

PROCESSING OF DATE HONEY

Doma, M. B. ; S. M. M. EL-Shahawy and S. A. H. Grawish

Dept. of food Industries, Fac. of Agric., Mans. Univ., Egypt

ABSTRACT

Taking into consideration the high annual production rates of dates in Egypt and in a trial to magnify the economical value of its second degree this work was designed to study the availability of processing two dates varieties namely Egyptian Siwy dates and Iraqi Zahdy dates for the production of quality Date honey with out adding any additives or preservatives and use this honey in manufacturing biscuits by replacing sugars by Date honey (Dibs). Two extraction methods were applied. In the first method (I), the extraction was done by adding hot water (80 – 90°C), to date flesh at W/D ratio 1.5:1 (w/w) respectively, followed by extraction, guise filtration and concentration, while in the second extraction method, hot water (70 °C) was added to date flesh at ratio of 3:1 respectively followed by extraction and concentration process. The syrup obtained in each method was packed and evaluated for its physical and chemical characteristic and compared with the local market syrup. The obtained data revealed that moisture, total sugars, crude proteins, fat and ash content of Siwy and Zahdy date syrup were as follow: 28.00-29.00 %, 69-68%, 1.2-1.4%, 0.5-0.4% and 1.3-1.2%, respectively for the syrup extracted by the first method. The same criteria but for the second extraction method of Siwy and Zahdy date syrup were as follows: 25.00-24.80%, 72.00-72.20%, 1.2-1.4%, 0.50-0.40%, and 1.30-1.20% respectively. The results of this study showed that filtration of date juice after extraction lead to improving date syrup color; this is due to removing the non soluble solids also the results showed that date syrup crop output was increased at 3:1 W/D ratio. Biscuits made using Siwy date syrup by replacing sugar by it at ratios of 10%, 20% and 30% compared with control (100% sugar), showed that sample manufactured by (70% sugar + 30% Siwy date syrup) recorded the highest total score and over acceptability value. It also recorded the highest appearance, shrinkage, taste and odor, while the control was the best value of crispiness only.

Indexwords: Date syrup, dibs, semi dry dates, Siwy and Zahdy date syrup, composition, preparation, organoleptic evaluation.

INTRODUCTION

The world production of date fruits reached about 6.7 million tones (FAO, 2004). The date palm (*Phoenix dactylifera L.*) is one of the major fruits trees in Egypt (El-Assar et al., 2005). Date fruit consumption is an important source of supplying mineral and vitamin elements in a balanced nutrition regime (Al-Shahib and Marshall, 2003), Egypt is the second important country in date fruits world production which produces 750000 tons per year as reported by FAO, (1998). Semi-dry date represent about 20.4% of the total production. Date fruit is a nutritive food product, rich in calories and natural source of energy due to their high carbohydrate content (70 - 80%), proteins (1.9 - 3%), fat (0.2 - 2.8%), minerals (1.3%) and vitamins (Abo-Rady *et al.*, 1987; Al-Farsi, *et al.*, 2007). Most of the carbohydrates in dates are in the form of glucose and fructose approximately, 38.2% and 39.4% respectively as reported by Razavi *et al.* (2007), which are easily absorbed by the human body (Batu, 1993). Date seeds represent 10-15% of date fruits. At present

time there are 16 factories for date processing and some other will be built in the future in Egypt (GOI 1999).

For the date pit, the percentage of non-reducing sugars is 3.82%, (Fayadh and Al-Showiman, 1990). In the Middle East, for instance date pits are used in animal feeding (Al Dabib, 2005; Hamada et al., 2002). Mature date fruits are also processed into products such as date bars, date syrup, etc. (Abd El-Mohsen and Nezam El- Din, 1995).

Date syrup is one of Dates derivatives that can be produced with a high quality and low economical and competitive charge. Date syrup is the natural extract of dates, without any additives, colors or preservatives reagents (Entezari et al., 2004).

Dibs is used to produce date juice and date juice milk drink (Ramadan, 1998 and Yousif et al., 1996), ice cream (Hamad et al., 1983), caramel color (Mikki et al., 1983), and Tamr-eddin, which is a substitute for Qumerdeen, (Sumainah and El-Nakhal, 1984).

Date syrup can be used in food preparations like sweets, snacks, confectionery, bakery products and health foods (Riedel, 1986). We can enter dates molasses in the manufacture of sweets, cakes and biscuits, FAOSTAT Database (1998). This study aimed to get benefits from the second class dates and use it for making a product called Date honey (Dibs) of high quality, find good and suitable methods for date syrup industry from the Egyptian Siwy and Iraqi Zahdy date fruit with good quality with out adding any additives or preservatives in processing methods, and use the product of Dibs for making biscuits by replacing sugar by it.

MATERIALS AND METHODS

Materials:

I - Materials of date syrup industry

In this study two palm fruit varieties were chosen namely: Siwy dates from Egypt cultivars, and Zahdy Iraqi dates.

The former, Siwy is one of the finest cultivars (semi-dry) in Egypt and Zahdy is one of the finest cultivars (semi dry) in Iraq. It was collected from El- Mansoura local market, Egypt. All of date samples obtained during the 2012 season, at Tamr stage, which considered a good quality.

Representative part of the date fruits used for some chemical analysis and another part pitted and the flesh minced just before physical evaluation.

II - Materials of Preparing Biscuits:

Wheat flour (72% extraction): American wheat produced by the Eastern Delta Flour Josef Company, was obtained from El- Mansoura local market, Egypt. Siwy date syrup: Siwy date syrup from preparing in this study. Other materials in this study such as sugar, fat (Butter), Salt and baking powder were obtained from local market of El-Mansoura City.

