

EVALUATION OF NEW APRICOT CULTIVARS FROM SLOVAK REPUBLIC IN THE REGION OF BELGRADE

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Abstract

The evaluation of seven introduced apricot cultivars originated from Slovak Republic was carried out in the region of Belgrade over a period of five years (2009–2013). Control cultivar for comparison was ‘Hungarian Best’. Among studied cultivars small differences in flowering time were found (1–5 days). Average maturing time of introduced cultivars was from June, 18 (‘Velita’ and ‘Veselka’) to July, 15 (‘Veharda’), or from 14 days before to 13 days after the ‘Hungarian Best’. The average yield per tree ranged from 4.1 kg in ‘Veharda’ to 9.4 kg in ‘Vestar’. Compared with the control cultivar, significantly higher yield was achieved in two cultivars: ‘Vestar’, and ‘Veselka’. The average fruit weight ranged from 40.6 g in ‘Veharda’ to 55.6 g in ‘Veselka’. Significantly higher fruit weight had only cultivar ‘Veselka’, while smaller fruit weight had two cultivars: ‘Veharda’ and ‘Velita’. The content of soluble solids varied from 12.0% in ‘Vesna’ to 17.1% in ‘VS-22/32’. Cultivars ‘VS-22/32’ and ‘Veselka’ stands out for fruit appearance, and ‘Veselka’ also for fruit quality. Among studied cultivars, the best results were shown by ‘Veselka’ which can be recommended for growing in this region, predominantly for fresh consumption. In addition, cultivars ‘Vestar’ and ‘Vesprima’ can also be recommended, mostly for processing.

Key words: *Prunus armeniaca*, flowering, maturing, yield, fruit quality

Introduction

Assortment of apricots in Serbia is characterized by relatively small number of cultivars and short period of harvest. Most apricot fruits are harvested in the season of ‘Hungarian Best’, or at a short time (about ten days) afterwards. There is particularly a lack of early-season cultivars, maturing in June, and characterized by high quality of fruit.

There is a lot of work in the world on the creation of new apricot cultivars with improved characteristics, such as better adaptability to different environmental conditions, higher resistance to disease-causing agents, higher yield, and better fruit quality. In the last 20 years more than 500 new apricot cultivars were created (Milatovi , 2013a). The introduction of new foreign cultivars and their study in Serbian climatic and soil conditions allow better choice of cultivars, and may improve production of apricots.

In Slovak Republic a public apricot breeding programme took place in the Research Breeding Station Veselá at Pieš any. Under this programme 10 new cultivars were created during 1991–2000 (Benediková, 2006; 2013). The main breeding goals were: resistance to frost, late blooming, high quality, regular yields, early and late ripening, processing suitability, flesh firmness, resistance to diseases. Both European and Central Asian cultivars were used as parents in the hybridization.

The aim of this study was the evaluation of seven new apricot cultivars of different maturing time originating from Slovak Republic. The best performing cultivars will be recommended for growing in the region of Belgrade, as well as in other regions with similar ecological conditions.

Material and methods

The study was conducted in the apricot collection orchard at the Experimental Station “Radmilovac” of the Faculty of Agriculture in Belgrade during the period of five years (2009–2013). The orchard was planted in 2007. The rootstock is Myrobalan (*Prunus cerasifera* Ehrh.) seedling, training system is central leader, and tree spacing is 4.5 x 3 m. All cultivars are represented by five trees.

The study included seven apricot cultivars: ‘Velita’, ‘Veselka’, ‘Vesna’, ‘VS-22/32’, ‘Vestar’, ‘Vesprima’, and ‘Veharda’. Cultivar ‘Hungarian Best’ was taken as a control.

Flowering was recorded by recommendations of the International Working Group for pollination: start of flowering – 10% open flowers, fool bloom – 80% open flowers, end of flowering – 90% of the petal fall (Wertheim, 1996). The beginning of harvest was recorded as the date of maturing. Fruit characteristics were measured on a sample of 25 fruits per cultivar. Fruit shape index was calculated using the formula: length x length / width x thickness. Soluble solids were determined by refractometer and total acids (expressed as malic acid) by titration with 0.1 N NaOH. Sensory properties of the fruit (appearance and taste) were evaluated by a five-member jury, scoring the cultivars using the scale from 1 to 5 points.

The obtained data for yield and fruit traits were statistically analyzed using analysis of variance. The significance of differences between mean values was determined using Dunnett’s test at 0.05 level of probability.

