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DETERMINATION OF SOME PHYSICAL AND CHEMICAL PROPERTIES OF DATE PALM FRUITS NEW SEEDLING STRAIN (UNKNOWN) FULL-GROWN IN UPPER EGYPT

Rasha, N. Arafa[1]; Tamer I. M. Ragab[2]; Sayed, A. A. Elsayh[3] and Ghada, A. Ali.[1]

[1]Central lab of date palm researches and development, Agriculture Research Center, Giza, Egypt.
[2]Chemistry of Natural and Microbial Products Department, Pharmaceutical Industry Division, National Research Centre, 12622 Dokki, Giza, Egypt.
[3]Fruit Breeding Department, Horticulture Research Institute, Agriculture Research Center. Giza, Egypt.

ABSTRACT

This study was conducted during two successive seasons 2017 and 2018 on date palm fruits (*Phoenix dactylifera* L.) from seedling tree named Nag Hamadi 1 about 25 years old which grown in Sheikh Ali Village, Nag Hamadi, Qena governorate, Egypt; in comparison with Medjool cv. The aim of this study focused on physical and chemical evaluation of that new seedling strain. The results revealed that the highest palm yield was obtained from Nag Hamadi 1 (225 kg/palm) in comparison with Medjool (119 kg/ palm). Concerning physical properties showed that the highest values of fruit length (5.6 cm), fruit diameter (2.53 cm), fruit weight (30 g), seed weight (1.87 g) and number of date/kg (33 dates) were recorded with Nag Hamadi 1 comparison with the Medjool which were (4.7 cm, 2.74 cm, 24.07 g, 1.42 g and 41 dates), respectively. As for chemical properties the highest value was obtained with Nag Hamadi 1. A date palm fruit contains 20% moisture and 78 g/100g total soluble solid. Total carbohydrates and total protein content were estimated as 76.2 g/100g and 3.46 g/100g, respectively. Ash content and crude fibers contents were determinate to be 0.87 g/100g and 6

g/100g, respectively. Analysis showed that the carbohydrate content consists of a large amount of glucose and fructose plus its doesn't contain sucrose. The low level of crude lipids 0.4 g/100g compared with its sugar content indicated that date palm could be saving for cardiovascular and diabatic patients.

Key words: carbohydrate; chemical and physical properties; Date palm; minerals and sugars.

INTRODUCTION

There is a particular lack of information on functional constituents of dates and their potential value as functional foods that provide health benefits beyond basic nutrition **IFICF (1998)**. Epidemiological studies have consistently shown that there are clear significant positive associations between intake of fruits and vegetables and reduced rate of heart diseases mortality, common cancers and other degenerative diseases as well as ageing **(Dillard and German, 2000)**. This is attributed to the fact that these foods may provide an optimal mix of dietary fiber, natural antioxidants and other biotic compounds. Date fruits are the products of date palm tree, belonging to the family of Arecaceae. Date palm (*Phoenix dactylifera* L.) the tree of life is one of the oldest cultivated plants in the world **(Al-Shahib and Marshall, 2003)** and is the most important subsistence crop in all Northern Africa and the Middle East, although it is also cultivated in other parts of the world. In Egypt, date palms are distributed in Nile valley, oases and desert including soft dates (Zagloul, Samani, Hayani, Bent Aicha and Amhat), semi dry dates (Al-Amri and Saidy) and dry dates (Barakawi, Ebrimi and Sakouti). Besides, there are a great number of seedling date palms, as a result of sexual reproduction; some of them are highly desirable for fruit qualities and propagation of their off-shoots as well as in our studies **Mohammed (2000)**.

Dates are rich in certain nutrients and provide a good source of rapid energy (314 Kcal) due to their high carbohydrate content (70–80%). Most of the carbohydrates in dates are reducing sugars (fructose and glucose) which are easily absorbed by the human body **(Safi *et al.*, 2008)**. Dates may contribute to the human diet with high quality of some essential amino acids. The protein content in dates is low (2.5–6.5 g/100g) containing 23 types of amino acids, some of which are not present in the most popular fruits such as oranges, apples and bananas (**Al-Shahib and Marshall, 2003).** Also, dates were a good source of minerals such as iron, potassium and iodine.