Methods:

Extraction methods: The extraction of date syrup was done by two methods. The first method (I) done at (The water/date pulp ratio was (W/D) (1.5:1)). The flesh of date samples weighed, the amount of hot water at (80-90°C)

added to flesh and left for one hour, the sample mixed with a hot water using a household mixer; the slurry was filtered through cheese cloth with a hand press. The residue pulp was re mixed with new amount of hot water (80-90°C), to make up the water/pulp ratio at 1.5:1 (w/w) and re-extracted again twice through a cheese cloth with a hand press, the collected date juice was filtered through a cheese cloth again. The clear extract was concentrated at 65°C under a vacuum of 500–600 mmHg) by using a rotary evaporator to produce syrup of about 70°brix. The concentrated samples were packed in sealed glass bottles and stored. Some glasses were stored at room temperature and others were stored in refrigerator at (5 – 7 °C). Date syrup was analyzed and evaluated compared with the local market sample of date syrup.

The second method (II) was done at The water / date pulp ratio (W/D) (3:1) as follows, the flesh of date samples was weighed, and cut into small pieces with approximately dimensions of 1 cm x 1 cm / 0.3 cm. The amount of hot waters (70 - 75 °C), was added to flesh and left for three hours. The slurry was filtered through cheese cloth with a hand press, the residue pulp was mixed with additional amount of hot water at (70 - 75 °C), and filtered again twice. The hot water was added twice to make up the water / date pulp ratio as (W/D) (3/1). The slurry was blended and filtered again by cheese cloth with a hand press. The clear extract was concentrated by using a rotary evaporator at (70 °C) under vacuum of (500–600 mmHg) to about 68-74°brix. The product date syrup packed in sealed glass bottles, some bottles were stored at room temperature and the others were stored in refrigerator at (5 -7 °C). Date syrup was analyzed and evaluated compared with the local market sample of date syrup.

Method of preparation of biscuits:

Technical methods:

Flour mixing: The moisture content of wheat flour and additives was adjusted to 14 % before mixing. The flour mixtures prepared by replacing sugar by Siwy date syrup at ratios 10 %, 20 % and 30 %.

Biscuits formula was prepared to the following ratios:

Wheat flour, 100 gm; sugar, 50 gm; fat (Butter), 35 gm; salt, 1 gm.; and baking powder, 1.4 gm

The dough was allowed to ferment for about 4 hours at 28 °C. Biscuits were baked in continues band oven at 230 °C for 15 – 18 min..

Biscuits samples were packed in polyethylene bags after cooling and then subjected to the organoleptic evaluation according to the methods described by Abd El-Magied *et al.* (1991)

Analytical Methods:

Chemical analysis: The moisture content percentage Determined by (Air oven method), according to the method described in (A.O.A.C., 1990). Total sugars, reducing and non-reducing sugars contents, were determined according to standard methods (AOAC, 2000). Reducing sugars determined by Somogyi (1952) method: Reducing sugars extracted by ethanol 80% and determined by arsinomolybdates and Somogyi Cupper reagent as described by Somogyi (1952) and Nelson, (1974). Crud protein was determined using Kjeldahl method according to the way A.O.A.C., Mentioned (2000), crude

protein calculated by multiplying total nitrogen by factor 6.25. Ether extracts (fat) was determined using soxhlet apparatus according to the standard methods (AOAC 1990). Ash content and minerals determined by the method described in (A.O.A.C., 1990). Acidity was determined in all samples by titration, according to official methods AOAC (1990).

Physical analyses:

Refractive Index determined using the hand refractometer.

Physical determinations of biscuit samples run according to A.A.C.C. (1983), as follow:

- Thickness (average of 6 biscuits) (cm).
- Weight of 15 biscuits (g).
- Diameter, (average of 6 biscuits) (cm).
- Stock height of 6 biscuit (cm).

The diameter and thickness of the biscuits were measured by blanometer to the nearest (mm).

Spread factor was calculated using the following equation:

$$\text{Spread factor} = \frac{\text{Diameter (cm)}}{\text{Thickness (cm)}}$$

Organoleptic evaluation of date syrup samples were determined by a taste panel comprising of 10 staff members of food industries department, faculty of agriculture, Mansoura University. The panel scoring system applied was: Color (20 points), taste (30 points), consistency (20 points) and acceptability (30 points), this system applied for some date products by Sumainah and El-Nakhal (1984), Ramadan (1995) and Yousif *et al.* (1989). The color of the diluted date syrup (20% TSS), measured as optical density at 420 nm using a spectrophotometer according to De Whaley, (1964)

Organoleptic evaluation of biscuits: Appearance, color, thickness, crispness, Shrinkage, taste and odor were evaluated by 10 panelists according to the method of Smith (1972).

RESULTS AND DISCUSSION

Physical characteristics of Siwy, Zahdy date fruits

The data tabulated in table (1) indicated that, the number of fruits/kg was 115 and 112 fruit for Siwy and Zahdy dates, respectively. The weights of fruit and flesh of Siwy date were (8.70 g and 7.30 g) followed by Zahdy date (8.93 g and 7.93 g). From the same table it noted that, Zahdy date had the highest flesh/pit ratio (7.93) and fruit flesh percentage (88.80%).