Results and discussion

Phenological traits included time of flowering and time of maturing, and the results are shown in Table 1.

Table 1. Phenological traits of apricot cultivars (average, 2009–2013)

Cultivar	Flowering dates			Duration of flowering (days)	Date of harvest	N ^o of days comparing to control
	Start	Full	End			
Velita	31.03.	02.04.	07.04.	6.9	18.06.	–14
Veselka	29.03.	01.04.	08.04.	9.4	18.06.	–14
Vesna	30.03.	01.04.	07.04.	8.4	20.06.	–12
VS-22/32	26.03.	29.03.	04.04.	9.2	03.07.	+1
Vestar	28.03.	31.03.	07.04.	8.4	07.07.	+5
Vesprima	31.03.	02.04.	07.04.	7.2	13.07.	+8
Veharda	29.03.	01.04.	06.04.	8.0	15.07.	+13
H. Best (control)	29.03.	31.03.	05.04.	6.8	02.07.	0

Average time of flowering of apricot cultivars was late March and early April. Among studied cultivars small differences in flowering time were recorded. The start of flowering was from three days before the ‘Hungarian Best’ (‘VS-22/32’) to two days after the control (‘Velita’ and ‘Vesprima’). All introduced cultivars manifested longer duration of flowering than the control cultivar (‘Hungarian Best’ with 6.8 days). It ranged from 6.9 days in cultivar ‘Velita’ to 9.4 days in cultivar ‘Veselka’.

Compared to the results of Milatovi (2005) obtained at the same location for the ten-year period (1995–2004) duration of flowering was shorter by two days in average. This difference can be explained by higher temperatures during flowering season in the period of study (2009–2013).

Average time of maturity was from 18th of June (‘Velita’ and ‘Veselka’) to 15th of July (‘Veharda’). Compared to the control cultivar (‘Hungarian Best’) time of maturity was from

14 days earlier to 13 days later. Average difference in the date of maturity between the year with the earliest harvest (2009) and the year with the latest harvest (2010) was 6 days, and among cultivars it ranged from 4 to 11 days.

The average yield per tree ranged from 4.1 kg in ‘Veharda’ to 9.4 kg in ‘Vestar’ (Table 2). These data refer to the yield in the period of initial cropping, when the age of the trees was between three and seven years. Compared with the control cultivar significantly higher yields were achieved in two cultivars: ‘Vestar’ and ‘Veselka’.

Table 2. Yield of apricot cultivars (kg per tree)

Cultivar	Years					Average
	2009	2010	2011	2012	2013	
Velita	1.5	2.3	10.9	0.1	11.0	5.2bc
Veselka	0.7	5.9	16.5	10.7	5.7	7.9ab
Vesna	0.3	7.8	8.4	4.2	3.6	4.9c
VS-22/32	0.1	5.8	8.0	8.1	0.9	4.6c
Vestar	0.5	6.4	24.5	7.0	8.7	9.4a
Vesprima	0.1	3.4	8.8	8.1	5.7	5.2bc
Veharda	0.2	6.9	9.1	0.5	3.9	4.1c
H. Best (control)	0.3	2.1	10.8	2.0	3.0	3.7c

* Mean values followed by the same letter within a column do not differ significantly according to Dunnett’s test at P 0.05

In all cultivars the highest yield was obtained in 2011 when the weather conditions were favourable. In 2012 most cultivars achieved low yield due to the occurrence of winter frost (-20.7°C on 9 February), and late spring frost (-2.4°C on 10 April) (Milatovi et al., 2013). In this year the considerable yield achieved cultivars ‘Veselka’, ‘VS-22/32’, ‘Vesprima’ and ‘Vestar’, and they can be considered as less susceptible cultivars to frost. In 2013 the yield was also low because of the cold weather during flowering which resulted in low fruit set (Zec et al., 2013).

The obtained results of yield are in accordance with the results of Vach n (2002), who studied the productivity of 24 apricot cultivars during six-year period and found variation of average yield from 3 to 20 kg per tree.

The average fruit weight ranged from 40.6 g in ‘Veharda’ to 55.6 g in ‘Veselka’ (Table 3). Compared to the control cultivar significantly higher fruit weight had only cultivar ‘Veselka’, while smaller fruit weight had two cultivars: ‘Veharda’ and ‘Velita’. In most cultivars the lowest fruit weight was in 2011, when the highest yield was recorded, while the highest fruit weight was obtained in 2013, when the yield was low.

