SOME PHYSICO-CHEMICAL CHARACTERISTICS OF CURRANT GENOTYPES FROM TURKEY

CÂTEVA PROPRIETĂŢI FIZICO-CHIMICE ALE GENOTIPURILOR DE COACĂZE DIN TURCIA

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Abstract. *Currants (Ribes spp.) are cultivated and applied as raw materials in food, cosmetics and medicines in Europe and Asia. Total anthocyanin, vitamin C and phenolic compounds are important components contributing to the nutritional value and sensory properties of berries. In this study, physical-chemical properties (vitamin C, antioxidant activity, total phenolic and total anthocyanins) of currant fruits grown in the Bursa province of Turkey were investigated. Vitamin C contents were found 573.92 to 32.15. The highest total phenolic contents were found 18.22 to 6.43. Antioxidant capacity (DPPH) was in the range from 56.43% to 5.24% and total anthocyanin content between 318.87 and 71.26 mg/100 g.*
Key words: currant, vitamin C, antioxidant activity, total phenolic, Turkey

Rezumat. *Coacăzele (Ribes spp.) sunt cultivate pentru a fi folosite ca materie primă în industria alimentară, cosmetică şi farmaceutică din Europa şi Asia. Antocianii totali, vitamina C şi compuşii fenolici sunt componente importante care contribuie la stabilirea valorii nutritive şi a proprietăţilor senzoriale ale coacăzelor. În studiul de faţă au fost analizate proprietăţile fizico-chimice (vitamina C, activitatea antioxidantă, fenolii totali şi antocianii totali) ale fructelor de coacăz cultivate în provincia Bursa, Turcia. Conţinutul de vitamina C a avut valori cuprinse între 573,92 şi 32,15. Conţinutul de fenoli totali a fost de 18,22 până la 6.43. Capacitatea antioxidantă (DPPH) s-a situat în intervalul 56,43% până la 5,24% iar conţinutul de antociani totali a avut valori cuprinse între 318.87 şi 71.26 mg/100 g.*
Cuvinte cheie: coacăze, vitamina C, activitate antioxidantă, fenoli totali, Turcia

INTRODUCTION

The genus *Ribes* was originally considered to be a member of the Saxifragaceae family, but taxonomic studies have placed the genus in the Grossulariaceae family due to morphological characteristics such as inferior ovaries, syncarpous gymnosperm and fleshy fruit (Brennan, 1996; Cronquist, 1981).

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The currant is an important fruit crop cultivated in Europe. Presently, it is also commercially produced in moderate temperate regions encompassing many countries of the world (Brennan, 1996). Currant is mainly cultivated for juice and beverage production and for processing into jams, jellies, yoghurts, teas and functional food products, but to some extent is sold as fresh fruit (Hummer and Barney, 2002).

The word 'currant' is derived from the ancient Greek word for the city Corinth, and was first used to describe grapes cultivated in that region. Earlier English references described the cultivated species of Ribes with word variations such as 'corinthes', 'corans', 'currants' and 'bastarde corinthes' (Hedrick, 1925).

Industrially, the fruits of black currant are considered a natural high value raw material and a source of many essential nutritional components. The fruits are characterised by good organoleptic properties, i.e. rich flavour, taste and intense colour, and are therefore of use in diverse food applications. The processed products include jams, jellies, purees, pie fillings, ice creams, flavoured waters, sweets, toppings for desserts and perfumes (Hummer and Dale, 2010). The fruits are also eaten fresh and this market is steadily increasing with the development of dessert-quality fruits with high soluble solid content (Pluta *et al.,* 2012).

The objective of the present study is to determine the content and composition of currant fruit (vitamin C, antioxidant activitiy, total phenolic and total anthocyanins) in two currant varieties (Goliath and Red Lake). The results obtained were compared with those of two currant varieties.

MATERIAL AND METHOD

Fruit material

Two currant varieties were harvested in region of Kestel, Bursa, Turkey, in July 2015 years, and the harvested fruits were then transported to the laboratory for analysis. ANOVA indicated that the genotype had a major influence on all parameters under evaluation ($p<0.01$).

Determination of total phenolics

Total phenolic content were determined with Folin-Ciocalteu assay (Singleton and Rossi, 1965). For this, flesh+peels (10 g) were centrifuged at 6000 rpm after homogenized in 40 ml ethanol solution. After, diluted (1/10) 1000 µl Folin-Ciocalteu and 800 µl Na2CO3 solution was added upon supernatant. After a 2-h incubation period, the samples were read at 750 nanometer wavelength in spectrophotometer. Water-ethanol mixture was used as blank. Gallic acid is used as a standard in the calculation.