Table (1): Physical characteristics of Siwy and Zahdy date fruits.

| Date variety | physical characteristics | | | | | |
|--------------|--------------------------|-----------------|-----------------|---------------|-----------------|---------------|
| | Fruits No./Kg | Fruit weight gm | Flesh weight gm | pit weight gm | Flesh/pit ratio | Fruit Flesh % |
| Siwy date | 115 | 8.70 | 7.30 | 1.40 | 5.22 | 83.90 |
| Zahdy date | 112 | 8.93 | 7.93 | 1.00 | 7.93 | 88.80 |

These results agreed with that reported by Hussein and Hussein (1983), Nour *et al.* (1989) and Ramadan (1990, 1995 and 1998).

Physical measurements of the experimental biscuit samples:

The data presented in Table (2) shows the effect of replacing sugar by Siwy date syrup at ratios 10%, 20% and 30% on physical properties of biscuit.

The obtained results showed that the sample (100% sugar) recorded the highest average diameter of 6 biscuits means was 8.8 cm, the samples No. (4) [70% sugar + 30% Siwy date syrup], recorded the lowest average of diameter, was (8.4 cm), while the samples No. (2) and (3) recorded; 8.7cm and 8.6 cm. The control sample (100% sugar) recorded the highest average weight of 6 biscuits means was 95.90 gm, but the samples No. (2), (3) and (4) recorded; 91.00 gm, 91.20 gm, and 91.50 gm.

With regarding to spread factor, it was found that the highest spread factor value was 8.8 for the sample No. (1) [100% sugar], while the sample No. (3) [80% sugar + 20% Siwy date syrup] and (4) [70% sugar + 30% Siwy date syrup] recorded the highest value of thickness (1.20 cm), while the sample No. (1) [100% sugar] recorded the lowest value of thickness (1.0 cm).

Table (2): Physical measurements of biscuit samples which made by replacing sugar by Siwy date syrup at ratios 10%, 20% and 30%, compared with control sample (100% sugar)

| Mixtures | Physical measurements of biscuits | | | | | | |
|------------------------------------|-----------------------------------|----------------|--------------------------|------------------------------|-------------------|--------------------|---------------|
| | Before baking | | | After baking | | | |
| | Diameter (cm) | Thickness (cm) | Wight of 6 biscuits (gm) | (1) Wight of 6 biscuits (gm) | (2) Diameter (cm) | (3) Thickness (cm) | Spread factor |
| 1-100% sugar (control sample) | 6.2 | 0.6 | 115 | 95.90 | 8.8 | 1.0 | 8.80 |
| 2- 90% sugar +10% Siwy date syrup | 6.2 | 0.6 | 110 | 91.00 | 8.7 | 1.1 | 7.90 |
| 3- 80% sugar + 20% Siwy date syrup | 6.2 | 0.6 | 110 | 91.20 | 8.6 | 1.2 | 7.16 |
| 4- 70% sugar + 30% Siwy date syrup | 6.2 | 0.6 | 110 | 91.50 | 8.4 | 1.2 | 7.00 |

Chemical composition of raw date fruits (on dry basis)

In this study, the results in Table (3), showed the chemical components of the studied date samples; Siwy and Zahdy date fruits were 18.00 and 17.30% Moisture content, respectively, these results not agree

with those obtained by Al-Hooti *et al.* (1997), and Al-Farsi *et al.* (2007) whose found that dates at Tamr stage had moisture content less than 15%. Moistures content was decreased by storage from 18.00 % to 10.4% of Kharja dates respectively, (Ingles and Reynolds, 1958). Ramadan (1990, 1995), and Hussein *et al.* (1976) reported that, the dry and semi-dry dates had a moisture content less than 20% and 20-30%, respectively. From the same table (3), Siwy and Zahdy date recorded a high amount of total sugars it was (75.25 and 76.20%). The last studies by Ramadan (1998), reported that, Saigy date variety recorded a higher amount of sugars (83.80%), crude protein (3.81%) and ash (1.95%).

The data in table (3), showed that, reducing sugars of Siwy and Zahdy date fruits recorded; 63.45% and 70.90% respectively, while they had the lowest content of non-reducing sugars, 11.80 and 5.30%.

In last study by Hussein *et al.* (1972), reported that, Zahdy date fruit recorded highest amount of reducing sugars, it was (70.70%), while the Siwy date fruits recorded (39.30%). The last studies on storage of semi and dry dates carried out on Egyptian Siwy date variety by Abd El-Mohsen and Nezam El-Din (1995), reported that, reducing and total sugar were 63.1%, 72.60% in Siwy Kharja date. The data presented in table (3) showed that, Siwy and Zahdy date fruits recorded; 3.85 and 2.20 % of Crude protein, while it was recorded the lowest amount of fat as Ether extractor; 0.60 and 0.40%. The results in the same table showed that the Siwy and Zahdy date fruits recorded the highest content of ash were 2.30 and 3.90%, these results were in agreement with those found by Ahmed & Ahmed (1995), Al-Hooti *et al.* (1995), and Yousif *et al.* (1982).

Table (3) Chemical composition of Siwy and Zahdy date fruits (on dry basis)

| Date variety | Chemical characteristics | | | | | | |
|--------------|--------------------------|-------------------|-----------------------|----------------|-----------------|-------------------------|-------|
| | Moisture % | Reducing Sugars % | Non-Reducing sugars % | Total Sugars % | Crude protein % | Ether extractor (fat) % | Ash % |
| Siwy Date | 18.00 | 63.45 | 11.80 | 75.25 | 3.85 | 0.60 | 2.30 |
| Zahdy Date | 17.30 | 70.90 | 5.30 | 76.20 | 2.20 | 0.40 | 3.90 |

Chemical composition of raw Siwy and Zahdy date pits (on dry basis):

Full date pits are used in the traditional methods to extract oil and carbohydrates, it is preferable to remove date pits and transform it to date paste to become but the basic raw material of extracting the soluble substances, the basic procedures of preparing and processing dates in industry.

