCSA.

Fruit quality was determined thought weight, dimensions and chemical characteristics. In general, the analyzed fruits were sampled when was the first commercial harvest. Fruit from each variety was randomly harvested from 10 different trees, 30 representative cherries were processed for all the analysis. Fruit weight was measured using digital balance. Fruit length (L), fruit width (W) and fruit thickness (T) was determined using vernier calliper. Fruit volume were calculated using the formula 4/3pr3, where r = [L + W + T]/6 and fruit sphericity (ø) was calculated using the following equation ø = ([LWT]) 0,333)/L (Perez-Sanchez et al., 2010). Soluble solid concentration (°Brix) was determined using a refractometer. Titratable acidity was determined on three juice samples, diluted in distilled water, and microtitrated with NaOH 0.1 N (Daza et al., 2008).

Statistical analyses were performed using SPSS 14.0 (SPSS Inc., 2005). The differences were evaluated by ANOVA analysis through General Linear Model procedure. After GLM analyses post hoc comparison of means ware calculated by LSD. Results were expressed at the $P < 0.05$ level of significance.

Results and discussion

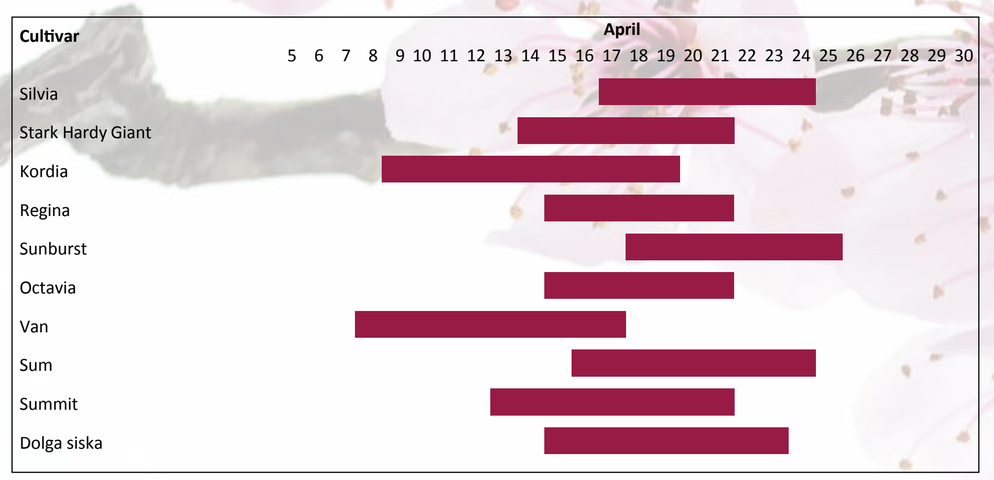

Figure 1. Blooming period of different varieties

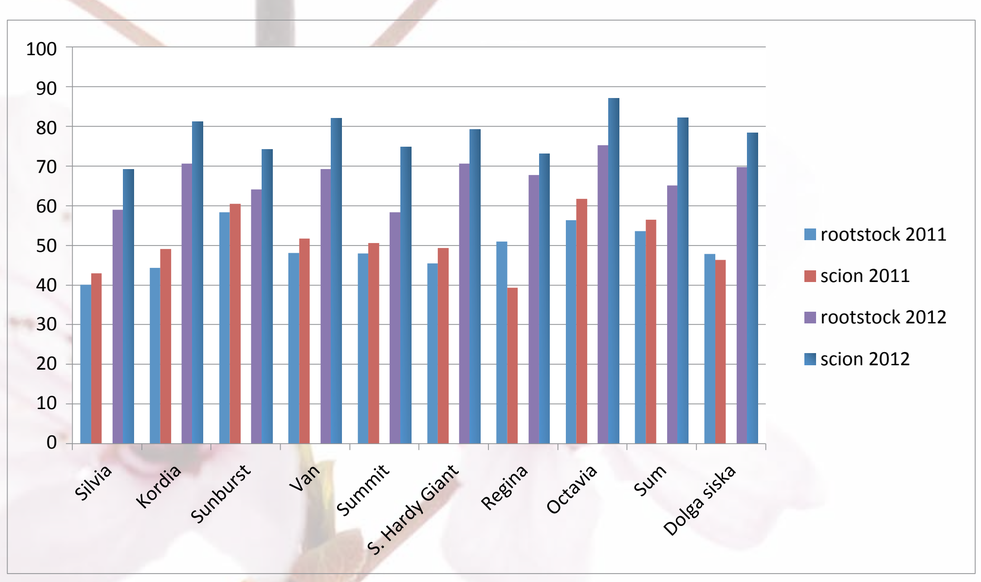

Figure 2. Diameter of the rootstock and scion, 2011 and 2012, mm.