Today's healthy diets recommend eating date fruits that are low in sodium, fat, cholesterol and high in digestive fiber. The good nutritional value of dates is also based on their dietary fiber content reaching 11.5 g/100 g such as cellulose, hemicellulose, lignin, pectin, etc. which makes them suitable for preparation of fiber based foods and dietary supplements, as shown by **Al-Farsi and Lee (2008)** and **Habib and Irahim (2011)**. The fiber concentration is dependent on date cultivar and ripening stage **(Hasnaoui *et al*., 2011)**. Dietary fiber consists of the edible plant material which is not hydrolyzed by the human digestive tract. Many studies recommend the consumption of adequate amounts of dietary fiber from a variety of plant foods **(Mai *et al*., 2003)**.

The Physical characterization of the new strain dimensions (length; diameter; length/diameter; surface area and flesh thickness) and seed length were measured. Chemical parameter like acidity; total carbohydrates; total sugars; reducing sugars; determination of energy value; total phenolic contents; amino acids; condensed tannins and mineral composition were determined. The obtained data of the new strain Nag Hamadi 1 was compared to known cultivar as Medjool.

The aim of the study was focused on physical and chemical evaluation of a new unknown strain from Nag Hamadi, Qena governorate consistent with international specification of dates.

MATERIALS AND METHODS

This study was carried out at Nag Hamadi in two successive seasons 2017 and 2018 to evaluate a new seedling strain (unknown) of date palm fruits (*Phoenix dactylifera* L.) named Nag Hamadi 1 of about 25 years old grown in Sheikh Ali Village, Nag Hamadi, Qena governorate, Egypt, **Fig (1)**. The palm was 10-12 m height with a trunk diameter of about 1.75 m, the number of leaves was 55 leaf/palm, leaf length 2.75 m and the number of fruit bunches on palm at 12 bunch/palm.

Fig (1): The date palm unknown Nag Hamadi 1

The palm production of dates was 225 kg/palm. This palm hasn't produced any offshoots. The palm was planted in soil without fertilization or irrigation (without interest). All data of Medjool 1 was comparetive with dates fruits of Medjool palm was grown in east Qena governorate.

1. Sample collection and preparation:

Fifty fruits for each sample were randomly collected healthy and free from any injuries at the Tamar maturity stage and transferred to the laboratory for analysis. All the analysis was carried out at both Central lab of date palm researches and development, Agriculture Research Center, Giza, Egypt and Chemistry of Natural and Microbial Products Department, Pharmaceutical Industry Division, National Research Centre, Dokki, Giza, Egypt. We studied the evaluation of this palm for a bout their physical and chemical characteristics and compared them to Medjool cv.

Fruits were divided into two parts; the first part was fresh and used to evaluate some physical characteristics and the second one was dried for 48 h at 70 ^{o}C to get rid of moisture and then milled into powder using a blender for the determination of chemical properties. After removing the

pits using sharp knife edge, the date flesh was cleaned and the flesh (pulp) was cut into small pieces and minced just before analysis.

2. Physical characterization:

Fruit dimensions (length; diameter and flesh thickness), seed length were measured in centimeters using Vernier caliper. The average fruits and seeds weight in grams, fruits number/kg were determined using an electrical balance. The volume (cm^3) of the fruit was determined by the water displacement method and the fruit density was calculated as weight over volume.

3. Chemical parameter:

The moisture content was determined after drying in a vacuum oven at 70 °C for 48 h, total soluble solids (TSS) was determined in the fruit juice using a hand refractometer; ash content; crude fiber; total protein content and wax content were determined by the method outlined in **AOAC (1990).** The method was established for total lipid extraction using the mixture of 100 ml chloroform and 200 ml methanol as a solvent **(Bligh and Dyer, 1959)**.

Fruit acidity was determined according to **A.O.A.C (1975).** Total carbohydrate content of date was determined colorimetrically by the anthrone method **(Jayaraman, 1981).** Total sugars of each fruit sample were extracted using distilled water **(Loomis and Shull, 1937).** Reducing sugars content was determined as mentioned by **Schaffar and Hartman (1921).** Non-reducing sugars were calculated by difference between total sugars and reducing sugars. The energy values of dates were evaluated using formula described by **Crisan and Sands (1978).** The total phenolic from palm date fruits were extracted as described previously **(Singh *et al.*, 2002).** Amino acid analysis carried out as described by **Laury (1997).** Condensed tannins were determined according to the method of **A.O.A.C. (1995).** Total minerals were determined using an Atomic Absorption Spectrophotometer according to the method of **Lindsey and Norwell (1969).**

A two-way analysis of variance (ANOVA) was performed using MSTATC software according to **MSTAT Development Team (1989).**

RESULTS AND DISCUSSION

1. Physical characterization:

1.1. Dimension of date fruit:

Data in Table (1) and Fig. (2) showed the evaluated dates of Nag Hamadi 1. The maximum fruit dimension was measured versus Medjool cv. at Tamar stage. The average of date length, fruits diameter and length/diameter ratio were in the range of the findings in previous studies of **Saeed and Yousof (2014)** and **Sulieman *et al*. (2012)**. While flesh thickness and surface area, both values were nearby **Saeed and Yousof (2014)**.

