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Fruit quality and yield of introduced late-ripening sweet cherry (*Prunus avium* L.) cultivars

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Abstract. Pomological and productive characteristics of four introduced late-ripening sweet cherry cultivars – 'Karina', 'Kordia', 'Regina' and 'Summit', were studied in the West Serbia region, during the three-year period (2008–2010). The investigation included morphometrical characteristics of fruit (fruit, stone and stalk weight; fruit dimensions – height, width and thickness; stalk length; fruit shape index; mesocarp ratio), chemical composition of fruit (soluble solids content; total sugar, inverted sugar and sucrose contents; total acid content; fruit juice pH; sweetness index), and yields per tree and unit area.

The highest value of fruit weight was found in 'Summit', whereas 'Kordia' was characterized with exceptional quality, in terms of chemical composition of fruits. The highest productivity was achieved in 'Regina'. Generally, the results pointed to the high-quality fruits and high yields of the investigated cultivars, which can be recommended for the commercial sweet cherry orchards in the Republic of Serbia, in order to improve assortment structure, and to extend harvesting season.

Key words: *Prunus avium* L., cultivar, pomological properties, fruit quality, yield

Introduction

Sweet cherry (*Prunus avium* L.) is a fruit species of remarkable potential for fruit growing of the Republic of Serbia. The fruits are used primarily for fresh consumption, and to a lesser extent, for industrial processing (compote, jam, dried cherry etc.).

Sweet cherry breeding, in terms of the number of realized cultivars, is not as dynamic compared to other moderate-zone fruit trees, such as apple or peach. The most significant breeding programs are conducted in Canada, USA, Italy, France, United Kingdom, Germany, Czech Republic, Hungary and Australia (Milatović & Nikolić, 2011). The main objectives are developing new genotypes with large, attractive, good-tasting fruits, high and stable yields, reduced fruit-cracking susceptibility, which are self-compatible, and with improved resistance or tolerance to pathogens (Dirlewanger et al., 2007).The cultivars in commercial orchards should belong to different sweet cherry ripening season weeks, in order to provide the market with quality fruits over the widest possible time span, and to organize the harvest rationally. Demanding Western European and other world markets usually request roundish, hearted or broad-hearted fruit shape, and deep-red skin color; long, green stalk is preferable than short; mesocarp firmness, as well as a good storage and transportability of fruits are also desirable characteristics.

The average sweet cherry fruit production in the Republic of Serbia during the period 2012–2016 was 19,710 *t* (Radičević et al., 2017). High prices and demand for sweet cherry fresh fruit have significantly influenced the increased interest in planting cherry trees in the last decade. The tendency of establishing new orchards, especially on less vigorous rootstocks, has brought cultivars which are commercially important in cherry areas in Europe, and world-wide.

The aim of this work is to contribute to an adequate choice of late-ripening sweet cherries that can extend harvesting season for commercial orchards, through the investigation of its pomological properties, chemical composition of fruits and yields, in the area typical for fruit growing in the Republic of Serbia.

Material and Methods

Plant material. The experiment was conducted over three years (2008–2010) in an experimental orchard at 'Preljina' facility of Fruit Research Institute, Čačak. Four introduced sweet cherry cultivars were used in this study viz., 'Karina', 'Kordia', 'Regina' and 'Summit'. The cultivars are mutually cross-compatible (fully or partially), with the *S*-allelic constitutions S_3S_4, S_3S_6, S_1S_3 and S_1S_2, respectively (Radičević et al., 2013). They belong to the 4th ('Summit'), 5th ('Karina', 'Kordia') and 6th ('Regina') cherry ripening season weeks (Milatović et al., 2011; Milatović et al., 2015; Radičević et al., 2017). Cultivars were grafted on Gisela 5 rootstock. The orchard was established in 2005, in a randomized block design with five trees in three replications, at a distance 4.0 × 1.5 *m*. The 'Zahn spindle' training system was used, and appropriate cultural practices were applied (pruning, fertilization, 'drop by drop' irrigation, pest and disease control).

Morphometrical characteristics of fruits. Standard morphometric methods were used for the evaluation of fruit, stone and stalk weight, fruit dimensions (height, width and thickness) and stalk length, on a sample of 75 fruits (25 fruits per replication). Fruit shape index was calculated as length^2 · width^{-1} · thickness^{-1}, and mesocarp ratio as a percentage of edible parts of fruit (flesh and skin) in the total fruit weight. Pomological classifications were performed according to the method of Albertini & Della Strada (2001).

