POMOLOGICAL TRAITS OF NOVI SAD APRICOT CULTIVARS AND SELECTIONS

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*SUMMARY***:** *The paper presents the results of three-year research (2008–2010) on pomological traits of four Novi Sad apricot cultivars (NS–4, NS–6, Novosadska rodna and Novosadska kasnocvetna) and five selections (SK–1, SK–3, SK–5, SK 13a and SK 16a). The research was carried out in an apricot genotypes collection of the Department of Fruit Science, Viticulture, Horticulture and Landscape Architecture of the Faculty of Agriculture in Novi Sad, at the "Rimski Šančevi" locality. The following pomological traits were tested: fruit weight, stone weight, flesh ratio, fruit length, width, thickness and fruit shape index. Those pomological traits were grouped into categories and graded according to the IBPGR descriptor. The pomological traits of Novi Sad apricot cultivars NS-4, NS-6, Novosadska rodna and selections SK-1, SK-3 and SK-13a were also compared to Hungarian best (control), showing better results.*

Key words*: apricot, cultivar, selection, pomological traits.*

INTRODUCTION

The apricot (*Prunus armeniaca* L.) is an important fruit species, having a high biological value due to its fine balance of nutrients, excellent for both fresh consumption and processing into juices, compotes, jams, marmalades, jellies, etc. Apricots can also be used dried or for producing fruit brandies of high quality (Vlahović, 2003). Moreover, sweet kernels can be used as an almond substitute, and bitter kernels for making essential oil for cosmetic products.

Due to the current situation of strong competition in the markets, new apricot cul-

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tivars must be characterised by high fruit quality attributes which satisfy the consumers (Ruiz and Egea, 2008). In Serbia and other European countries, biological traits of certain cultivars and selections are constantly tested in order to select the best ones for commercial production in certain regions. Studies were conducted in France (Moreau–Rio, 2006), Italy (Valentini et al., 2006), Turkey (Dellal and Koc, 2003), Spain (Egea et al., 2006) and Romania (Cociu, 2006) to test introduced and local apricot cultivars of late flowering, with better cropping and fruit quality for future production. The selection and creation of new apricot cultivars from natural population started in 1980 at the Faculty of Agriculture in Novi Sad (Đurić et al., 2005), and in 2004 NS-4, NS-6, Novosadska kasnocvetna and Novosadska rodna were registered as new cultivars.

In Serbia, 24.600 tons of apricots are produced annually. The average yield is 8.5 t/ha, varying from year to year due to the freezing of buds and flowers during low winter temperatures and late spring frosts, or alternative cropping (Keserović et al., 2010). Despite many problems, the apricot production in Serbia does have a great perspective. Over the last years, apricot cultivars NS–4, NS–6, Novosadska rodna and Novosadska kasnocvetna, selected by breeders from Faculty of Agriculture in Novi Sad, have played an important role in setting up new orchards in Serbia (Đurić, 2003; Đurić et al., 2005; Đurić and Keserović, 2007). Furthermore, according to Mratinić et al. (2007), introduced and domestic apricot cultivars, such as Ligeti Orias, Bergeron, Kostjuzenski and Novi Sad cultivars, which are higher-cropping and more resistant, decrease percentage of Hungarian best and Kecskemet apricot in new orchards.

The objective of the research was to compare the pomological traits of Novi Sad cultivars and selections to the cv. Hungarian best in the conditions of Novi Sad locality, and select the ones that had better fruit traits than the standard.

The results could be used to intensify the production of Novi Sad apricot cultivars and selections on other localities with similar ecological conditions.

MATERIAL AND METHODS

The evaluation of pomological traits of Novi Sad apricot cultivars and selections was conducted in an apricot genotypes collection of the Department of Fruit Science, Viticulture, Horticulture and Landscape Architecture, Faculty of Agriculture in Novi Sad, at the"Rimski Šančevi" locality during 2008-2010.

The orchard was planted in 2000, with 5 x 4 m spacing. *Prunus cerasifera* L was used as the rootstock, and *Stanley* plum cultivar as the interstock. The trees had an improved pyramidal shape.

Fruit and stone weight were scale–weighted and expressed in grams. Fruit ratio was expressed as a percentage of total fruit weight/ flesh weight ratio. Fruit dimensions (length, width and thickness) were measured by calliper. Fruit length was determined by measuring the distance from the stem cavity to the apex. Fruit width was determined by measuring the distance from the suture to the dorsal side at the widest part, and thickness by measuring the space between two halves. Based on fruit dimensions, fruit shape index (roundness factor) was calculated by using the following formula: Io = length^2/width x thickness.

The pomological–technological traits of four Novi Sad apricot cultivars (NS–4, NS–6, Novosadska rodna, Novosadska kasnocvetna) and five selections (SK–1, SK–3, SK–5, SK 13a and SK 16a) were studied. Twenty–five fruits of each cultivar and selec-

tion were analysed. The categories of fruit size, shape, suture depth, stem cavity depth, apex shape and fruit attractiveness, as well as stone size and shape were evaluated in accordance with the international IBPGR (International Board for Plant Genetic Resources) apricot descriptor (Guerriero and Watkins, 1984).

