



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2018; 6(2): 362-364

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Received: 04-01-2018

Accepted: 05-02-2018

Vinita

Department of Foods and Nutrition, CCS Haryana Agriculture University, Hisar, Haryana, India

Darshan Punia

Department of Foods and Nutrition, CCS Haryana Agriculture University, Hisar, Haryana, India

Proximate and sugars composition of seeds of four date palm (*Phoenix dactylifera* L.) cultivars grown in Haryana, India

Vinita and Darshan Punia

Abstract

The seeds of four date palm (*Phoenix dactylifera* L.) cultivars, *Hillawi*, *Khadrawi*, *Shamran* and *Medjool* from the Hisar region-Haryana (India), were analyzed for their proximate and sugars composition. Moisture content of seeds of different varieties of date fruits ranged from 7.99 to 9.40 per cent. The results of the study indicated that the seed of variety *Khadrawi* had highest protein (5.59%) content and the variety *Medjool* had the lowest (4.08%). Fat and crude fiber contents of date seed varieties ranged from 6.54 to 9.19% and 10.73 to 16.97%, respectively. The seed of variety *Hillawi* had highest amount of total soluble sugars (10.40 g/100g) and reducing sugar (7.73 g/100g). The seed of variety *Hillawi* had the highest amount of starch content (36.90 g/100g).

Keywords: Date fruit, proximate composition, carbohydrate, starch

1. Introduction

Date seed is a byproduct of date fruit industry which is normally being discarded, used as animal feed ingredient or turned into non-caffeinated coffee by the Arabs. Date seed do not have a smell or odorless and has a slightly bitter taste bland. In general, it has a light and dark brown color. Date seeds constitute between 10 to 15% of date fruit weight (Hussein *et al.*, 1998) [8] and contain relatively high amount of protein (5.1 g/100g) and fat (9.0 g/100g) compared to date flesh.

It possesses characteristics that distinguish them from other vegetable oils and it has unique fatty acid and tocopherols composition. Most abundant fatty acid present in date oil is oleic acid. Oleic fatty acid is beneficial to health due to its low saturation level, minimal trans-stability. On the other hand, protein also had been detected to be present in date seed in considerable amount. Date seed protein contains the majority of essential amino acids. Albumin, globulin, prolamin and glutelin are among the soluble protein that was detected in date seed, with 5-6% of total protein content (Hamada *et al.*, 2002) [7]. Date seed contains of 71.9 to 73.4 % of carbohydrate, 5 to 6.3 % protein, 9.9 to 13.5 % fat, 6.4 to 11, 5 % fiber, and 1 to 1.8 of ash. Date seed can be useful materials for flour (Rahmadi, 2010) [10]. It is assumed with semi-processed form of the equivalent protein value of wheat flour, which means it can be used date seed into various preparations such as cakes, breads, pastries and others.

At present, date seeds are used mainly for animal feed. The advantages of incorporating date seeds into the animal diet include increased weight gain and improved feed efficiency. Utilization of such waste is very important as date seeds could potentially be considered as an inexpensive source of protein and fats.

2. Materials

Four varieties of date fruit, namely *Hillawi*, *Khadrawi*, *Medjool* and *Shamran* were procured in a single lot from the Department of Horticulture, College of Agriculture, CCS Haryana Agricultural University, Hisar. All the varieties were cleaned and washed under tap water to remove dirt and dust. The washed dates were spread over filter paper to remove excess water. Seeds were collected after deseeding of date fruit and dried in hot air oven at 60±5°C till constant weight. The dried date seeds were ground to fine powder in an electric grinder and kept in air tight containers at room temperature for analysis of various nutrients.

Correspondence**Vinita**

Department of Foods and Nutrition, CCS Haryana Agriculture University, Hisar, Haryana, India

2.1 Methods

Proximate composition including moisture, protein, fat, ash and crude fiber were determined by standard methods (AOAC, 2000) [2]. Total soluble sugars other than starch were extracted according to the procedure of Cerning and Guilhot (1973) [5]. The amounts of non-reducing sugars were calculated as the difference between total soluble sugar and reducing sugar. Starch from the sugar free pellet was estimated by using the method of Clegg (1956) [4].