Table 3. Pomological characteristics of the fruits, average 2011-2012

Cultivar	Fruit weight, g	Stone weight, g	Randman, %	Stalk length, mm
Sylvia	7,63^{f}	0,50	93,44	41,16^{e}
Kordia	9,81^{c}	0,45	95,41	49,79^{d}
Sunburst	11,72^{b}	0,37	96,84	41,32^{e}
Van	9,69^{c}	0,45	95,35	30,90^{g}
Summit	8,60^{def}	0,24	97,21	40,87^{ef}
Stark Hardy Giant	11,33^{b}	0,57	94,97	59,92^{ab}
Regina	8,26^{ef}	0,49	94,07	53,19^{c}
Octavia	9,17^{cde}	0,48	94,76	58,09^{b}
Sum	9,27^{cde}	0,28	96,98	37,15^{f}
Dolga siska	13,27^{a}	0,56	95,78	63,17^{a}

*Values followed by the same letter in a column were not statistically different ($P < 0.05$).

Table 4. Physical characteristics of the fruits, average 2011-2012

Cultivar	Fruit length, mm	Fruit width, mm	Fruit thickness, mm	Fruit volume, cm^3	Sfericity, %
Sylvia	23,09^{c}	24,60^{d}	21,15^{e}	6,43^{e}	99,01^{b}
Kordia	25,66^{ab}	26,87^{bc}	22,34^{c}	8,21^{cd}	96,83^{bc}
Sunburst	27,28^{a}	27,98^{b}	23,99^{b}	9,71^{b}	97,04^{bc}
Van	23,39^{c}	27,62^{b}	22,29^{c}	7,68^{d}	103,90^{a}
Summit	25,41^{ab}	25,84^{c}	21,25^{de}	7,58^{d}	94,81^{cd}
Stark Hardy Giant	25,00^{b}	28,14^{b}	24,22^{ab}	9,02^{bc}	103,07^{a}
Regina	24,22^{bc}	24,80^{cd}	21,98^{cd}	7,01^{de}	97,61^{b}
Octavia	24,85^{b}	24,75^{cd}	21,97^{cde}	7,23^{de}	96,05^{c}
Sum	26,02^{ab}	24,96^{cd}	21,84^{cde}	7,51^{d}	93,04^{d}
Dolga siska	26,83^{a}	30,50^{a}	25,07^{a}	10,90^{a}	102,05^{a}

*Values followed by the same letter in a column were not statistically different ($P < 0.05$).

Table 5. Productivity of the varieties, 2011-2012

Cultivar	Yield per tree, kg		Cumulative yield, kg	Cumulative yield efficiency, kg/cm^2
	2011	2012		
Sylvia	1,35	3,55	4,90^{b}	0,127^{b}
Kordia	1,31	3,50	4,81^{b}	0,108^{b}
Sunburst	1,18	3,00	4,18^{b}	0,094^{b}
Van	1,07	3,15	4,22^{b}	0,080^{b}
Summit	0,90	3,03	3,93^{b}	0,089^{b}
Stark Hardy Giant	1,58	4,35	5,93^{b}	0,130^{b}
Regina	0,93	3,95	4,88^{b}	0,112^{b}
Octavia	3,31	9,13	12,44^{a}	0,214^{a}
Sum	3,36	9,30	12,66^{a}	0,239^{a}
Dolga siska	1,36	4,27	5,36^{b}	0,121^{b}

*Values followed by the same letter in a column were not statistically different ($P < 0.05$).

Table 6. Chemical characteristics of the fruits, average 2011-2012

Cultivar	TSS , °Brix	TA, %	TSS/TA ratio
Sylvia	14,8	0,49	30,20
Kordia	15,3	0,63	24,29
Sunburst	15,2	0,50	30,40
Van	16,7	0,60	27,83
Summit	14.0	0,76	18,42
Stark Hardy Giant	15,1	0,55	27,45
Regina	17,4	0,67	25,97
Octavia	16,1	0,58	27,76
Sum	14,2	0,61	23,28
Dolga siska	15,7	0,55	28,55

Conclusions

All evaluated varieties shown positive adaptation on specific agroecological condition of the Ohrid region, R of Macedonia. This research shown that intensive production of quality sweet cherries grafted on dwarfing rootstock Gisela 5 in this region is possible. Although all evaluated varieties shown lower results concerning fruit quality parameters than local cultivar Dolga siska, some of them can be recommended for mass production in this region. Among them, Stark Hardy Giant, Sunburst and Van can be distinguished.

For the better and more precise evaluation of the behavior of this cultivars under agroecological conditions of the Ohrid region further investigation is necessary.

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