

POMOLOGICAL CHARACTERISTICS OF CORNELIAN CHERRY (*CORNUS MAS* L.) SELECTIONS IN SERBIA AND THE POSSIBILITY OF GROWING IN INTENSIVE ORGANIC ORCHARDS

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Abstract

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The Cornelian cherry, which can be used as both food and medicine, is highly tolerant to diseases and pests, so it is a rare plant species that can be grown without chemicals and it is capable of fruit bearing under modest agrotechnical conditions. In Serbia, over 500 Cornelian cherry genotypes have been monitored and observed in all morphological and chemical characteristics and registered a very large variation in flowering time and maturity, morphometric properties of fruits and nutrient content. Based on the last three years results, this paper shows pomological characterization for five the best selections that can be recommended for reproduction by specially developed technology to the Faculty of Agriculture in Novi Sad, and their benefits of growing in organic orchards. Phenological observations showed that the earliest start of flowering was noted for Apatinski rani and R1 (mid-January) while later flowering was in Bačka and PPC1 (end of January). At the latest flowering registered in CPC16 (in early February). Although Cornelian cherry flowers early, before leafing, fruits ripen very late. In the average for all study years, the earliest start of ripening fruit was found in PPC1, following Apatinski rani and CPC16 (mid-July) while latest start ripe fruit Bačka (in early August). On the basis of morphometric measurements clearly stands out PPC1 from the fruits of maximum mass (6.60 g) and flesh ratio (88.75%), followed by R1 (4.55 g; 87.84%). All other genotypes have a weight over 3 g and flesh ratio over than 80%. The average the total soluble solids, total acidity, total sugar, vitamin C and anthocyanins were 20.22%; 2.59%; 16.28%; 19.13 mg/100 g; 87.00 mg/g, respectively, for all examined genotypes.

Keywords: *Cornus mas* L., selection, pomological characteristics, organic production

INTRODUCTION

In Serbian folk tradition *Cornus mas* L. is a symbol of health, spiritual firmness, stamina and longevity. The popular saying “healthy as the Cornelian cherry” translates aptly into English as “fit as a fiddle”. Serbia has extraordinarily favorable conditions for Cornelian cherry growing and expansion of this neglected fruit species and exploitation of its huge potential for organic production would bring large

economic benefits (Bijelić, 2011). The Cornelian cherry fruits can be consumed fresh or in the form of various processed products (Bijelić, 2009, 2011; Bijelić *et al.*, 2011c) and can be safely recommended as food for children. Also, the Cornelian cherry may have large applications in medicine and cosmetics (Celik *et al.*, 2006), or as ingredient of herbal preparations used in the treatment of diabetes (Jia *et al.*, 2003; Jayaprakasam *et al.*, 2005). In addition

2: *Fenogram of Cornelian cherry ripening (average of 2011–2013)*

I: Some morphometric and chemical properties of cornelian cherry selections in Serbia (average of 2011–2013)

Selection	Fruit weight (g)	Flesh/Stone ratio (%)	Total soluble solids (%)	Total acids (%)	Total sugars (%)	Vitamin C (mg/100 g)	Anthocyanins (mg/100 g)
CPC16	3.98 ^b	86.32 ^{ab}	18.25 ^b	2.88 ^a	13.58 ^c	21.00 ^a	78.11 ^c
Apat. rani	3.65 ^b	84.21 ^{bc}	21.34 ^a	2.57 ^{ab}	17.67 ^b	16.15 ^b	105.92 ^{ab}
Bačka	4.20 ^b	82.56 ^c	22.08 ^a	2.69 ^{ab}	20.85 ^a	14.63 ^b	111.85 ^a
R1	4.55 ^b	87.84 ^{ab}	20.82 ^a	2.72 ^{ab}	14.71 ^c	22.52 ^a	90.42 ^{bc}
PPC1	6.60 ^a	88.75 ^a	18.61 ^b	2.08 ^b	14.62 ^c	21.32 ^a	48.71 ^d

Values in the same column with different letters are significantly different at $p < 0.01$

was found in Apatinski rani (July 15), and the latest ripe fruit of Bačka (September 5). According to Klimenko (2007) Cornelian cherry varieties in Ukraine ripen from late June to mid-October, depending on variety. The fruits of Cornelian cherry from the area of the Upper Polimlje mature in the period of 28 August to 16 October (Jaćimović, 2006), which is longer by 15 days of ripening interval specifying the other authors (Krgović and Vračar, 1998). The results obtained in this study are consistent with previous studies of phenological phases of Cornelian cherry genotypes in Serbia (Bijelić, 2011; Bijelić *et al.*, 2011b).