1.2. Fruit weight:

The average of fruit weight, fruit volume and seed weight of Nag Hamadi 1 were recorded which were higher than Medjool cv. as shown in **Table (1) and Fig. (2 and 3)**. Characters like fruit weight and length, flesh thickness and seed weight are of importance in differentiation between the cultivars. Other studies also proved significant differences of the fruit characters in the study of cultivars **(Nour *et al*., 1986).** The average fruit weight was significantly increased due to pollen grains **(Merwad *et al*., 2015)**. On the other hand, **Samia (2016)** founded that the fruit weight, could be arranged as follows: Sewy (13.27 g), Khalas (11.65 g) and Zahdi (11.24 g) then fruits of "Sakai" cv. which were the lowest in weight (7.42 g).

Fig. (2): Date fruits of Nag Hamadi 1.

Fig. (3): Date fruits of Medjool cv.

1.3. Palm yield:

From data of yield/palm presented in **Table (1)** reveal the same trend as that observed on number of bunches/palm, *i.e.* palms of Nag Hamadi 1 produced the highest yield in average of 225 kg/palm, followed by Medjool of about 119 kg/palm. This result coincided with **Osman (2008)** who found that, average of fruit yield of Samany date palm grown at El-Badrasheen is 165 kg. While, that grown at Kom-Ambo, Aswan produced 145 kg. In the same trend **EI-Kosary (2009)** in comparison study on Barhee cultivar and two strains of barhee palm seedling, found that Barhee strain number two produced the heaviest bunches (about 10

kg) followed by Barhee cultivar (about 9 kg) then strain number one (about 8 kg).

Table (1): Physical characterization of dates fruits of Nag Hamadi 1 and Medjool.

Characterize	Nag Hamadi 1	Medjool	
Fruit weight	30 g ± 0.72	24.07 g ± 0.62	S
Fruit length	5.6 cm ± 0.20	4.7 cm ± 0.09	S
Fruit diameter	2.53 cm ± 0.09	2.74 cm ± 0.08	S
Flesh thickness	0.88 cm ± 0.02	0.94 cm ± 0.02	S
Fruit volume	26.69 cm^3 ± 0.12	21.40 cm^3 ± 0.32	S
Seed weight	1.87 g ± 0.02	1.42 g ± 0.05	S
Seed length	3.6 cm ± 0.15	2.7 cm ± 0.15	NS
Palm yield	225 kg/palm ± 1.15	119 kg/palm ± 3.18	S
Number of date/kg	33 dates ± 1.73	41 dates ± 1.20	S
Number of fruit bunches	12 ± 0.58	11 ± 0.88	NS

Values are means ± standard error (SE) of 3 samples each cultivar.
S; significant at $P<0.05$
NS; nonsignificant at $p<0.05$

1.4. Number of dates/kg:

The number of fruits/kg ranged to 33, 41 date in Nag Hamadi 1 and Medjool cv., respectively. From previous studies **Ragab *et al.* (2011)** recorded that fruit number/kg increased in the Semi-Rutab and Rutab stage which ranged between 36-92 and 40-98, respectively. **Gado (1999)** reported that the fruits number/kg ranged between (40-72).

1.5. Number of fruit bunches/palm:

Data in **Table (1)** show no significant difference in number of bunches/palm. These results are in agreement with **Samia (2016)** who indicated that Sewy, Medjool and Zahdi palms produced the highest number of bunches (11.84, 11.33 and 10.84 bunch/palm), respectively with no significant differences between them. However, Khalas (9.00 bunches/palm) in comparison with Sakai palms which produced the lowest number of bunches (6.67 bunches/palm).

2. Chemical parameter:

Dates contain a high percentage of carbohydrate, fat comprising 14 types of fatty acids, 15 salts and minerals, protein with 23 different amino

acids and proteins, six vitamins and a high percentage of dietary fiber **(El-Nakhal *et al.*, 1988)**.