Chemical composition of fruits. The following parameters were determined by chemical analysis: soluble solids content (by manual refractometer); total and inverted sugars content (volumetrically, according to Luff-Schoorl; Egan et al., 1981); total acids content expressed in malic acid (by titration of 0.1 N NaOH with phenolphthalein as an indicator); existing acidity (CyberScan 510 pH/Conductivity Meter); sucrose content and sweetness index (calculated manually).

Yield per tree and unit area. In the phenophase of full ripening, yield measurements per tree were carried out. Based on the average yield per tree and the number of trees per hectare (1667 trees ha^{-1}), the calculation of the yield per unit area has been done.

Data analysis. Standard error was calculated for the measured parameters. The data were statistically analysed using a two-factor analysis of variance (ANOVA). The significance of differences among mean values was determined by Duncan's Multiple Range Test at $P \leq 0.05$. Data analysis was done by using the SPSS statistical software package, Version 8.0 for Windows (SPSS. Inc., Chicago, IL).

Results and Discussion

Morphometric characteristics of fruits. The highest average fruit weight among the tested cultivars was found in 'Summit' (9.69 *g*), and the smallest in 'Kordia' (8.79 *g*) (Tab.1). The average fruit weight value was the highest in 2008 for all the cultivars except for 'Kordia' (2010). Fruits of 'Summit' can be classified as very large (> 9.3 *g*), whereas the fruits of other cultivars were large (7.6–9.3 *g*).The highest fruit shape index was found highest in 'Kordia' (1.28), indicating the most elongated fruits, and the smallest in 'Karina' (0.97), which is in line with its roundishfruit shape.

The stone weight ranged in a small interval from 0.41 *g* ('Karina' and 'Summit') to 0.45 *g* ('Regina'), and the stalk weight from 0.13 *g* ('Summit') to 0.20 *g* ('Regina'). 'Kordia' and 'Regina' can be classified into the category of cultivars with long stalks (> 49 *mm*), whereas the stalks of 'Karina' and 'Summit' were medium-long (39–49 *mm*). The mesocarp ratio had the highest value in 'Summit' (94.38%), which is in line with the highest weight of the fruit of this cultivar.

The statistical significance of the variability factors and their interactions' impact on the morphome-

Tab. 1.Fruit morphometric characteristics of introduced sweet cherry cultivars in agroecological conditions of Čačak (2008–2010)
Tab. 1. Morfometrijske osobine ploda introdukovanih sorti trešnje u agroekološkim uslovima Čačka (2008–2010. godina)