Siwy date pits were collected washed, dried by air oven then, It were crushed, grinded to powder and stored in deep freezer at (-18°C) until chemical analysis

For date pits, the moisture content of Siwy and Zahdy date pit was (12.2-10%). The ash and fat content in Siwy date pits were 1.11, and 8.4 %, respectively but in Zahdy date pits were (1.2-7.8%) Table (4). In the same

table the data showed that, Total sugars in Siwy and Zahdy date pit were (5.46-6.40 %) and these results were less than those found by Fayadh and Al-Showiman (1990), which was (7%). The crude protein of dried Siwy and Zahdy date pits was (7.2-5.22%), nearly similar to values of on Ruzeiz date seed (Sawaya *et al.*, 1984).

Table (4): Chemical composition of Siwy and Zahdy date pit (on dry basis)

| Date variety | Chemical characteristics | | | | | | |
|----------------|--------------------------|-------------------|-----------------------|---------------|-------|----------------|-------|
| | Moisture % | Reducing Sugars % | Non-Reducing sugars % | Total Sugars% | Fat % | Crude protein% | Ash % |
| Siwy date pit | 12.20 | 2.20 | 3.40 | 5.46 | 8.4 | 7.20 | 1.11 |
| Zahdy date pit | 10.00 | 2.50 | 3.90 | 6.40 | 7.8 | 5.22 | 1.20 |

Effect of water / date pulp ratio (W/D) on sugars extraction rate:

The data in Table (5) showed that, sugar extraction rate (SER) was relatively affected by the-moisture content of date pulp and water / date pulp ratio (W/D). Data revealed the extraction rate of sugars increased according to the water/flesh ratio increased. In the same data that Zahdy date recorded the high SER (95.00%) at 3/1 W/D ratio and (77.00%) at 1.5:1 W/D ratio, while Siwy date recorded the lowest (SER), it was (93.00%) at 3/1 W/D ratios and (75.00%) at 1.5:1 W/D ratio this is due to Siwy date has the highest moisture content. Whereas, Benjamin *et al.* (1982) reported that, the optimum conditions to maximize the extraction rate of 96% were temperature, 85°C; diffusion time, 50 min, and the maximize the extraction rate at 80 °C was 95% in the same time.

In the same table, the results in the second way showed that, Zahdy date recorded the highest record of (SER), it was 95.00 % at ratio 3/1 W/D when the flesh leaved in water 3 hours before extracting, while, Siwy date recorded the lowest record 93.00 % at ratio 3/1 W/D. Whereas, Zahdy Date fruits had a (lowest moisture content) was recorded the highest Juice/date pulp, gm/kg at all of (W/D) ratios. However, the low TSS of the extract is not easy to preserve on the industrial scale and will require very high energy to concentrate. Moreover, it was concluded from the data in Table (5) that one kilogram of each samples of Siwy date pulp could produce about 1450 gm juice at 1.5:1 W/D and 2760 gm juice at ratio 3:1 W/D, while one kilogram of each samples of Zahdy date pulp could produce about 1480 gm juice at 1.5:1 W/D and 2800 gm juice at ratio 3:1 W/D, these rations is the higher than the ratios on Ramadan (1998), it was 2634 gm/ kg in Saily (Siwy) date.

Table (5): Effect of water/date pulp ratio (W/D) on sugars extraction percentage

| Variety | W/D | | | |
|-----------------|------------------|---------|-----------------------|---------|
| | 1.5/ 1(I) | 3/1(II) | 1.5/ 1(I) | 3/1(II) |
| | Sugar extraction | | Juice/date pulp gm/kg | |
| Siwy Date pulp | 75.00 | 93.00 | 1450 | 2760 |
| Zahdy Sate pulp | 77.00 | 95.00 | 1480 | 2800 |

The amount of date syrup yield

The results in Table (6) showed that, Siwy date recorded the lowest ratios of date syrup product in path ways, it was 550 gm/ kg, 570 gm/ kg, compared with Zahdy date syrup, which was 560 gm/ kg, 580 gm/ kg, this is due to, Siwy date fruit has a high amount of moisture content, the ratio of water and date fruits and the composition of date fruits. Al-Hooti *et al.* (2002) reported that Birhi and Sifri dates gave (35%) of RSS% without using enzymes

Table (6): The amount of honey date (Dibs) yield

| Variety | Product of Dibs gm/kg |
|------------|-----------------------|
| Siwy (I) | 550 ^b |
| Siwy (II) | 570 ^{ab} |
| Zahdy (I) | 560 ^{ab} |
| Zahdy (II) | 580 ^a |
| P value | 0.1551 |
| LSD | 30.101 |

a, b; Means with the same letter are not significantly different

Chemical composition of Siwy and Zahdy date syrup and control

The chemical compositions of date syrup are mentioned in Table (7). It observed that the moisture content of Siwy date syrup (I) and (II) was 28.00% and 25.00. The total sugars content of Siwy date syrup (I) and (II) was (69.00%, 72.00 %) respectively, crude protein and ash content were the same ratio 1.20% and 1.30%. In the same table the data showed that, in Zahdy date syrup (I) and (II), the moisture content was 29.00% and 24.80%, total sugars was 68.00% and 72.20%, and the same ratio of crude protein and ash was 1.40% and 1.20% in path ways, while the local market syrup recorded 26% moisture content, (71.00%) of Total sugars, and protein, fat and ash were (1.22, 0.40 and 1.3).

