

The total phenol, anthocyanin, total flavonoid and mineral contents of the date fruits

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Abstract

The total phenol, anthocyanin, total flavonoid contents and mineral contents of the date (*Phoenix dactylifera* L.) fruits provided from three different countries were determined. While total phenol contents of date fruits change between 12.5 mg GA/ g (Morocco) and 23.3 mg GA/g (Saudi Arabia), anthocyanin contents ranged from 7.3 µmol/g (Iran) to 10.1 µmol/g (Saudi Arabia). While Ca contents of fruits change between 739.28 mg/Kg (Iran) to 1486.95 mg/Kg (Morocco), K contents of samples varied from 8039.28 mg/Kg (Saudi Arabia) to 11025.18 mg/kg (Morocco). While Fe contents of fruits change between 13.13 mg/kg (Saudi Arabia) and 17.00 mg/kg (Morocco), Zn contents were found between 5.57 mg/kg (Iran) and 6.48 mg/kg (Saudi Arabia). In addition, Cu contents ranged from 2.49 mg/kg (Iran) to 3.48 mg/kg (Saudi Arabia).

Keywords: total phenol, anthocyanin, total flavonoid, mineral, ICP-AES

1. Introduction

The date palm (*Phoenix dactylifera* L.) is cultivated in dry and semi-arid regions in the world and is an important member of the family Palmaceae [1]. The date palm (*Phoenix dactylifera* L.) is considered the most important source of food for both human in arid and semi-arid regions. It is one of mankind's oldest cultivated plants. It has been used as food for centuries [2]. Date fruit are also, a good source of vitamin and macro nutrient such as potassium, magnesium, iron and calcium [2-5]. Generally, dietary plants and plant products are rich sources for natural phytochemical antioxidants including vitamins, carotenoids and phenolic compounds [5-7]. So, the aim of current study is to determine the total phenol, anthocyanin, total flavonoid contents and mineral contents of

the date (*Phoenix dactylifera* L.) fruits provided from three different countries.

2. Material and Methods

Date fruits were provided from Iran, Morocco and Saudi Arabia. They were transferred to laboratory in cool bag for analyses. Anthocyanins were analyzed according to the method of Ticconi et al. [8]. The phenols of the plant material were extracted with MeOH. Total phenolic content was assayed quantitatively by absorbance at 765 nm with Folin-Ciocalteu reagent according to the method of Madaan et al. [9]. Total flavonoids content was estimated according to Dewanto et al. [10]. The flavonoid content was expressed as mg Catechol equivalents (CE) per g of dry weight (mg CE/g DW). Mineral contents were determined by inductively coupled plasma-optical emission spectroscopy (ICP-AES; (Varian-Vista, Australia). The heavy metal

contents of the samples were quantified against standard solutions of known concentrations which were analysed concurrently [11]. The free radical scavenging activity of the extracts was determined by using 1,1-diphenyl-2-picrylhydrazyl or DPPH [12]. The average is calculated by analyzing the flours three times [13].

3.Results and Discussion

The total phenol, anthocyanin and total flavonoid contents of three different date fruits are given in Table 1. While total phenol contents of date fruits

change between 12.5 mg GA/ g (Morocco) and 23.3 mg GA/g (Saudi Arabia), anthocyanin contents ranged from 7.3 μ mol/g (Iran) to 10.1 μ mol/g (Saudi Arabia). Total flavonoid contents of date fruits were found between 61.5 mg Catechol/g (Iran) and 99.0 mg Catechol g (Iran).

Antioxidant activity values of samples changed between 55.0 (μ g/ml) (Morocco) and 87.2 (μ g/ml) (Saudi Arabia). Anthocyanin and total phenolic contents of Saudi Arabia were found higher compared with other samples.

Table 1. The total phenol, anthocyanin and total flavonoid contents of date fruits

Samples	Total phenol (mg Gallic Acid/g)	Anthocyanin (μ mol/g)	Total flavonoid (mg Catechol/g)	Antioxidant activity (μ g/ml)
Morocco	12.5 \pm 1.4*	9.8 \pm 0.5	99.0 \pm 2.9	55.0 \pm 1.3
Iran	17.5 \pm 4.3	7.3 \pm 0.3	61.5 \pm 1.4	62.5 \pm 1.7
Saudi Araba	23.3 \pm 0.8	10.1 \pm 0.1	67.2 \pm 0.2	87.2 \pm 2.6

*mean \pm Standard deviation

Table 2. Macro and micro element contents of date fruits (mg/Kg)

Samples	Macro elements					Micro elements				
	P	K	Ca	Mg	Fe	Zn	Mn	B	Cu	Na
Morocco	656.43 \pm 16.0*	11025.2 \pm 1700.9	1486.95 \pm 98.01	977.47 \pm 8.02	17.00 \pm 1.81	5.84 \pm 0.11	3.37 \pm 0.01	26.39 \pm 0.67	3.35 \pm 0.20	759.87 \pm 32.9
Iran	709.22 \pm 7.25	9863.6 \pm 941.6	739.28 \pm 19.52	573.16 \pm 11.41	13.76 \pm 1.25	5.57 \pm 0.08	3.57 \pm 0.26	21.88 \pm 0.64	2.49 \pm 0.42	682.52 \pm 14.85
Saudi - Arabia	662.87 \pm 17.75	8039.28 \pm 4.32	765.50 \pm 11.52	782.77 \pm 5.45	13.13 \pm 0.57	6.48 \pm 0.18	3.41 \pm 0.13	26.09 \pm 0.83	3.48 \pm 0.35	792.77 \pm 1.19

**mean \pm standard deviation

The macro and micro element contents of date fruits are shown in Table 2. P contents of samples ranged from 656.43 mg/kg (Morocco) to 709.22 mg/kg (Iran). While Ca contents of fruits change between 739.28 mg/Kg (Iran) to 1486.95 mg/Kg (Morocco), K contents of samples varied from 8039.28 mg/Kg (Saudi Arabia) to 11025.18 mg/kg (Morocco). Na contents ranged from 682.52 mg/kg (Iran) to 792.77 mg/kg (Saudi Arabia). While Fe contents of fruits change between 13.13 mg/kg (Saudi Arabia) and 17.00 mg/kg (Morocco), Zn contents were found between 5.57 mg/kg (Iran) and 6.48 mg/kg (Saudi Arabia). In addition, Cu contents ranged from 2.49 mg/kg (Iran) to 3.48 mg/kg (Saudi Arabia). The total phenolics content

reported by Al-Farsi et al. [14] for several Oman tamer varieties ranged between 217 and 343 mg per 100 g. Vinson et al. [15] provided more information about the concentration and the state of phenolics in date fruits. They reported that the average of soluble free phenolics were 257 and 400 mg catechin equivalent (CE) per mg/100 ml FW. The differences between those results can be due to a difference between the varieties and the local cultural conditions affect the composition of date fruit flesh. Those differences according to our studies may be attributed to the variability of the studied cultivars and also to the variability of the climatic conditions, different regions, the differences in time of harvest, post-harvest treatments, and the use of fertilizers.

Generally, date palm varieties are a potential source of valuable nutrients.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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