Factor *Faktor*			Fruit weight *Masa ploda (g)*	Fruit shape ratio *Indeks oblika ploda*	Stone weight *Masa koštice (g)*	Stalk weight *Masa peteljke (g)*	Stalk length *Dužina peteljke (mm)*	Mesocarp ratio *Randman mezokarpa (%)*
Cultivar *Sorta* (A)	'Karina'		8.98 ± 0.17 bc*	0.97 ± 0.03 d	0.41 ± 0.02 c	0.17 ± 0.02 b	47.22 ± 1.34 b	93.48 ± 0.28 b
	'Kordia'		8.79 ± 0.14 c	1.28 ± 0.02 a	0.43 ± 0.01 b	0.16 ± 0.01 b	54.37 ± 1.60 a	93.24 ± 0.23 c
	'Regina'		9.21 ± 0.28 b	1.03 ± 0.02 c	0.45 ± 0.03 a	0.20 ± 0.00 a	54.54 ± 0.61 a	92.95 ± 0.24 c
	'Summit'		9.69 ± 0.13 a	1.07 ± 0.03 b	0.41 ± 0.01 c	0.13 ± 0.00 c	43.62 ± 1.62 c	94.38 ± 0.24 a
Year *Godina* (B)		2008	9.56 ± 0.20 a	1.14 ± 0.02 a	0.42 ± 0.00 b	0.19 ± 0.01 a	53.18 ± 0.89 a	93.54 ± 0.28 b
		2009	8.69 ± 0.14 c	1.04 ± 0.06 c	0.37 ± 0.01 c	0.15 ± 0.01 b	50.31 ± 2.11 b	94.01 ± 0.24 a
		2010	9.26 ± 0.12 b	1.08 ± 0.03 b	0.49 ± 0.01 a	0.16 ± 0.01 b	46.32 ± 1.61 c	92.99 ± 0.22 c
A × B	'Karina'	2008	9.60 ± 0.11 b	1.04 ± 0.00 fg	0.40 ± 0.00 f	0.24 ± 0.03 a	51.03 ± 0.74 de	93.25 ± 0.32 cde
		2009	8.39 ± 0.08 fg	0.88 ± 0.01 j	0.34 ± 0.01 g	0.13 ± 0.00 cd	48.10 ± 1.36 f	94.32 ± 0.22 b
		2010	8.96 ± 0.19 cde	0.99 ± 0.02 hi	0.50 ± 0.00 b	0.14 ± 0.01 cd	42.53 ± 0.69 g	92.88 ± 0.19 ef
	'Kordia'	2008	8.63 ± 0.43 efg	1.27 ± 0.02 b	0.41 ± 0.00 ef	0.18 ± 0.00 b	55.26 ± 0.58 bc	92.84 ± 0.41 fg
		2009	8.81 ± 0.12 ef	1.36 ± 0.02 a	0.42 ± 0.01 def	0.14 ± 0.00 cd	59.05 ± 1.57 a	93.64 ± 0.04 cd
		2010	8.93 ± 0.09 de	1.21 ± 0.01 c	0.46 ± 0.01 c	0.15 ± 0.01 c	48.80 ± 0.99 ef	93.23 ± 0.07 de
	'Regina'	2008	9.81 ± 0.18 b	1.11 ± 0.00 de	0.44 ± 0.00 cde	0.20 ± 0.01 b	56.55 ± 0.51 ab	93.50 ± 0.18 cd
		2009	8.18 ± 0.09 g	0.95 ± 0.01 i	0.36 ± 0.00 g	0.19 ± 0.00 b	53.48 ± 0.72 cd	93.23 ± 0.07 de
		2010	9.65 ± 0.26 b	1.03 ± 0.01 gh	0.56 ± 0.01 a	0.20 ± 0.01 b	53.60 ± 0.85 cd	92.12 ± 0.03 g
	'Summit'	2008	10.20 ± 0.10 a	1.15 ± 0.01 d	0.42 ± 0.01 def	0.13 ± 0.00 cd	49.90 ± 0.84 ef	94.57 ± 0.08 ab
		2009	9.38 ± 0.03 bcd	0.97 ± 0.01 i	0.36 ± 0.00 g	0.12 ± 0.00 d	40.61 ± 0.89 g	94.84 ± 0.04 a
		2010	9.49 ± 0.10 bc	1.08 ± 0.03 ef	0.44 ± 0.02 cd	0.15 ± 0.00 c	40.36 ± 0.62 g	93.73 ± 0.37 c
A			*	*	*	*	*	*
B			*	*	*	*	*	*
A × B			*	*	*	*	*	*

* Significant diferences for $P \leq 0.05$ (F test); Small-case letters in columns indicate significant differences for $P \leq 0.05$ according to Duncan's Multiple Range Test / *Značajne razlike za $P \leq 0,05$ (F test); Mala slova u kolonama pokazuju značajne razlike za $P \leq 0,05$ primenom Dankanovog testa*

trical characteristics of fruit is a consequence of the absence of parallelism in the tendencies of the basic factors, or the appearance of opposing tendencies. It can be noticed that the cultivar specificities in terms of fruit weight and fruit shape index were modified by unequal effect of agroecological conditions by years.

In sweet cherry as an exceptionally alogamous species, the occurrence of metaxenia, i.e. the influence of the pollen on the change in fruit shape and stone characteristics (Stančević, 1971), could also contribute to the differences statistically expressed in the interaction of the variability factors. According to Kankaya et al. (2008), fruits of 'Summit' could have weightmore than 11 *g*, whereas Blažkova et al. (2010) stated that the average fruit weight for 'Summit' was 9.4 *g*, and for 'Kordia' 7.5 *g*. Milatović et al. (2011) stated that the average weight of 'Summit' fruitwas over 9 *g*, and the fruit shape index 1.16, which indicates a somewhat elongated fruit shape. The results obtained for stone weight are in line with Milatović et al. (2015), according to whom the average weight of the stone in cherry cultivars varied from 0.3 to 0.6 *g*.