Table (7): Chemical composition of Siwy and Zahdy date syrup

| Samples | Chemical Characteristics | | | | | | |
|------------------------------|--------------------------|-------------------|-----------------------|----------------|-----------------|-------------------------|-------|
| | Moisture % | Reducing Sugars % | Non-Reducing sugars % | Total Sugars % | Crude protein % | Ether extractor (Fat %) | Ash % |
| Siwy date syrup (I) | 28.00 | 62.50 | 6.50 | 69.00 | 1.20 | 0.50 | 1.30 |
| Siwy date syrup (II) | 25.00 | 63.20 | 8.80 | 72.00 | 1.20 | 0.50 | 1.30 |
| Zahdy date syrup (I) | 29.00 | 64.40 | 3.60 | 68.00 | 1.40 | 0.40 | 1.20 |
| Zahdy date syrup (II) | 24.80 | 67.40 | 4.80 | 72.20 | 1.40 | 0.40 | 1.20 |
| Local market syrup (control) | 26.00 | 67.20 | 3.80 | 71.00 | 1.22 | 0.40 | 1.30 |

Characteristics of Siwy and Zahdy date syrup (I) and (II)

The presented data in table (8) showed that, the prepared date syrup had high acidity and TSS, therefore the expected storage ability will be high. This is due to the high level of sugars and relatively low moisture content. With regard to the same table results showed that the pH value recorded ranged from 4.0 to 4.8 for date syrups. The total soluble solids (TSS %) of Siwy date syrup (I) and (II) were 69.00% and 72.00%, and the refractive index was, 1.4665, 1.4740, respectively. while the total soluble solids (TSS %) of Zahdy date syrup (I) and (II) were 68.00% and 72.20%, and refractive index was, 1.4640, 1.4745, respectively.

Table (8): Effect of extraction method on physiochemical characteristics of Siwy, Zahdy and local market date syrup (Dibs)

| Date syrup | TSS % | Refractive index at 20 °C | pH | Acidity % As citric acid | Density Gm/cm ³ | Viscosity (cP) |
|-----------------------------|-------|---------------------------|-----|--------------------------|----------------------------|----------------|
| Siwy Dibs (I) | 69.00 | 1.4665 | 4.0 | 0.42 | 1.3545 | 2.70 |
| Siwy Dibs (II) | 72.00 | 1.4740 | 4.1 | 0.55 | 1.3757 | 3.10 |
| Zahdy Dibs (I) | 68.00 | 1.4640 | 4.2 | 0.60 | 1.3483 | 2.50 |
| Zahdy Dibs (II) | 72.20 | 1.4745 | 4.3 | 0.66 | 1.3771 | 3.20 |
| Local market syrup(control) | 71.00 | 1.4715 | 4.8 | 0.34 | 1.3686 | 2.80 |

Organoleptic evaluation of date syrup

The data, presented in Table (9), showed that, Siwy date syrup (I) recorded the highest value of color although using the high temperature in processing, this is due to using filtration of date juice twice again, which it lead to separate non salable solids and total sugars was decreasing. The results showed that the more date syrup concentration becomes the darker the color of date syrup.

With regard to the same data, it was clear that, Siwy date syrup (I) recorded the highest average color value; and equal in their taste, flavor and acceptable score, compared with Zahdy date syrup (I). With regard to the same data, it was clear that, Zahdy date syrup (II) recorded the lowest values of color, taste and total score of sensory evaluation terms, it was (16.0, 25.2 and 83.5). While Siwy date syrup (II) recorded the highest average of taste, flavor and total score, it was (25.9, 16.9 and 84.5) total score, Siwy date syrup (I), Zahdy date syrup (I) and Local market date syrup recorded equal of acceptable it was (25.3). In the same table, that Siwy date syrup (II) and Zahdy date syrup (II) was recorded the same value of acceptable, it was (25.5). Zahdy date syrup (I) and Local market date syrup recorded equal value of total score. The results stated that Siwy date syrup (II) is the best of all sample. These results obtained was in accordance with those obtained by Al-Saidy *et al.* (1982), Benjamin *et al.* (1982), Al-Saady and Benjamin (1983) and Ramadan (1995). With regard to the same data, it was clear that, Siwy date syrup (I) recorded the highest value of color although using the high temperature in processing, this is due to using filtration of date juice twice again, which it lead to separate non salable solids and total sugars was decreasing.

Table (9): The average of organoleptic evaluation of date syrup

| Samples | Color (20) | Taste (30) | Flavor Consistency (20) | Acceptable (30) | Total score (100) |
|-------------------------|-------------------|-------------------|-------------------------|-------------------|-------------------|
| Siwy date syrup (I) | 16.8 ^a | 25.7 ^a | 16.6 ^a | 25.3 ^a | 84.4 ^a |
| Siwy date syrup (II) | 16.2 ^a | 25.9 ^a | 16.9 ^a | 25.5 ^a | 84.5 ^a |
| Zahdy date syrup (I) | 16.5 ^a | 25.7 ^a | 16.6 ^a | 25.3 ^a | 84.1 ^a |
| Zahdy date syrup (II) | 16.0 ^a | 25.2 ^a | 16.8 ^a | 25.5 ^a | 83.5 ^a |
| Local market date syrup | 16.6 ^a | 25.6 ^a | 16.6 ^a | 25.3 ^a | 84.1 ^a |
| LSD | 0.9683 | 0.8179 | 0.6964 | 1.1330 | 2.3234 |

a, Means with the same letter are not significantly different

Organoleptic evaluation of biscuits

Appearance, color, thickness, crispness, shrinkage, taste and odor were evaluated according to Smith (1972). Organoleptic evaluation of biscuit samples which made by replacing sugar by Siwy date syrup at ratios 10%, 20% and 30%, compared with control sample (100% sugar). The results in Table (10), showed that, the sample No., (1) which contain 100% sugar recorded the best crispiness value (14.4) but it had the lowest value of appearance, color, shrinkage, taste, odor, total and acceptability, it was (8.60-14.00-13.50-13.50-13.30-91.00 and 91.00 %), while the sample No. (4), which contain (70% sugar + 30% Siwy date syrup) recorded the highest total score and acceptability value (93.0 and 96.20) It had highest appearance, shrinkage, taste and odor (9.30 -13.80 - 14.00 - 13.70).