2.1. Moisture:

The moisture is one of the essential components of fruit which affects basically its quality and acts on conservation. In present study, moisture content of Nag Hamadi 1 date fruits ranged at 20.0% and in Medjool at 21.5%, as shown in **Table (2)**. The dates consider as soft, if they present water content more than 30%, and as dry if this rate is less than 10% and half soft if the rate is between 10 and 30%. This nomenclature permits us to classify the Nag Hamadi 1 and Medjool date as half soft date, **(Nehdi *et al.*, 2010)**. Our results are in agreement with **Ismail *et al.* (2006)** who mentioned the moisture levels ranged between 20.25% and 22.14% with Khalas having the highest moisture content and Boumaan the lowest. **Gadalla (2013)** who found that the moisture content of some Arabian and local date cultivars fruits was ranged from 21.45 to 32.90% according to cultivar. **Samia (2016)** indicated that the average values of the two seasons show that moisture content of flesh was high in "Sakai" fruits (32.59%) followed in a descending order of Medjool (28.85), Zahdi (26.04%) and Sewy (24.90%)**.** While, the moisture of some varieties was as low as 10% **(Nour *et al.*, 1986)** and as high as 35% in other varieties **(Aidoo *et al.*, 1996).**

2.2. Total soluble solids (T.S.S):

Data in **Table (2)** indicated that there are significant differences in TSS values in the fruits, Nag Hamadi 1 recorded the highest value which was 78 g/100g while Medjool cv. recorded 66 g/100g. In the previous studies indicated that **El-Sohaimy and Hafez (2010)** checked the TSS content of Trunja, Lagou and Gounda dates which were 86.20%, 85.9% and 86.8%, respectively. **Amen *et al.* (2018)** recorded TSS as 70.84, 68.86, 67.94 and 64.49% calculated as an average of the three studied seasons for fruits from Aswan, El-Kharga, Al-Dakhla and Assiut climatic conditions, respectively. **Samia (2016)** reported in fruits of Sakai that the average (71.35%) against (50.30 %) for Zahdi cv. the other tested cvs. including Sewy cv. showed intermediate T.S.S. percentage. However, **Osman (2008)** who found that Zaghloul and Samani cultivars grown at Kom-Ambo recorded the highest value of TSS (31.32%), while the lowest TSS was recorded with those grown in El-Badrashen (26.30%).

2.3. Ash content:

Ash content is an index to the nutritive value of foods, **(Pearson, 1976)**. The ash content obtained in this work was 0.87 and 1.75 (g/100g), respectively by Nag Hamadi 1 and Medjool, as shown in **Table (2)**.

From previous reviews indicated that the average percentage of ash content ranged from 1.67% in Ambrah to 1.14% in Sa'gai. The values were within the range (1.0- 2.5 g/100g) reported by **(Al-Harrasi *et al*., 2014)**. The ash content of the studied varieties of date is between 1.23 and 1.99% for the varieties of Hammouri and DegletNour, respectively **(Souli *et al*., 2016)**. While, **Padmanayaki and Pon Periyasamy (2017)** demonstrated that the ash content of date fruits was 9.8%.

2.4. Crude fiber content:

Today's healthy diets recommended eating foods that are low in sodium, fat, cholesterol and high in fiber. The value of crude fiber content of date fruit Nag Hamadi 1 was 6 g/100 g and with Medjool was 6.8 g/100 g. From the previous studies **Elsohaimy and Hafez (2010)** reported the highest value of crude fiber (5.30 to 6.51 g/100g) in date palm fruits. **Vinita and Darshan (2016)** mentioned that total dietary fiber of date fruit varieties ranged from 6.81 to 11.70 g/100g with variety Medjool and Hillawi, respectively. High values reported for total dietary fiber (7.95 to 18.83g/ 100g) by **Besbes *et al*. (2008)** and by **Ali *et al*. (2009)** which ranged between 8.83 to 13.11g/100g. **Parvin *et al.* (2015)** demonstrated that dates are rich in crude fiber and contain 6.9%, 6.05% and 6.5% for Trunja, Lagou and Gounda dates respectively. Dates are good source of crude fiber and depending upon cultivar and stage of ripening, it ranged from 6.4 % to 11.5 % in 14 different varieties **(Al-Shahib and Marshall, 2003)**. However, **Sadiq *et al*. (2013)** reported a lower value (0.50 g/100 g) of crude fiber content than the values obtained in present study.