Determination of total anthocyanins

For total anthocyanin analysis, 10 g flesh+peels were homogenized in methanol solution that 1% HCL included. Samples were filtered with filter paper after a night standing. Supernatant were incubated in tampon solution (pH 1.0 and pH 4.5). Samples were read against the blank at 530 and 700 nanometer wavelengths (Giusti and Wrolstad, 2001).

Determination of vitamin C

For vitamin C analysis, pureeing and filtering obtained fruit juice samples. The samples were homogenized by centrifuge and 400 µL oxalic acid (0.4%) and 4.5 ml 2,6- diklorofenolindofenol solution were added upon supernatant. Data were read against the blank at 520 nanometer wavelength in spectrophotometer.

Determination of total antioxidant activity

In the 1,1-diphenyl-2-picrylhydrazyl (DPPH°) assay, antioxidants were capable to reduce the stable radical DPPHº to the yellow coloured diphenylpicrylhydrazine (DPPH-H). The test is based on the reduction of an alcoholic solution of DPPH° in the presence of a hydrogen donating antioxidant due to the formation of the non-radical form DPPH-H (Gulcin, 2007). The DPPH° radical-scavenging activity of the peach fruit extracts was estimated as described by Blois (Blois, 1958). Briefly, 0.1 mL of each sample extract was mixed with 0.9 mL of 0.04 mg/mL methanolic solution of DPPH°. The mixtures were left for 20 min at room temperature and its absorbance then measured at 517 nm against a blank. All measurements were carried out in triplicate. The percentage of DPPH radical-scavenging activity was calculated using the following equation:

$$\% \text{ DPPH radical-scavenging} = [(Ac - As)] \times 100$$

where Ac was the absorbance of the negative control (contained extraction solvent instead of the sample), and As was the absorbance of the samples.

RESULTS AND DISCUSSIONS

Table 1 shows the results of vitamin C, antioxidant activitiy, total phenolic and total anthocyanins composition two currant varieties (Goliath and Red Lake) collected from Kestel district in Bursa province.

Vitamin C value in currant varieties were between 32.15-573.92. In the earlier work conducted on the Belgrade of Serbia, reported Vitamin C contents of currant varied from 45.8 to 172.2 mg GAE/g FW. Earlier reports had shown that the Vitamin C contents of currant varieties was between 19–642 GAE mg/g (Milivojević *et. al.*, 2010; Ciornea *et. al.,* 2009; Pantelidis *et. al.,* 2007; Aneta *et. al.*, 2013; Djordjević *et. al.,* 2014).

Table 1.

Vitamin C, antioxidant activitiy, total phenolic and total anthocyanins composition of currant Varieties

Genotypes	Vitamin C (mg/100ml)	Antioxidant Activitiy (DPPH)	Total Phenolic (µg GAE/g FW)	Total Antocyanins (µg siy-3-glk/g)
Red Lake	32.15 ± 1.24	5.24 ± 0.41	6.43 ± 0.53	71.26 ± 1.13
Goliath	573.92 ± 0.98	56.43 ± 0.67	18.22 ± 0.84	318.87 ± 4.27

The antioxidant activity of currant varieties were 5,24 to 56,43 µM TE/g fw (DPPH assay). According to earlier reports, DPPH content in currant varieties were 12.67-73.55 (Aneta *et. al.,* 2013; Mikulic Petkovsek *et. al.,* 2012; Villano *et. al.,* 2007). In this study total phenolic value in currant varieties were between 6.43-18.22. Total phenolic varied 110-430 (Stewart, 2005). The other study total phenolic varied 6.38-13.33 (Bordonaba and Terry, 2008). Total antocyanins value were between 71.26-318.87. Total antocyanins of different currant cultivars in UK and Italy ranged from 3.49 to 216.3 (Bordonaba and Terry, 2008; Benvenuti *et. al.*, 2004).

CONCLUSIONS

The present study showed that genotype Goliath appeared as higher physico-chemical characteristic.In conclusion, the results clearly indicate the difference between the cultivars used grown in the same way. Antioxidant activity also varies among the different cultivars of currant, and this is a reflection of the phytochemical differences between cultivars. Currant have high vitamin C, total phenolic, and antioxidant capacity in fruit. It is known, positive effect on human health of these substances.

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