Table (10): Organoleptic evaluation of biscuit samples

| Mixtures | Characteristics | | | | | | | | |
|------------------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------------|
| | Appearance (10) | Color (15) | Thickness (15) | Crispiness (15) | shrinkage (15) | Taste (15) | Odor (15) | Total (100) | Acceptability Value (%) |
| 1- 100% sugar (control sample) | 8.60 ^a | 14.00 ^a | 13.70 ^a | 14.40 ^a | 13.50 ^a | 13.50 ^a | 13.30 ^a | 91.00 ^a | 91.00 ^a |
| 2- 90% sugar +10% Siwy date syrup | 9.10 ^a | 14.20 ^a | 14.00 ^a | 13.90 ^a | 13.60 ^a | 13.70 ^a | 13.40 ^a | 91.90 ^a | 92.10 ^a |
| 3- 80% sugar + 20% Siwy date syrup | 9.20 ^a | 14.30 ^a | 14.20 ^a | 13.80 ^a | 13.70 ^a | 13.80 ^a | 13.50 ^a | 92.50 ^a | 95.30 ^a |
| 4- 70% sugar + 30% Siwy date syrup | 9.30 ^a | 14.30 ^a | 14.20 ^a | 13.70 ^a | 13.80 ^a | 14.00 ^a | 13.70 ^a | 93.00 ^a | 96.20 ^a |
| P value | 0.3090 | 0.9197 | 0.6587 | 0.4971 | 0.0076 | 0.8165 | 0.5798 | 0.3946 | 0.1088 |
| LSD | 0.814 | 1.0004 | 0.9232 | 0.9913 | 0.7633 | 1.2836 | 0.8801 | 4.9967 | 4.2234 |

REFERENCES

- A.A.C.C. (1983), American Association of Cereal Chemists, Approved Methods of the A.A.C.C. Pub. By The Am American Association of Cereal Chemists, St, Paul. MNY. USA.
- Abd El- Magied, M. M.; E. Hassan and A. T. Akel (1991), High protein cookies made with pigeon pen and sorghum blends . *Minia J. Agric. Res. and Dev.* 13 (1).
- Abd El-Mohsen M, and Nezam El-Din M (1995), Technological study on Dibs production from the Siwy date, *Egyptian J. Food Sci.* 23(3): 229-239. Source: (CHAPTER1).
- Abo-Rady MDK, Khalil MM. and Ahmed HS. (1987), The use of shredded date palm leaves as a substrate in horticulture II Growth and yield of tomato and cucumber. *Date Palm J.* (FAQ/NENADATES), 5(2):144-152.
- Ahmed IA & Ahmed A-WK (1995): Chemical composition of date varieties as influenced by the stage of ripening. *Food Chem.* 54, 305 -309
- Al-Dabib S.N. (2005). Effect of feeding low quality date palm on growth performance and apparent digestion coefficients in fattening Najdi sheep. *Small Rumin. Res.*, 57: 37-42 Cross Ref.
- Al-Farsi M, Al-Asalvar C, Al-Abid M, Al-Shoaily K, Al-Amry M, and Al-Rawahy F (2007). Compositional and functional characteristics of dates, syrups, and their by-products. *Food Chem.* 104(3): 943-947
- Al-Hooti S, Sidhu JS and Qabazard H (1995): Studies on the physico-chemical characteristics of date fruits of five UAE cultivars at different stages of maturity. *Arab Gulf J. Sci. Res.* 13, 553 -569
- Al-Hooti S, Sidhu JS, and Qabazard H (1997). Physicochemical characteristics of five date fruit cultivars grown in the United Arab Emirates, *Plant Foods for Human Nutrition* 50:101–113
- Al-Hooti SN, Sidhu JS, Al-Saqerand MN, Al-Othman JM (2002). Chemical composition and quality of date syrup as effected by pectinase/cellulase enzyme treatment. *Food Chem.* 79: 215-220
- Al-Saady, G.K. and N.D. Benjamin. 1983. Date technology in Iraq. Proc. of the 1st Symp. on Date Palm, K.F. Univ., March 23-25, 1982, Al-Hassa, Saudi Arabia, pp. 754-756.
- Al-Saidy, M.A., K.A. Al-Dujaili and A.M. Majced. 1982. Evaluation of date syrup (dibs) as a substitute for table sugar in bread making. *J. of Biological Sci., Biological Research Center, Baghdad*, 13 (1): 93-107
- Al-Shahib W. and Marshall R.J., (2003). The fruit of the date: It's possible as the best food for the future? mt. i. *Food Nutr.*, 54: 247-259.
- A.O.A.C. Official methods of Analysis, Association of official Analytical Chemistry (1990) 15th Edition.
- AOAC (2000). Official methods of analysis (17th Ed.). Washington, DC: Association of Official Analytical Chemists, Methods 37.1.12, 44.1.05, 2.4.03, 37.1.51, 37.1.34.