2.5. Total protein content:

The protein content of dry date fruit was 3.46 g/100 g with Nag Hamadi 1 while Medjool cv. recorded 1.80 g/100 g. These results were in line with **Rawah (2007)**, who reported that in date fruit the range of 1 – 3% protein and through their amino acid pattern is favorable to human need; the amounts are too small to be considered as important nutritional source. **Vinita and Darshan (2016)** reported that the date fruit varieties contained 1.88 to 2.77% protein. **Elleuch *et al*. (2008)** demonstrated that protein values were 2.3-2.7% and 2.1-3%, respectively for date fruit varieties. On the other hand, **Nadeem *et al*. (2011)** reported higher protein content 2.3-5.6% in date fruit.

2.6. Crude lipid:

The low level of the fat content in date fruit compared with its higher content of sugar means that consumption of date fruit is safe for people suffering from heart and blood diseases. The content fat was 0.4 g/100 g with dry date fruit of Nag Hamadi 1. While, with Medjool was recorded 0.14 g/100 g.

These results were in agreement with the range reported by **Vinita and Darshan (2016)**, the fat content of date fruit varieties varied from 0.17 to 0.50 %. **Al-Farsi and Lee (2008)** reported that fat content is 0.14 g/100 g for fresh dates and 0.38 g/100 g for dried dates. Fats are mainly concentrated in the skin (2.5% - 7.75%) and have a more physiological importance in protecting the fruit than contributing to the nutritional value of the date flesh **(Barreveld, 1993)**.

2.7. Acidity:

Data in **Table (2)** showed the average acidity content ranged at 0.19% by Nag Hamadi 1 and 0.09% by Medjool. **Haseeb (2014)** cleared that acidity content in all tested palm trees had the same statistical values during the studied seasons. **El-Shenawy and Badran (2014)** found that total acidity in soft date palm seeded types, ranged between 0.272 for palms 3, 4 and 5 and 0.197% for palm 1, while ranged between 0.272% for palms 7 and 8 and 0.205% for palm 11. Moreover Semi dry seeded date palm had the same values. **Metwaly *et al.* (2009)** cleared that the average acidity content in Sewi cultivar recorded 0.084%. On the other hand, **Salama *et al*. (2014)** found that the average of fruit total acidity in Hayany date palm that grown at Ras-Sudr city, South Sinai Governorate, Egypt was ranged from 0.22% to 0.32%.

2.8. Total carbohydrates determination:

Data indicated that Nag Hamadi 1 dates contain a high level of carbohydrate 76.2 g/100g also Medjool contains 74.53 g/100g. The carbohydrate content consists of a large amount of glucose, fructose (reducing sugar) and small amount of sucrose (non- reducing sugar), which easy to digest in human cells and useful for getting the energy for metabolic processes, on the other hand, dates contain a minimum quantity of xylose, arabinose, glucuronic acid and galacturonic acid, as shown in **Fig. (4)**.

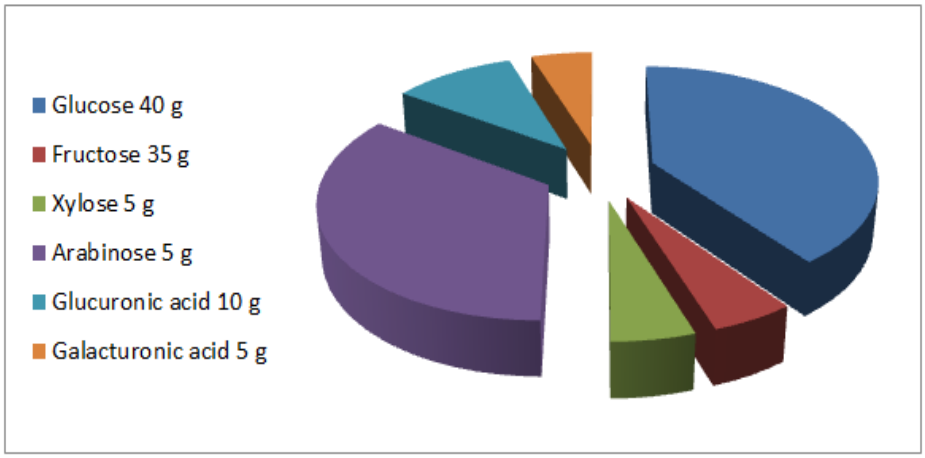

Fig. (4): Total sugar content/100g of Nag Hamadi 1 date.