Brown et al. (1996) stated that the length and color of stalk in cherry fruit contribute to its attractiveness. Long stalk is generally considered as an advantage, due to easier harvest and smaller rotting of the fruits. On the other hand, shorter and intensely green colored stalk is associated with freshness and juiciness of fruit (Schick & Toivonen, 2000). The results of our work are in line with those of Milatović et al. (2015), according to which 'Summit' has a medium long stalk, whereas the stalks of 'Kordia' and 'Regina' are long. Stančević et al. (1988) stated that the average mass of stalks, examined for 12 sweet cherry cultivars, ranged

from 0.06 to 0.1 *g*. In our work, 'Regina' had the smallest value of mesocarp ratio, which is the consequence of the highest value of stalk and stone weight, despite the large fruits.

Chemical composition of fruits. The highest value of soluble solids content was determined in fruits of 'Kordia' (16.54%), and the lowest in fruits of 'Summit' (14.93%) (Tab. 2). The highest contents of total and inverted sugars were also found in 'Kordia' (11.92%; 11.12%, respectively). The influence of the cultivar and interactions between the cultivar and the year on these parameters was statistically significant, while the impact of the year was not. On the other hand, statistically significant effect of the year on the sucrose contenthasshown, while the impacts of cultivar and cultivar-year interaction were not significant.

Regarding the total acid content, the highest value wasdetermined in fruits of 'Kordia' (0.73%), and the lowest in fruits of 'Regina' (0.43%) (Tab. 2). The average values of the fruit juice pH show an opposite tendency in relation to the average contents of the total acids. Sweetness index had the highest value in fruits of 'Regina' (26.33), and the lowest value in fruits of 'Kordia' (16.52), having a similar tendency with the value of fruit juice pH, i.e. the reverse tendency in relation to the total acid content. Kappel et al. (1996), gi-

Tab. 2. Fruit chemical composition of introduced sweet cherry cultivars in agroecological conditions of Čačak (2008–2010)
Tab. 2. Hemijski sastav ploda introdukovanih sorti trešnje u agroekološkim uslovima Čačka (2008–2010. godine)