The analysis of variance and the F–test for a two–factorial experiment, the A x B model, was used to establish significance of the observed differences (Hadživuković, 1973). For individual cultivar comparisons, the LSD test was used.

RESULTS AND DISCUSSION

Great fluctuations in fruit weight were observed among the genotypes and ranged from 43.90 g (N. kasnocvetna) to 78.23 g (NS–4). Đurić et al. (2005) and Đurić and Keserović (2007) reported similar results for both cultivars. Fruits of Hungarian best were classified by Rahović (2002, 2003) and Milatović et al. (2005) as medium/large (35–50 g).

The pomological traits of the apricot cultivars and selections are shown in the Table 1.

Table 1. Pomological traits of apricot cultivars and selections, "Rimski Šančevi", 2008–2010

Cultivar /selection	Fruit weight (g)	Stone weight (g)	Flesh ratio (%)
	Average	Average	Average
NS–4	78.23	2.91	95.96
NS–6	76.13	3.19	95.56
N. rodna	60.12	3.06	94.75
N.kasnocvetna	43.90	2.59	93.98
SK–1	66.28	2.70	95.83
SK–3	61.56	2.50	95.73
SK–5	47.53	2.40	94.95
SK 13a	60.87	2.43	96.00
SK 16a	47.19	2.83	93.62
Hungarian best	55.78	3.05	94.52
Average/Prosek	59.76	2.77	95.09
LSD $_{Cultivars}$ 0,05	3.18 4.19	0.21 0.28	0.32 0.42
0,01			

Compared to the control, Novosadska kasnocvetna cultivar and SK–5 and SK 16a selections have been classified as medium (35–50 g); Novosadska rodna cultivar along with SK–1, SK–3 and SK 13a selections as large (58–70 g); and NS–4 and NS–6 selections as very large (above 70 g). The results obtained for Novosadska rodna are in compliance with the results of Korać et al. (2000), while the results for Hungarian best were better than previously reported by Milatović et al. (2005), Milošević et al. (2010) and Mratinic et al. (2010). Compared to Hungarian best, N. kasnocvetna, SK–5 and SK–16a were of significantly lower weight, while NS–4, NS–6 and Novosadska rodna cultivars, as well as SK–1, SK–3 and SK 13a selections, had higher fruit weight than the control.

Keserović et al. (2005) pointed out that NS–4 cultivar had large fruits and regular cropping.

Stone weight was in a correlation with fruit weight, i.e. as fruit weight was increasing/decreasing, stone weight was also increasing/decreasing. NS–6 had the highest stone weight (3.19 g.), whilst SK–5 (2.40 g) had the smallest stone weight. The observed cultivars and selections can be classified into the following groups: medium stone (SK–3, SK–5 and SK 13a), medium to large stone (NS–4, Novosadska kasnocvetna and Hungarian best, SK–1 and SK 16a) and large stone (NS–6 and Novosadska rodna).

All tested cultivars and selections had a good flesh ratio. SK–13a had the highest flesh ratio (96.00%), and SK 16a selection had the smallest one (93.62%). Compared to Hungarian best, the fruit ratio of Novosadska kasnocvetna cultivar and SK 16a selection was slightly lower or at the standard level, whereas the other cultivars and selections had better fruit ratio than the standard. Stone ratio in fruit weight was low (up to 5.5%, grade 3), ranging from 2.53% (SK 13 a) to 3.34% (NS-6), according to the IBPGR descriptor.

The statistical data analysis showed significant statistical differences among cultivars and selections for the fruit weight, stone weight and fruit ratio.

The highest length (52.9 mm) and width (52.1 mm) were measured on fruits of SK–1 and the highest thickness (51.2 mm) on NS–6. In accordance with fruit weight, the lowest length, width and thickness were measured on fruits of N. kasnocvetna (45.1 mm, 41.4 mm and 41.6 mm, respectively).

The morphometric traits of the apricot cultivars and selections at the "Rimski Šančevi" locality in the period 2008–2010 are shown in the Table 2.

Table 2. Morphometric traits of apricot cultivars and selections, "Rimski Šančevi", 2008–2010

Cultivar /selection	Length (mm)	Width (mm)	Thickness (mm)	Shape index
	Average	Average	Average	Average
NS–4	52.1	46.9	49.7	1.2
NS–6	52.5	49.4	51.2	1.1
N. rodna	48.9	46.3	47.1	1.1
N.kasnocvetna	45.1	41.4	41.6	1.2
SK–1	52.9	52.1	47.1	1.1
SK–3	50.5	49.3	44.9	1.2
SK–5	47.6	47.5	41.9	1.1
SK 13a	50.2	48.7	44.8	1.2
SK 16a	45.8	44.0	41.7	1.2
Hungarian best	50.5	49.6	51.1	1.0
Average/Prosek	49.6	47.5	46.1	1.1
LSD Cultivars0.05	0.91	0.91	0.96	0.017
0.01	1.21	1.20	1.27	0.022

Fruit shape index was calculated based on fruit dimensions, ranging from 1.00 to 1.20. The following fruit shapes were represented: round (shape index below 1.15 – Hungarian best, NS–6, Novosadska rodna, SK–1, SK–5 and SK 16a) and elliptic (shape index above 1.15 – NS–4, Novosadska kasnocvetna cultivars, SK–3 and SK 13a). The statistical data analysis showed significant statistical differences among cultivars and selections for the fruit length, width, thickness and shape index.

