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QUANTITATION OF ELLAGIC ACID IN BLACKBERRIES

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Abstract

The objective of this study was to evaluate the content of ellagic acid in blackberries, as well as in the juice of different blackberry cultivars obtained by using a specific technology. The analysis of the ellagic acid content in the test samples was performed using the high-pressure liquid chromatography with diode-array detection (HPLC-DAD). The results have shown considerable variations in ellagic acid content in the test blackberry fruit samples, the highest being determined in the fruit of the blackberry-raspberry hybrid cv. "Tayberry" (54.794 mg/100 g fresh weight), and the lowest in blackberry cv. "Čačanska Bestrna" (1.852 mg/100 g fresh weight). The ellagic acid content in the "Tayberry" juice produced using the specific technology was very high and almost identical to that in fruits.

Keywords: ellagic acid, bioavailability, human health.

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Over the last years, there has been an increasing awareness among nutritionists, doctors and most importantly consumers, related to the role of nutrition in improving human health and the quality of life [1]. Dark-coloured small fruits belonging to the families Ericaceae (blueberries) and Rosaceae (blackberries, raspberries and strawberries) are particularly known for their polyphenol content [2], with polyphenols making a significant contribution to the total antioxidant capacity of fruits [3,4]. A growing number of research papers and articles are being published in scientific journals dealing with this subject that show positive effects of plant-based foods on the prevention of different diseases [5–8].

Small fruits are singled out from among these foods due to their beneficial effect on human organism, with their high levels of ellagic acid playing a preventive role against malignant diseases [9–11]. Namely, ellagic acid has been proven to slow down or even prevent the division of malignant cells [12–14]. Moreover, ellagic acid exhibits a potent antioxidant activity, thereby preventing and controlling the spread of cancer [15–17]. The antioxidant properties of ellagic acid allow it to neutralize free radicals, chelate toxic metals and activate antioxidant enzymes, thus contributing to strengthening the body's antioxidant defence systems [18]. In addition, several other beneficial properties have been reported for ellagic acid in particular and phenolics in general, including anti-inflammatory, anti-microbial

and anti-allergenic properties, as confirmed by many researchers [19–22].

Given the above facts, modern tendencies in fruit and vegetable production are oriented towards the production of functional foods that have special health effects, involving attempts to increase and preserve the ellagic acid content in fruits or edible parts of plants. Although the high content of ellagic acid in strawberry and raspberry cultivars is a long known fact [23,24], its content in different blackberry species and cultivars has not been sufficiently studied. Therefore, the objective of the present study was to evaluate the ellagic acid content in fruits of different blackberry (*Rubus caesius* L.) cultivars largely grown in the south-western part of Serbia. Another objective was to determine the ellagic acid content in the blackberry juice obtained by a specific technology, in order to determine the potential effect of the technology on the preservation of ellagic acid content in the produced juice. Namely, the ellagic acid as an extremely valuable substance is found mostly in the seed, and hardly a third of its juice content, on average, can be retained using conventional fruit processing methods [25]. The preservation of ellagic acid content in fruit juices is of utmost importance for human health, considering the highest consumer acceptance rate of juice as a processed fruit product that is available for consumption throughout the year.

MATERIAL AND METHODS

Chemicals

Methanol (HPLC, gradient grade), acetonitrile and formic acid (HPLC) were supplied by Merck KGaA (Darmstadt, Germany). The standard substance, includ-

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