Factor / *Faktor*			Soluble solids content / *Sadržaj rastvorljivih suvih materija* (%)	Sugar content/*Sadržaj šećera* (%)			Total acids content / *Sadržaj ukupnih kiselina* (%)	pH / *pH*	Sweetness index / *Indeks slasti*
				Total / *Ukupni*	Inverted / *Invertni*	Sucrose / *Saharoza*			
Cultivar / *Sorta* (A)	'Karina'		15.51 ± 0.25 b	11.23 ± 0.17 b	10.49 ± 0.18 b	0.75 ± 0.18 a	0.60 ± 0.07 b	3.73 ± 0.05 c	18.80 ± 0.58 b
	'Kordia'		16.54 ± 0.18 a	11.92 ± 0.13 a	11.12 ± 0.22 a	0.76 ± 0.14 a	0.73 ± 0.10 a	3.61 ± 0.08 d	16.52 ± 0.55 c
	'Regina'		15.04 ± 0.12 bc	11.06 ± 0.19 b	10.30 ± 0.13 b	0.72 ± 0.16 a	0.43 ± 0.08 c	3.98 ± 0.04 a	26.33 ± 1.19 a
	'Summit'		14.93 ± 0.44 c	11.01 ± 0.25 b	10.28 ± 0.24 b	0.69 ± 0.16 a	0.59 ± 0.10 b	3.82 ± 0.05 b	18.90 ± 0.64 b
Year / *Godina* (B)		2008	15.59 ± 0.26 a	11.33 ± 0.19 a	10.48 ± 0.19 a	0.84 ± 0.09 a	0.63 ± 0.13 a	3.62 ± 0.06 c	18.51 ± 0.82 c
		2009	15.34 ± 0.37 a	11.39 ± 0.29 a	10.72 ± 0.25 a	0.64 ± 0.10 b	0.61 ± 0.15 a	3.78 ± 0.05 b	19.44 ± 1.24 b
		2010	15.59 ± 0.16 a	11.20 ± 0.13 a	10.45 ± 0.11 a	0.72 ± 0.14 b	0.52 ± 0.12 b	3.95 ± 0.03 a	22.47 ± 1.44 a
A × B	'Karina'	2008	14.40 ± 0.26 e	10.62 ± 0.15 bcd	9.80 ± 0.15 ef	0.93 ± 0.11 a	0.56 ± 0.02 d	3.51 ± 0.01 g	18.96 ± 0.35 de
		2009	15.87 ± 0.07 bc	11.37 ± 0.15 bcd	10.72 ± 0.11 bc	0.61 ± 0.25 d	0.68 ± 0.01 b	3.81 ± 0.01 e	16.80 ± 0.33 gh
		2010	16.27 ± 0.24 ab	11.70 ± 0.21 bc	10.96 ± 0.15 b	0.71 ± 0.20 bcd	0.57 ± 0.05 d	3.86 ± 0.01 de	20.65 ± 0.11 cd
	'Kordia'	2008	16.70 ± 0.12 ab	12.03 ± 0.15 ab	11.11 ± 0.14 b	0.88 ± 0.11 ab	0.79 ± 0.06 a	3.35 ± 0.02 h	15.19 ± 0.51 i
		2009	16.97 ± 0.49 a	12.45 ± 0.72 a	11.76 ± 0.49 a	0.65 ± 0.18 cd	0.78 ± 0.03 a	3.57 ± 0.02 g	15.88 ± 0.51 hi
		2010	15.97 ± 0.03 bc	11.28 ± 0.09 cde	10.49 ± 0.03 bcd	0.76 ± 0.22 abcd	0.61 ± 0.02 c	3.91 ± 0.01 cd	18.50 ± 0.22 efg
	'Regina'	2008	14.67 ± 0.21 de	10.70 ± 0.13 de	9.90 ± 0.14 def	0.76 ± 0.01 abcd	0.48 ± 0.10 e	3.82 ± 0.03 e	22.39 ± 0.92 c
		2009	15.50 ± 0.16 cd	11.45 ± 0.00 bcd	10.81 ± 0.06 bc	0.61 ± 0.27 d	0.44 ± 0.01 f	4.05 ± 0.01 ab	26.22 ± 0.20 b
		2010	14.97 ± 0.03 de	11.03 ± 0.06 de	10.19 ± 0.03 cde	0.80 ± 0.32 abc	0.36 ± 0.02 g	4.07 ± 0.01 a	30.37 ± 0.44 a
	'Summit'	2008	16.60 ± 0.04 ab	11.95 ± 0.13 ab	11.11 ± 0.18 b	0.80 ± 0.29 abc	0.68 ± 0.05 b	3.81 ± 0.01 e	17.50 ± 0.30 fgh
		2009	13.03 ± 0.24 f	10.28 ± 0.19 e	9.58 ± 0.20 f	0.67 ± 0.19 cd	0.55 ± 0.07 d	3.70 ± 0.05 f	18.86 ± 0.74 def
		2010	15.17 ± 0.37 cde	10.78 ± 0.35 de	10.15 ± 0.27 cde	0.60 ± 0.29 d	0.53 ± 0.09 d	3.96 ± 0.07 bc	20.34 ± 1.52 de
ANOVA									
A			*	*	*	ns	*	*	*
B			ns	ns	ns	*	*	*	*
A × B			*	*	*	ns	*	*	*

*/ns Significant / Not significant differences for $P \leq 0.05$ (F test); Small-case letters in columns indicate significant differences for $P \leq 0.05$ according to Duncan's Multiple Range Test / *Značajne razlike / Razlike koje nisu statistički značajne za $P \leq 0,05$ (F test); Mala slova u kolonama pokazuju značajne razlike za $P \leq 0,05$ primenom Dankanovog testa*

ving a model of an 'ideal' sweet cherry cultivar, stated that its fruit should have a soluble solids content of 17–19%, and a fruit juice pH of 3.76. For 17 sweet cherry cultivars, the content of total sugar exhibited interdependence with the soluble solids content, but without strict coincidence in changes of soluble solids and total sugars contents by cultivars and years (Radičević et al., 2009).