In present study, the Nag Hamadi 1 recorded the total sugar and reducing sugar higher than Medjool, as shown in **Table (2)**. Dates are high in carbohydrate content 77.31% - 88.02% **(Borchani *et al.*, 2010)** for Tunisian cultivar, where Trunja 83.95%, Lagou 77.31%, Gounda 84.79%. While, Lemdina date cultivar comprises 44.67% of carbohydrate has been reported **(Fouteye *et al.*, 2014)**.

Sugars are the most important carbohydrate components in date fruit, making them a rich source of energy for the human system **(Khan *et al.*, 2008)**. Glucose, are readily absorbed during digestion and lead to rapid elevation of blood sugars. As fructose is twice as sweet as glucose, it induces a feeling of satiety and may also reduce the total calorie intake compared to fat-rich foods **(Liu *et al.*, 2000)**. Among four varieties of date fruits, variety Khadrawi had highest (17.46 g/100g) and variety Medjool had lowest (15.96 g/100g) content of starch **(Vinita and Punia, 2016).** The results of the present investigation are almost similar to those reported by **Ismail *et al.* (2006)** who found 64.8 to 76.2%, for total reducing sugar in date fruit. **Al-Shahib and Marshall (2003)** suggested that the total sugar level can range from 44% to 86%, starting from fresh to final tamar stage date fruit. **Mikki (1999)** reported that Saudi date varieties contain about 70% reducing sugars with an almost equal quantity of glucose and fructose. The aforementioned authores analyzed ten date cultivars grown in the Saudi Arabia and found 68.2-78.3% reducing sugar and 2.9-5.1% non-reducing sugar **(Assirey, 2015)**. While, **Iqbal *et al.* (2011)** reported slightly lower mean values for total soluble sugar, reducing sugar and non-reducing sugar (71.05, 56.65 and 13.87g/100g, respectively) in date fruit.

2.9. Energy value:

The energy provided by the protein, fat, and carbohydrates in dates was calculated according to **MAFF (1995)**. This method of calculation of energy assumes that all carbohydrate present is energy providing. **Table (2)** showed the energy value of Nag Hamadi 1 dried dates which were higher than Medjool, nearly all from carbohydrates. Bedouin Arabs, who eat them on a regular basis, show an extremely low incidence rate of cancer and heart disease. Each Nag Hamadi 1 date contains 79.7 kcal, almost all of which come from the 18.29 grams of carbohydrates, since each date only contains 0.83 g of protein and 0.1 g of fat. Each medjool date contains 66 calories, almost all of which come from the 18 grams of carbohydrates, since each date only contains 0.4 grams of protein and trace amounts of fat.

The results nearly studied by **Al-Farsi and Lee (2008)** that dates are a good source of energy mainly due to their high sugar content. The average energy of fresh and dried dates is 213 and 314 kcal/100 g respectively. The sugar in dates are easily digested and can immediately be moved to the blood after consumption and can quickly be metabolized to release energy for various cellular activities **(El-Sohaimy and Hafez, 2010)**.

2.10. Total phenolic:

Phenolic compounds are playing an important role in protection against disease and pests **(Silva *et al.*, 2006)**. Date fruits have been reported to contain various phenolic. A significantly higher content of total phenol was observed in the Medjool cultivar, which is 652 mg/100g higher than the Nag Hamadi 1 which was 165 mg/100g (dry weight), as shown in **Table (2)**. This result corresponds to that found by **Shahdadi *et al*. (2015)** who showed that an average of Kharak date (Iranian dry date) at 141.35 mg/100 g dry weight. **Kchaou *et al.* (2013)** showed average level of total phenolic content for the Tunisian date varieties (160.98 to 222.23 mg/100g FW). The differences observed could be related to many parameters such as the geographical origin, varieties, postharvest storage conditions and extraction duration and solvent.

Whereas **Wu *et al*. (2004)** found that Deglet Noor and Medjool varieties presented a high level on total phenolic content which were 661 and 572 mg/100 g fresh weight, respectively. **Besbes *et al*. (2008)** reported higher level of polyphenols (280.6 to 681.8 mg/100g) in date fruit. The phenol content of date fruit in Morocco range at 3.98 mg/g for the Medjool cultivar **(Bouhlali *et al*., 2017)**.