- Batu A (1993). Kuru üzüm ye pekmezin insan salii ye beslenmesi acisindan Onemi (The importance of raisin and pekmez on human health and nutrition). *Gida*. 18(5), 303-307.
- Benjamin, N.D., M.F. Abbas ^{and} B.H. Shubbar. 1982. Preparation and clarification of a date juice: 1- Preparation. *J. Agric. Water Reso. Res.*, 1 (2): 75-87.
- De Whalley, H.C. (1964). *Methods of Sugar Analysis*. International Commission for Uniform Methods of Sugar Analysis. Pp. 36 59. Amsterdam: Elsevier. Egyptian Standards Organization 1963. "Paked dehydrated dates", No. 375/1963, Ministry of Industry, Cairo, Egypt, pp. 1-6.
- El-Assar, A.M., R.R. Krueger, P.S. Devanand and C.T. Chao, (2005). Genetic analysis of Egyptian date (*Phoenix dactylifera* L.) accessions using AFLP markers. *Genet Resour. Crop Evol.*, 52: 601-607
- Entezari MH, Nazary SH, and Khodaparast MH (2004). The direct effect of ultrasound on the extraction of date syrup and its micr-organisms. *Ultrasonics Sonochemistry* 11: 379-384
- FAO (1998). Food and Agriculture Organization, production Year book vol. 52 (1998).
- FAOSTAT database (1998). [http:// apps.fao.org/lim500/ nph-wrap.pl?Production.Crops.Primary&Domain=USA](http://apps.fao.org/lim500/nph-wrap.pl?Production.Crops.Primary&Domain=USA).
- FAO (2004), Agriculture Data: FAOSTAT.[http:// faostat.fao.org /faostat/collections? Subset = agriculture](http://faostat.fao.org/faostat/collections?Subset=agriculture) (last accessed May 2004).
- Fayadh, J.M. and S.S. Al-Showiman, (1990). A review on chemical composition of date palm (*Phoenix dactylifera* L.). *J. Chem. Soc. Pak.*, 12: 84-103
- GOI, (1999). General Organization for Industrialization, Cairo, Egypt
- Hamad, A. M., M. I. Mustafa, and M. S. Al-Kahtani. (1983). Possibility of utilizing date syrup as sweetening and flavoring agent in ice cream making. In *Proceedings of the First Symposium on Date Palm in Saudi Arabia*, King Faisal University, Al-Hassa (pp.544-550). Riyadh, Saudi Arabia: Mars Publishing House.
- Hamada, J.S., I.B. Hashim and F.A. Sharif, (2002). Preliminary analysis and potential uses of date pits in foods. *Food. Chem.*, 76: 135-137
- Hussein, F. and K.M. Abdalla (1972), "physiological studies through the post – bloming development of “ Gondeila and Malakabi” dates grown at Aswan. 1 st Congr. Egypt. Bot. Soc., Cairo,25 – 27 March.1972.(hand book
- Hussein, F., S. Moustafa, F. El-Samiraea and A. El-Zeid. (1976). Studies on physical and chemical characteristics of eighteen date cultivars grown in Saudi Arabia. *Indian J. Hort.*, 33: 107-113.
- Hussein, F. and Hussein M.A. (1983). Effect of irrigation on growth, yield and fruit quality of dry dates grown at Aswan. *Proc. of the Ij Symp. on Date Palm*, K.F. Univ., March 23-25, 1982, Al-Hassa, Saudi Arabia, pp. 168-172
- Ingles, D.L. and Reynolds, T.M. (1958). Chemistry of non-enzymatic browning IV determination of amino acid deoxy fructose in browned freeze dried Apricot. *Aust. J. Chem.*, 11, 575.

- Mikki, M. S., V. Bukhaeve, and F. S. Zaki. (1983). Production of caramel color from date juice. In Proceedings of the First Symposium on Date Palm in Saudi Arabia, King Faisal University, Al-Hassa (pp. 552-558) Riyadh, Saudi Arabia: Mars Publishing House.
- Nelson, N. (1974). A photometric adaptation of the Somogi methods for determination of glucose. *J. Biol. Chemistry*, 153-375, 380.
- Nour, G.M., A.S. Khalifa, A.A.M. Hussein and A.A. Moustafa (1989), Studies on the evaluation of fruit characteristics of nine dry date palm cultivars grown at Aswan. Proc. of the 2j Symp. on Date Palm, K .F. Univ., March 3-6, 1986, Al-Hassa, Saudi Arabia, pp.
- Ramadan, B.R. (1990). Chemical and technological studies on some New Valley dates. MS Thesis, Food Sci. & Tech. Dept., Fac. of Agric., Assiut Univ., Egypt.
- Ramadan BR (1995). Biochemical, nutritional and technological studies on dates. Ph.D. Thesis, Food Sci. & Tech. Dept., Fac. of Agric., Assiut Univ., Egypt.
- Ramadan, B. R. (1998). Preparation and evaluation of Egyptian date syrup. MS Thesis, Food Sci.& Tech. Dept., Fac. of Agric., Assiut Univ., Egypt.
- Razavi SMA, Najafi MBH and Alae Z (2007). The time independent rheological Properties of low fat sesame paste/date syrup blends as a function of fat substitutes and temperature. *Food Hydrol.* 21(2007), 198-202.
- Riedel H R (1986). Dates, where they come from and how they can be used in the confectionery industry. *Kakao-und-Zucker*, 38 (12):16-19
- Sawaya, W. N., Khalil T.K. and Safi, W.J. (1984), Chemical composition and nutritional quality of date seeds. *J. Food Sci.*, 49(1984), pp. 617-620.
- Smith, W. H. (1972), *Biscuits, Crakers and Cookies*, applied science published L T D, London, England
- Sumainah, G. M. and El-Nakhal H. (1984). Tamr-Eddin: Anew product of date. *J. Food Sci. Technol.*, 21: 88-91.
- Somogi, M. (1952). Notes on sugar determination. *J. Biol. Chem.*, 195, 19.
- Yousif, A.K., N.D. Benjamin, A. Kado, S. Mehi Addin, and S.M. Au. (1982). Chemical composition of four Iraqi date cultivars. *Date Palm* 3., 1 (2): 285-294.
- Yousif, A.K., S.Sh. Ahmed and W.A. Mirandilla. (1989). Developing of a nutritions beverage from concentrated date syrup and powdered milk. Proc. of the 2nd Symp. on Date Palm, K.F. Univ., March 3-6, (1986), Al-Hassa, Saudi Arabia, pp. 121 131.
- Yousif A. K. A. S. Alghamdi A. Ahmed and A. I. Mustafa, (1996). Processing and evaluation of date juice milk drink. *Egyptian J. Dairy Sci.*, 24: 277-288.