3. Results and Discussion

3.1 Proximate composition

Moisture content of seeds of different varieties of date fruit ranged from 7.99 to 9.40 per cent. The seeds from variety

Medjool had highest moisture content (9.40%), followed by the seeds from varieties *Khadrawi* (8.43%), *Shamran* (8.03%) and *Hillawi* (7.99%). The seeds from varieties *Hillawi* and *Shamran* had similar moisture content. The protein content of seed of different varieties of date fruit varied from 4.08 to 5.59 percent. The crude protein content of seeds from varieties *Hillawi*, *Khadrawi* and *Medjool* differed significantly. The data presented in Table 1, indicated that seeds from varieties *Hillawi*, *Khadrawi*, *Medjool* and *Shamran* had 9.19, 8.20, 6.54 and 7.57 per cent fat, respectively. The seeds from all the varieties differed significantly from each other for their fat content.

Table 5: Proximate composition of seeds of different varieties of date fruits (% , dry weight basis)

Variety	Nutrients				
	Moisture	Crude Protein	Fat	Crude fiber	Ash
Hillawi	7.99±0.19	4.98±0.35	9.19±0.02	11.13±0.87	0.91±0.01
Khadrawi	8.43±0.09	5.59±0.21	8.20±0.17	16.97±0.91	1.05±0.01
Medjool	9.40±0.06	4.08±0.03	6.54±0.02	15.40±0.52	1.13±0.01
Shamran	8.03±0.09	5.29±0.04	7.57±0.02	10.73±0.94	0.82 ±0.01
CD (P≤0.05)	0.39	0.36	0.29	2.73	0.03

Values are mean ± SE of three independent determinations

The seeds from variety *Khadrawi* had highest crude fiber (16.97%) whereas the seeds from variety *Shamran* had the lowest crude fiber (10.73%) content as shown in fig.1. The seeds from varieties *Khadrawi* and *Medjool* had significantly ($p \leq 0.05$) higher amounts of crude fiber as compared to seeds

from varieties *Hillawi* and *Shamran*. The ash content of seeds from all the varieties of date fruit ranged from 0.82 to 1.13 per cent. The highest amount of ash was found in seeds from variety *Medjool* and lowest amount in variety *Shamran*.

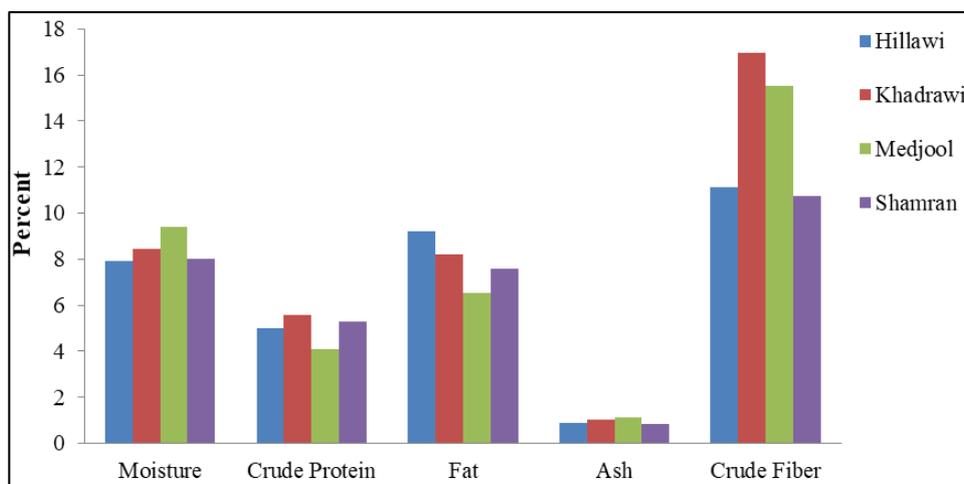


Fig 1: Proximate composition of seeds of different varieties of date fruit (% , dry weight basis)

A significant difference was observed in ash content of the seeds from all the varieties. This results supported by Al-Farsi *et al.*, 2007 [1] reporting high amounts of protein and fat in date seeds compared to date flesh. Hamada *et al.*, 2002 [7] and Besbes *et al.*, 2004 [3] reported higher content of protein and fat in different varieties of date seeds ranged between 4.7-6.0% and 9.2-11.6%, respectively. The fat content in the date seed obtained from several studies were range from 5.7 to 12.7% (Besbes *et al.*, 2004; Rahman *et al.*, 2007; Habib and Ibrahim, 2009; Nehdi *et al.*, 2010) [3, 6, 9]. The difference may occur due to different date varieties, different origin, different harvesting time, and the use of fertilizer which could affect

the nutrient content of the date. Besbes *et al.*, 2004 [3] (on a dry-weight basis) were obtained for *Deglet nour* and *Allig* cultivars, respectively: protein 5.56 and 5.17%, Fat 10.19 and 12.67%, ash 1.15 and 1.12%.