2.11. Amino acids:

The amino acids content of date fruits Nag Hamadi 1 was 1.5 g/100g and Medjool recorded 1.23 g/100g. The date fruits considered an important nutritional source because they contain essential amino acids **(Al-Farsi and Lee, 2008)**. Amino acid contents of dates are reduced as they pass through different maturation stages that are due to reduction in its water content **(Ishurd *et al.*, 2004).** Fruits amino acids contents referred to seedling trees No. 4, 7 and 9 which recorded 3.1 and 3.2 mg/g, 4.0 and 4.1 mg/g and 3.5 and 3.7 mg/g (FW) upon two comparable cultivars Amhat cv. 1.6 and 1.8 mg/g and Zaghloul cv. 2.3 and 2.3 mg/g (FW) **(Abd-El Hamed *et al.*, 2017)**.

Table (2): Chemical composition of dates fruits of Nag Hamadi 1 and Medjool.

Chemical parameter	Nag Hamadi 1	Medjool	
Moisture	20% ± 1.45	21.5% ± 0.20	NS
Total soluble solids	78 g/100g ± 0.88	66 g/100g ± 0.15	S
Ash content	0.87 g/100g ± 0.01	1.75 g/100g ± 0.04	S
Crude fiber	6.0 g/100g ± 0.12	6.8 g/100g ± 0.09	S
Total protein content	3.46 g/100g ± 0.04	1.80 g/100g ± 0.15	S
Crude lipid (Fat)	0.4 g/100g ± 0.01	0.14 g/100g ± 0.01	S
Acidity	0.19% ± 0.01	0.09% ± 0.01	S
Total carbohydrates	76.2 g/100g ± 0.26	74.53 g/100g ± 0.17	NS
Total sugar	73 g/100g ± 0.21	66.40 g/100g ± 0.29	S
Reducing sugar	73 g/100g ± 0.23	65.84 g/100g ± 0.20	S
Non reducing sugar	0.0 ± 0.00	0.50 g/100g ± 0.02	S
Starch	1.0 g/100g ± 0.15	0.81 g/100g ± 0.02	S
Energy value	332.45 kcal/100g ± 0.61	290 kcal/100g ± 2.33	S
Total phenolic	165 mg/100g ± 1.01	652 mg/100g ± 4.33	S
Amino acid	1.5 g/100g ± 0.02	1.23 g/100g ± 0.03	S
Condensed tannins	0.13 g/100g ± 0.01	0.19 g/100g ± 0.02	S

Values are means ± standard error (SE) of 3 samples each cultivar.
S; significant at $P<0.05$
NS; nonsignificant at $p<0.05$

2.12. Condensed tannins:

The data in **Table (2)** showed non-significant differences in fruit tannins. The results are in harmony with those obtained by **Sayed (1999)** who reported that fruits tannins content ranged from 0.1 % to 0.366 % in some Saudi and Iraqi cvs. **Samia (2016)** cleared that in general fruits tannins content was low in Sewy fruits (0.16 %), and high in Zahdi fruits (0.20 %) and intermediate in the rest of tested cvs. While, **Ahmed *et al.* (1996)** mentioned that total soluble tannins content in "Zahidi" fruits was 13.11 mg/100g of fresh weight.

2.13. Mineral composition:

Samples were analyzed for the macro-elements (Na, K and Ca) using flame photometer **Table (3)**. All other elements (Cu, Fe, Mg, Mn, Zn and P) were determined using atomic absorption spectrophotometer. **Table (3)** demonstrates the concentration of all the analyzed elements in Nag Hamadi 1 compared to the content of the same elements in Medjool cv. contributing for valuable and useful elements. The concentration sequence in descending order was as follows: Ca, K, Na, Mg, Fe, Zn, Cu, Mn and P for Nag Hamadi 1 while it was K, Ca, Na, P, Mg, Fe, Zn, Cu and Mn in Medjool cv.

The high calcium concentration indicates that Nag Hamadi 1 can be a rich source for calcium which is essential for healthy bone development and for energy metabolism, while the high potassium concentration in Medjool cv. may be attributed to the addition of K containing fertilizers. On the other hand, the relatively low potassium and sodium contents of Nag Hamadi 1 are suitable for people with hypertension **(Appel *et al.*, 1997)**.