تصنيع عسل التمر

محمود بدوى دومه، شادى محمد محمود الشهاوى و سمير عبد العزيز حسن جراوش
قسم الصناعات الغذائية - كلية الزراعة - جامعة المنصورة

أخذين فى الاعتبار معدلات الإنتاج السنوية العالية للتمر فى مصر وفى محاولة لتعظيم القيمة الاقتصادية للدرجة الثانية من التمور النصف جافة تم تصميم هذا العمل بهدف دراسة إمكانية معالجة صنفين من التمور وهما السيوى المصرى والزهدى العراقى وذلك لإنتاج منتج عالى الجودة من عسل التمر دون إضافة أى إضافات أو مواد حافظة، واستخدام عسل التمر الناتج فى صناعة البسكويت، وذلك باستبدال السكر بعسل التمر بنسب ١٠%، ٢٠%، ٣٠%. وتم إجراء عملية الإستخلاص بطريقتين فى الطريقة الأولى تم إضافة الماء الساخن (٨٠ - ٩٠ م) إلى لحم التمر بنسبة ١:١.٥ على التوالي ثم الإستخلاص ثم ترشيح العصير الناتج ثم التركيز، بينما فى طريقة الإستخلاص الثانية تم إضافة الماء الساخن (٧٠ م) إلى لحم التمر بنسبة ٣ : ١ على التوالي ثم الإستخلاص ثم تركيز العصير الناتج. العسل الذى تم الحصول عليه من كل طريقة تم تعبئته وتم عملية التقييم الفيزيائى والكيميائى له مع مقارنة ذلك بخواص العسل الموجودة بالسوق المحلى. أظهرت الدراسة أن النتائج المتحصل عليها بطريقة الإستخلاص الأولى لكل من؛ الرطوبة، السكريات الكلية، البروتين الخام، الدهون والرماد لكل من عسل التمر السيوى والزهدى كانت (٢٨.٠، ٢٩.٠%)، (٦٩.٠، ٦٨.٠%)، (١.٢، ١.٤%)، (٠.٥، ٠.٤%) و (١.٣، ١.٢%) على التوالي، ولقد تم إجراء التحاليل السابقة على العسل المتحصل عليه بطريقة الإستخلاص الثانية وكانت النتائج على النحو التالى؛ (٢٥.٠، ٢٤.٨%)، (٧٢.٠، ٧٢.٢%)، (١.٢، ١.٣%) و (٠.٤، ٠.٥%) على التوالي. وأظهرت نتائج هذه الدراسة أن ترشيح العصير الناتج من إستخلاص التمر يؤدى إلى إنتاج عسل تمر جيد اللون وذلك للتخلص من المواد الصلبة غير الذاتية. كذلك أن كمية العصير الناتج من الإستخلاص قد زادت عند إضافة الماء الساخن إلى التمور بمعدل ١:٣ والنقع لمدة ثلاث ساعات عنه فى حالة إضافته بنسبة ١:١.٥ ماء إلى تمور والنقع لمدة ساعة وبالتالي زادت كمية عسل التمر الناتج وسجلت أعلى قيم فى تمر الزهدى والسيوى معا وكانت بمتوسط (٥٨-٥٧%) و (٥٦-٥٥%)، كما أظهرت الدراسة أن إستبدال السكر بعسل التمر فى صناعة البسكويت أعطى صفات حسية عالية فى جميع الصفات الحسية عند الإستبدال بنسبة ٣٠% عسل تمر + ٧٠% سكر، كما أن درجة القبول كانت عالية إلا أن البسكويت الذى احتوى على ١٠٠% سكر كان أعلى فقط فى قيم القرمشة. وتوصى الدراسة بأنه يجب إضافة الماء الساخن على التمور بدلا من إضافة الماء والتسخين عند الإستخلاص وكذلك يجب ترشيح عصير التمر بعد إستخلاصه وذلك للتخلص من المواد الصلبة غير الذاتية التى تؤثر على الصفات الحسية خاصة اللون، وحفظ عسل التمر على (٥ - ٧ م) واستخدام عسل التمر كبديل للسكر فى صناعة البسكويت لرفع قيمته الحسية والتغذية.

قام بتحكيم البحث

كلية الزراعة - جامعة المنصورة
كلية الزراعة - جامعة الزقازيق

أ.د / مسعد عبد العزيز ابو ريه
أ.د / فوزى رمضان حسانين