



Compositional Response of Plum (*Prunus Domestica* L.) Fruits to Different Grown Locations

Svetlana M. Paunović¹ · Pavle Mašković² · Žaklina Karaklajić-Stajić¹ · Mira Milinković³

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Abstract

This study investigated the influence of two different grown locations (300 and 550 m altitudes) on the fruit biochemical profile of seven plum cultivars developed in a breeding program at the Fruit Research Institute, Čačak (Republic of Serbia) and ‘Stanley’ as a standard cultivar. In the present results, significant differences were observed in the biosynthesis of chemical compounds and biological activity between fruits from the various cultivars, but also from the same cultivars, grown at different altitudes. As altitude increased, the accumulation of glucose, sucrose, citric acid, ascorbic acid and anthocyanins decreased in the fruits, whereas fructose, malic acid, phenolics and flavonoid concentrations increased. The research also indicated lower antioxidant and cytotoxic potential in the fruits (up to 20.61 and 22.92% of the total variation, respectively) grown at 550 m altitude compared to fruits grown at 300 m. In addition, the composition and quality of fruits varied remarkably depending on the genetic background of the cultivar. Principal component analysis (PCA) was able to discriminate biochemical components not only by the genetic predisposition of cultivar but also by altitudes. The results indicated the existence of differences in the biochemical profile of plum fruits, grown at different altitudes, which can be useful determinants when choosing an appropriate location for establishing commercial plum orchards and obtaining the desired quality fruits.

Keywords *Prunus domestica* L. · Altitude · Biochemical components · Antioxidant activity · Cytotoxic activity

Abbreviations

ANOVA Analysis of variance
DW Dry weight
FW Fresh weight
PCA Principal components analysis

Introduction

Plum (*Prunus domestica* L.) is one of the major fruit species in Serbia, considering that it is considered a Serbian national fruit. The main reason for the big spread of plums is the versatile use value of the fruits, modest growing requirements, high yield and good fruit quality. Plums are used for fresh consumption, drying and processed in jams, juices, compotes, and brandy. However, in Serbia, the largest amount of fruits are processed into brandy (more than 60%). Plum fruits are characterized by a high content of sugars (sucrose, glucose and fructose), organic acids (citric and malic acids), pectins, tannins, aromatic substances, chlorophyll and carotenoids, as well as large quantities of minerals and vitamins (Stacewicz-Sapuntzakis et al. 2001; Ertekina et al. 2006). The fruits also contain substantial quantities of phenolic compounds, mostly anthocyanins and flavonoids, which are known to be good natural sources of antioxidants (Miletić et al. 2014; Božović et al. 2017). A high content of sugars, acids and polyphenols determines the taste and nutritional qualities of the plum fruit (Tomić et al. 2019; Radović et al.

✉ Svetlana M. Paunović
svetlana23869@gmail.com

Pavle Mašković
pavlemaskovic@yahoo.com

Žaklina Karaklajić-Stajić
zaklinaks@yahoo.com

Mira Milinković
miramilinkovic@yahoo.com

¹ Fruit Research Institute, Kralja Petra I 9, 32 000 Čačak, Serbia

² Faculty of Agronomy, University of Kragujevac, Cara Dušana 34, 32 000 Čačak, Serbia

³ Institute of Soil Science, Teodora Drazera 7, 11 000 Belgrade, Serbia