Consumers worldwide are increasingly showing interest in natural high quality fruits, what exactly is a Cornelian cherry. On the basis of morphometric measurements (Tab. I) clearly stands out PPC1 from the fruits of maximum weight (6.60 g) and flesh ratio (88.75%), followed by R1.

Cornelian cherry population in Slovakia have flesh ratio of 77–86% (Brindza, 2005), while authors in Turkey (Pirlak *et al.*, 2003) found genotypes with higher flesh ratio. Cornelian cherry varieties grown in Ukraine are very large fruit and flesh ratio, 85–92% (Klimenko, 2004). Directions of Cornelian cherry selection should primarily focus on the greater fruit weight, which has the strongest direct correlation with the mesocarp weight (Bijelić *et al.*, 2007). Featured selections are very valuable genetic material for future breeding program, because can compete with the cultivars (Klimenko, 2004), as well as selections of Cornelian cherry (Yalcinkaya, 1999). In addition to the fact that in Serbia there are genotypes noteworthy breeders by the results of previous studies on higher flesh ratio and a significant fruit weight (Korać *et al.*, 1996).

The quality of each fruit intended for fresh market or processing is reflected in the contents of fruit sugar,

acids, vitamins, minerals, aromatic, pectin and other substances. Selection CPC16 stands out for its high content of total acidity (2.88%) and vitamin C (21.00 mg/100 g fruit), with low total solids content (18.25%), total sugar (13.28%) and anthocyanins (78.11 mg/100 g fruit). In fruit selection Apatinski rani recorded high total solids content (21.34%), total acidity (2.57%) and anthocyanins (105.92 mg/100 g fruit), while low total sugar content (17.67 %) and vitamin C (16.15 mg/100 g fruit). Selection Bačka is distinguished by high values of all examined the chemical composition of mesocarp, except in the low content of vitamin C (14.63 mg/100 g fruit), while the fruit R1 recorded lower total sugar content (14.71%) and anthocyanins (90.42 mg/100 g fruit), and PPC1 is distinguished by the highest content of vitamin C (21.32 mg/100 g fruit). Great variability in acids (4.70%) showed (Pirlak *et al.*, 2003), while Tural and Koca (2008) reported that the total acidity of fruits in Turkey in the range from 1.10 to 2.53%. Examined Cornelian cherry selections have significantly higher total sugar compared to the genotypes from Slovakia (Brindza 2006), Montenegro (Jaćimović, 2006) and Ukraine (Klimenko 2004). However, Klimenko (1990) states that, regardless of the lower content of total sugars in cornelian cherry fruits, 85–95% are fructose and glucose, while fructose has a lot more, and this is what, among other things, gives importance cornelian cherry as fruit species. Cornelian cherries have a significant content of colored substances and are among the herbs because the fruits have antioxidant properties (Popović *et al.*, 2012). Other authors cite many better anthocyanins values (Tural and Koca, 2008), where the epidermis contains far more anthocyanins than the flesh (Klimenko, 2007).

CONCLUSION

Based on the results obtained in this work, and based on previous research, we can conclude that through many years of trials clearly separated the top five selections suitable for commercial production of organic fruit orchards, because this species has a genetic tolerance to pathogens and pests. Flowering shows much less variability in relation to the maturation stage of the fruit, which is clearly separated early (CPC16, Apatinski rani and PPC1), medium (R1) and late maturing (Bačka) genotypes, which has great practical importance when planning to carry out harvesting and processing. The fruits are suitable for both fresh consumption and for processing into various products, and are certainly far better compared to the collection production, which has until recently only been present in the region. The research program was singled out as the best selection and production technology of plant material, which slowly take their deserved place in commercial fruit production.

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