The total acids content, the fruit juice pH and the sweetness index had been unequally influenced by environmental factors, which resulted in the opposite tendencies per cultivars and years, i.e. in the manifestation of statistically significant influence of the variability factors interaction. Also, should not neglect the effect of irrigation during the period of growth and development of the fruit which modified cultivars' specificites, and contributed to the interactions influence. Our results are in line with those of Milatović et al. (2011), according to which the average total acids content for 11 sweet cherry cultivars ranged from 0.40 to 0.61%. The results are also consistent with previous studies (Radičević et al., 2009) in terms of the soluble solids and total acids content, as well as the fruit juice pH values of 'Kordia' and 'Summit', while the sweetness index was slightly lower, especially for fruits of 'Kordia'.

Yield per tree and unit area. The highest average yield per tree among the tested cultivars was found in 'Regina' (14.51 *kg*), and the lowest in 'Summit' (9.54 *kg*; Tab. 3). Yield increasing by years (from 2008 to 2010)

Tab. 3. The yield of introduced sweet cherry cultivars per tree and unit area (2008–2010)
Tab. 3. Prinos introdukovanih sorti trešnje po stablu i jedinici površine (2008–2010)

Factor / *Faktor*			Yield / *Prinos*	
			Per tree / *Po stablu* ($kg\ st^{-1}$)	Per unit area / *Po jedinici površine* ($t\ ha^{-1}$)
Cultivar / *Sorta* (A)	'Karina'		13.24 ± 0.68 b*	22.07 ± 1.13 b
	'Kordia'		11.50 ± 0.50 c	19.17 ± 0.86 c
	'Regina'		14.51 ± 0.91 a	24.18 ± 1.51 a
	'Summit'		9.54 ± 0.41 d	15.91 ± 0.74 d
Year / *Godina* (B)		2008	10.59 ± 0.44 c	18.24 ± 0.74 c
		2009	11.47 ± 0.66 b	19.11 ± 1.11 b
		2010	14.19 ± 0.85 a	23.64 ± 1.42 a
A × B	'Karina'	2008	11.80 ± 0.11 ef	19.67 ± 0.19 ef
		2009	12.23 ± 0.12 e	20.39 ± 0.20 e
		2010	15.70 ± 0.07 b	26.17 ± 0.11 b
	'Kordia'	2008	10.17 ± 0.44 g	16.94 ± 0.73 g
		2009	11.07 ± 0.64 fg	18.44 ± 1.06 fg
		2010	13.27 ± 0.14 cd	22.11 ± 0.24 cd
	'Regina'	2008	12.75 ± 0.08 de	21.25 ± 0.13 de
		2009	14.17 ± 0.73 c	23.61 ± 1.21 c
		2010	16.60 ± 0.10 a	27.67 ± 0.17 a
	'Summit'	2008	9.07 ± 0.23 h	15.11 ± 0.39 h
		2009	8.40 ± 0.21 h	14.00 ± 0.35 h
		2010	11.17 ± 0.44 fg	18.61 ± 0.74 fg
ANOVA				
A			*	*
B			*	*
A × B			*	*

* Significant differences for $P \leq 0.05$ (F test); Small-case letters in columns indicate significant differences for $P \leq 0.05$ according to Duncan's Multiple Range Test / *Značajne razlike za $P \leq 0,05$ (F test); Mala slova u kolonama pokazuju značajne razlike za $P \leq 0,05$ primenom Dankanovog testa*

was determined in 'Karina', 'Kordia' and 'Regina', while 'Summit' had lower yield per tree in 2009, compared to 2008. The highest yield per unit area was 24.18 *t ha*$^{-1}$ ('Regina'), and the lowest was 15.91 *t ha*$^{-1}$ ('Summit').

Blažkova et al. (2010), examining yields of cultivars grafted on Gisela 5, stated that the average three-year yield of 'Kordia' was the highest among five tested cultivars (17.5 *t ha*$^{-1}$), while the yield of 'Summit' was the lowest (13.2 *t ha*$^{-1}$). Milatović et al. (2015) pointed out that 'Summit' grafted on Gisela 5 started bearing fruits later, and that the yield was relatively low.