Table 3. Fruit properties of apricot cultivars (average, 2009–2013)

Cultivar	Fruit weight (g)	Stone weight (g)	Stone share (%)	Fruit dimensions (mm)			Shape index
				Length	Width	Thickness	
Velita	41.3d	4.4a	10.6	42.3c	40.8c	38.7c	1.14
Veselka	55.6a	4.3a	7.8	46.3b	45.8a	43.3ab	1.08
Vesna	44.7cd	3.0d	6.7	43.1bc	42.4bc	41.2abc	1.06
VS-22/32	48.2bc	3.1d	6.4	46.2b	45.6a	40.6bc	1.15
Vestar	48.2bc	4.0ab	8.4	44.3bc	43.9abc	40.3bc	1.11
Vesprima	52.3ab	3.6bc	6.8	50.6a	44.6ab	41.9ab	1.37
Veharda	40.6d	3.4cd	8.4	43.8bc	41.6bc	38.8c	1.19
H. Best (control)	50.9bc	3.8bc	7.4	46.8b	46.4a	44.0a	1.07

* Mean values followed by the same letter within a column do not differ significantly according to Dunnett's test at P 0.05

Stone weight ranged from 3.0 g ('Vesna') to 4.4 g ('Velita'), and its share in the fruit weight ranged from 6.7% ('Vesna') to 10.6% ('Velita'). According to the classification given by Milatovi (2013b) four cultivars had medium share of the stone in the fruit weight (6.1–8.0%), while three cultivars ('Velita', 'Vestar' and 'Veharda') had high share (above 8.1%).

Fruit length of the studied cultivars varied from 42.2 to 50.6 mm, width from 40.8 to 46.4 mm, and thickness from 38.7 to 44.0 mm. Based on the fruit dimensions, the shape index was calculated, whose values ranged from 1.06 in 'Vesna' to 1.37 in 'Vesprima'.

Results of pomological fruit characteristics are in accordance with the previous findings for some cultivars (Benediková, 2006; 2013).

The content of soluble solids in tested apricot cultivars varied from 12.0% in 'Vesna' to 17.1% in 'VS-22/32' (Table 4). Cultivar 'Vesna' had significantly lower content of soluble solids than the control cultivar.

Table 4. Fruit quality properties of apricot cultivars (average, 2009–2013)

Cultivar	Soluble solids (%)	Total acids (%)	Soluble solids /Total acids	Sensory evaluation (1–5)	
				Appearance	Taste
Velita	13.9bc	1.09cd	12.8	3.3b	3.7ab
Veselka	14.0bc	1.31bcd	10.6	3.9a	4.0a
Vesna	12.0c	1.02d	11.8	3.4b	3.5b
VS-22/32	17.1a	1.76a	9.7	4.0a	3.7ab
Vestar	15.6ab	1.49ab	10.4	3.7ab	3.5b
Vesprima	14.6b	1.44abc	10.1	3.6ab	3.5b
Veharda	15.4ab	1.15bcd	13.4	2.7c	3.3b
H. Best (control)	16.0ab	1.38bc	11.6	3.6ab	4.1a

* Mean values followed by the same letter within a column do not differ significantly according to Dunnett's test at P 0.05

The total acid content varied from 1.02% in 'Vesna' to 1.76% in 'VS-22/32'. Ratio between soluble solids (consisting mostly of sugars) and acids contents indicates the sweetness of the fruit. In majority of the studied cultivars this ratio was lower than in the control. Higher ratio was found in two cultivars: 'Veharda' and 'Velita'.

The data on the chemical composition of fruits are in accordance with the previous findings (Badenes et al., 1998; Gurrieri et al., 2001; Ruiz and Egea, 2008; Mendelová et al., 2013).

Cultivars 'VS-22/32' and 'Veselka' stand out for attractive fruit appearance. Taste of all introduced cultivars was evaluated with lower scores than the control. The best score for fruit quality got the cultivar 'Veselka'.

Conclusion

Based on the five-year evaluation of seven new apricot cultivars from Slovak Republic in the Belgrade area, the best results were shown by cultivar ‘Veselka’. It can be recommended for growing, predominantly for fresh consumption. In addition, cultivars ‘Vestar’ and ‘Vesprima’ can also be recommended, mostly for processing.

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