In spite that the palm was planted in soil without fertilization or irrigation; its content of Zn, Cu and Mn were relatively higher than that in Medjool cv. However, Mg and P were much higher in Medjool cv. more than in Nag Hamadi 1 which may be also attributed to the use of fertilizers.

The elemental content of date fruits Nag Hamadi 1 are almost in agreement with the results obtained by **Agboola and Adejumo (2013)** and **Assirey (2015)** for Ca, Mg, Cu and Mn while in contrast for Zn, K, Na and P which were determined in trace amounts in this study compared to significant amounts in the previous studies.

Also, our result for Mg content was in close agreement with **Vinita and Darshan (2016)** who indicated that all the varieties differed non-significantly in their magnesium content.

Table (3): Mineral composition of date flesh in Nag Hamadi 1 and Medjool (mg/100 g dry weight).

Nutrient	Nag Hamadi 1	Medjool	
Calcium, Ca	52.9 ± 0.20	63.0 mg ± 0.65	S
Copper, Cu	0.5 ± 0.02	0.34 mg ± 0.02	S
Iron, Fe	8.5 ± 0.07	0.85 mg ± 0.03	S
Magnesium, Mg	11.8 ± 0.15	52.0 mg ± 0.35	S
Manganese, Mn	0.5 ± 0.03	0.30 mg ± 0.02	S
Phosphorus, P	0.13 ± 0.01	60.0 mg ± 0.65	S
Potassium, K	0.6 ± 0.04	680 mg ± 3.28	S
Sodium, Na	0.12 ± 0.01	1.0 mg ± 0.07	S
Zinc, Zn	0.8 ± 0.02	0.40 mg ± 0.03	S

Values are means ± standard error (SE) of 3 samples each cultivar.
S; significant at $P<0.05$
NS; nonsignificant at $p<0.05$

The iron (Fe) content which is essential for red blood cell production and of great nutritional value was significantly 8-fold higher in Nag Hamadi 1 than in Medjool cv. although no horticulture operations were carried out for that palm tree under evaluation.

Such variations in the minerals content of date fruit Nag Hamadi 1 and Medjool cv. might be due to their genetic origin, location, soil moisture content, minerals nutrient availabilities and organic matter content differences.

CONCLUSION

The new strain Nag Hamadi 1 was characterized physically and chemically and then compared with Medjool cultivar. The obtained results evidently that Nag Hamadi 1 has a tolerance properties. Nag Hamadi 1 recommended for the human diet owing to rich source of sugars, protein, fiber and essential minerals such as potassium, calcium and iron. Further studies will be multiplication to this palm by using technique tissue culture through a part of inflorescences.

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تقدير بعض الخصائص الطبيعية والكيميائية لثمار سلالة بذرية جديدة (غير معروفة) من نخيل البلح نامية بصعيد مصر

رشا ناجى عرفة[1]، تامر رجب[2]، سيد عبد الرحمن السايح[3] و غادة عادل علي[1]

[1] مركزالبحوث الزراعية - المعمل المركزى لأبحاث و تطوير نخيل البلح - جيزة - مصر

[2] قسم كيمياء المنتجات الطبيعية والميكروبية – شعبة الصناعات الصيدلية والدوائية – المركز القومي للبحوث - الدقى - القاهرة - مصر

[3] مركز البحوث الزراعية - معهد البساتين – قسم تربية الفاكهة - جيزة - مصر

أجريت هذه الدراسة خلال موسمين متتاليين 2017 و 2018 على ثمار نخيل البلح الناتج من سلالة بذرية (نجع حمادى 1). وتهدف هذه الدراسة إلى تقييم الصفات الطبيعية والكيميائية لهذه السلالة الغير معروفة النامية بنجع حمادى بمحافظة قنا. محتوى الثمار من الرطوبة كان 20% والمواد الصلبة الذائبة 78% بينما كانت نسبة الرماد والألياف 0.87% و 6% على التوالي. وكان محتوى الثمرة من البروتينات والكربوهيدرات والليبيدات 3.46%، 76.2% و 0.4% على الترتيب. وأوضحت النتائج أن نسبة كبيرة من محتوى الكربوهيدرات عبارة عن جلوكوز وفركتوز و لا تحتوي علي سكروز، بينما أشار المحتوى المنخفض من الليبيدات والأحماض الدهنية والكوليسترول مقارنة بمحتوى السكريات أن هذه الثمار من الممكن أن تكون مفيدة لمرضى القلب والأوعية الدموية والسكرى.