Modern cherry growing systems, raised on the low vigorous rootstocks, achieve their economic efficaccy at average yields of 17–20 *t ha*$^{-1}$ (Mićić et al., 2008). According to this criteria, the yields of 'Karina', 'Kordia' and in particular of 'Regina', were high and accompanied by good fruit quality, whereas the yield of 'Summit' was insufficient. The statistical significance of the variability factors and their interactions'impact on the yield per tree and unit area indicates cultivars' specificities, but also the unequal effect of the year on yield parameters. Bearing in mind favorable climatic and soil conditions during the research period, application of irrigation system, as well as cross-compatibility between the cultivars, it can be concluded that the year influenced the yields primarily in sense of their increase from the third to sixth-year-old orchard. Lang (2001) stated that, for cherry cultivars grafted on low-vigorous rootstocks, the abundant flowering, which can be associated with a significant yield, can be expected in the third or fourth year. The fact that research was carried out from the fourth to the sixth year of orchard (fifth to the seventh leaf) could influence the yield, the differences in cultivars per years, and the significance of the interaction effects, taking into account that the research periodwas at the begining of a full fruit bearing stage.

Conclusion

When choosing sweet cherry cultivars for commercial plantings, the main criteria should be their production results, stably manifested in a particular area over many years. Investigation of pomological properties, chemical composition of fruits and yields pointed out that introduced late ripening sweet cherry cultivars 'Karina', 'Kordia', 'Regina' could be recommended for the main fruit growing region in Republic of Serbia. Although 'Summit' has a somewhat lower yield at the beginning of fruit bearing stage, it could be also recommended for commercial orchards, due to its excellent quality fruits, especially in terms of fruit size.

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KVALITET PLODA I PRINOSI INTRODUKOVANIH SORTI TREŠNJE (*Prunus avium* L.) POZNOG VREMENA SAZREVANJA

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Rezime

Trešnja (*Prunus avium* L.) je vrsta od značajnog potencijala za voćarstvo Republike Srbije. Relativno visoka cena i zahtevi za svežim plodovima poslednjih godina, uticali su na pojačani interes za podizanjem zasada trešnje, naročito na slabo bujnim podlogama, što dovodi do introdukcije sorti komercijalno značajnih u glavnim proizvodnim regionima Evrope i sveta. U radu su prikazani rezultati ispitivanja pomoloških i proizvodnih osobina četiri introdukovane sorte trešnje poznijeg vremena sazrevanja – Karina, Kordia, Regina i Summit, na objektu Preljinsko brdo, Instituta za voćarstvo, Čačak. U trogodišnjem periodu (2008–2010. godine) proučavane su najznačajnije morfometrijske karakteristike ploda (masa ploda, koštice i peteljke; dimenzije ploda – visina, širina i debljina; dužina peteljke; indeks oblika ploda; udeo mezokarpa u ukupnoj masi ploda), hemijski sastav ploda (sadržaj rastvorljivih suvih materija, ukupnih šećera, invertnih šećera i saharoze; sadržaj ukupnih kiselina; pH soka ploda; indeks slasti), kao i prinosi po stablu i jedinici površine.

Najveću masu imali su plodovi sorte Summit, dok je kod sorte Kordia utvrđen izvanredan kvalitet ploda, naročito u pogledu njegovog hemijskog sastava. Najveći prinosi su utvrđeni kod sorte Regina. U pogledu ispitivanih osobina ispoljene su sortne specifičnosti, koje su ipak u izvesnoj meri modifikovane uticajima faktora spoljne sredine. Uticaj ovih faktora se nije ispoljavao u podjednakoj meri na ispitivane sorte, što je dovelo do odsustva paralelizma, odnosno pojave suprotnih tendencija po sortama i godinama. Ovakav uticaj se manifestovao kao statistički značajan uticaj faktora varijabilnosti, ali i njihovih interakcija.

Sprovedena ispitivanja i dobijeni rezultati upućuju na zaključak da se sorte Karina, Kordia i Regina mogu preporučiti za komercijalno gajenje u Republici Srbiji. I pored nešto slabijih rezultata u pogledu prinosa u početnim godinama rodnosti, pažnju zaslužuje i sorta Summit zbog izvanrednog kvaliteta ploda, naročito u pogledu njegove krupnoće. Širenjem ispitivanih sorti može se značajno unaprediti struktura sortimenta i uticati na produženje sezone berbe kvalitetnih plodova trešnjeu Republici Srbiji.

Ključne reči: *Prunus avium* L., sorta, pomološke osobine, kvalitet ploda, prinos