Based on the obtained results for fruit size, the tested cultivars and selections were classified into the following groups according to the IBPGR descriptor: small to medium (grade 4 – Novosadska kasnocvetna), medium (grade 5 – SK–5, SK 16a and Hungarian best), medium to large (grade 6 – Novosadska rodna and SK 13 a), large (grade 7 – SK–1 and SK–3) and very large (grade 8 – NS–4 and NS–6). Compared to Hungarian best, one cultivar had smaller, two selections equal, and three cultivars and three selections larger fruits.

High variability was observed for fruit shape, from round to oblong. The cultivars and selections were classified into the following categories, according to the IBPGR descriptor: round (grade 1 – NS–4, NS–6 and Hungarian best), elliptic (grade 3 – Novosadska rodna), ovate (grade 4 – Novosadska kasnocvetna, SK–1, SK–3 and SK–5) and oblong (grade 6 – SK 13a and SK 16a). Fruit shape depends on many characteristics such as stem cavity depth, the suture between two halves and the apex shape. Most cultivars and selections have intermediate or deep stem cavity (grade 6), intermediate suture (grade 5) and rounded apex (grade 3).

Based on stone size, the tested cultivars and selections were classified into the following groups: medium-sized (NS–4, Novosadska kasnocvetna, SK–1, SK–3, SK–5, SK 13a, SK 16a and Hungarian best), and large (NS–6 and Novosadska rodna). Stone shape depends on a cultivar. All the cultivars and selections tested have ovate stones (grade 2).

Fruit attractiveness is a set of traits that have a positive visual effect. It depends on fruit shape and size, as well as fruit colour, i.e. ground and over-skin colour. Two tested cultivars (NS–4, Hungarian best) and two selections (SK–1 and SK 16a) have orange skin (grade 6). The remaining cultivars and selections are light orange colour (grade 5). When it comes to over-colour, it can be found in all cultivars and selections, but in different intensities. Therefore, they can be classified into the following five categories: slight (grade 3: Novosadska rodna and Novosadska kasnocvetna), mottled (grade 4: Hungarian best), intermediate red (grade 5: SK–1, SK–5 and SK 13a), intermediate/mostly red (grade 6: NS–6 and SK–3) and mostly red (grade 7: NS–4 and SK 16a). Đurić and Keserović (2007) and Mratinić et al. (2010) pointed out very attractive cover color of NS 4 which is very appreciated by producers.

CONCLUSIONS

On the basis of triennial research (2008–2010) on pomological traits of apricot cultivars and selections at the "Rimski Šančevi" locality, the following conclusions could be drawn:

1) Novosadska rodna, SK 13a, SK–1, SK–3, NS–4 and NS–6, had larger fruit size and fruit weight than Hungarian best. NS–4 had the highest fruit weight (78.23 g).
2) SK-13a had the highest flesh ratio (96.00%). Better fruit ratio than in Hungarian best was observed for NS–4, NS–6, Novosadska rodna and SK–1, SK–3, SK–5, SK 13a.
3) Apart from the NS 4 and NS 6 cultivars that were already in commercial production, the new apricot selections SK 1, SK 3 and SK 13a, which had medium fruit size (60–66g), high flesh ratio (95–96%) and more intensive over–colour than Hungarian best, have potential for fresh consumption. A further evaluation should be carried out in order to determine suitable localities.

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POMOLOŠKE OSOBINE PLODA
NOVOSADSKIH SORTI I SELEKCIJA KAJSIJE

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Izvod

U radu su predstavljeni rezultati trogodišnjih (2008–2010) ispitivanja pomoloških osobina ploda četiri novosadske sorte (NS–4, NS–6, Novosadska rodna i Novosadska kasnocvetna) i pet selekcija kajsije (SK–1, SK–3, SK–5, SK 13a i SK 16a). Ispitivanje pomoloških osobina ploda obavljeno je u kolekcionom zasadu kajsije Departmana za voćarstvo, vinogradarstvo, hortikulturu i pejzažnu arhitekturu Poljoprivrednog fakulteta u Novom Sadu na lokalitetu „Rimski Šančevi“. Ispitivane su sledeće pomološke osobine ploda: masa ploda, masa koštice, randman, dužina, širina, debljina i indeks oblika ploda. Pomološke osobine ploda ocenjivane su na osnovu IBPGR deskriptora svrstavanjem u grupe sa pripadajućim ocenama. Pomološke osobine ploda novosadskih sorti i selekcija kajsije upoređivane su sa Mađarskom najboljom (standard). Plodovi novosadskih sorti NS-4, NS-6, Novosadska rodna i selekcija SK-1, SK-3 I SK-13a ispoljili su bolje osobine od Mađarske najbolje.

Ključne reči: kajsija, sorta, selekcija, pomološke osobine.