3.2 Sugars and starch

Data in respect of sugars content of seeds from different varieties of date fruit are presented in Table 2. Total soluble sugar content of seeds from different varieties of date fruit namely *Hillawi*, *Khadrawi*, *Medjool* and *Shamran* was 10.40, 9.08, 8.83 and 8.90 g/100g, respectively.

Table 2: Total soluble sugar, reducing sugar, non-reducing sugar and starch content of seeds of different varieties of date fruits (% , dry matter basis)

Variety	Sugars			Starch
	Total soluble Sugar	Reducing Sugar	Non-reducing Sugar	
Hillawi	10.40±0.40	7.73±0.12	2.67±0.33	36.90±0.52
Khadrawi	9.08±0.44	6.04±0.36	3.04±0.08	35.40±0.79
Medjool	8.83±0.30	5.58±0.13	3.25±0.18	32.40±1.04
Shamran	8.90±0.13	5.70±0.24	3.20±0.13	34.20±1.04
CD (P≤0.05)	1.12	0.78	NS	2.90

Values are mean ± SE of three independent determinations

Data revealed that the seeds from *Hillawi* variety contained significantly higher total soluble sugar as compared to other three varieties. There was non-significant ($P \leq 0.05$) difference in total soluble sugar content of seeds from varieties *Khadrawi*, *Medjool* and *Shamran*. Reducing sugar content of seeds from different varieties of date fruit ranged from 5.58 to

7.73 g/100g. The seeds from variety *Hillawi* had the highest amount of reducing sugar content, as shown in fig. 2. The seeds from varieties *Khadrawi*, *Medjool* and *Shamran* differed non-significantly among themselves for their reducing sugar content.

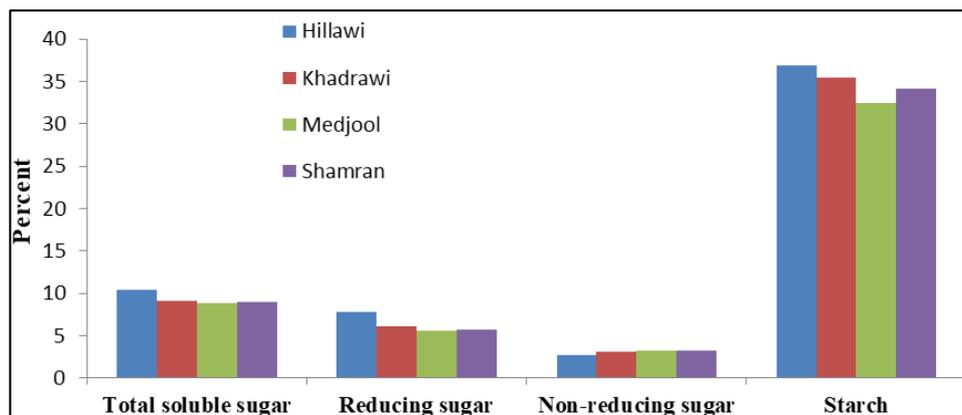


Fig 2: Sugars and starch content of seeds of different varieties of date fruit (% , dry weight basis)

Non-reducing sugar content of seeds from different varieties of date fruit ranged from 2.67 to 3.25 g/100g. There were non-significant ($P \leq 0.05$) differences in non-reducing sugar content of seeds from all the varieties of date fruit. Starch content of seeds from different varieties of date fruit ranged from 32.20 to 36.90 g/100g. The seeds from variety *Hillawi* had the highest amount of starch whereas the seeds from variety *Medjool* had the lowest amount.

4. Conclusion

Date seed is a byproduct of date fruit industry. Date palm seeds could be an excellent and inexpensive source of functional foods components considering the protein and fat content. In addition, the other high nutritional value of date seeds is based on their crude fiber content, which makes them suitable for the preparation of fiber-based foods and dietary supplements. From the data presented in this work, we can conclude that the date seed showed good and comparable nutritional and dietetic qualities.

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