

Evaluation of Some Date Palm Seeded Trees Grown under El-Frafra Oasis Conditions

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Abstract: The present investigation was conducted during two successive seasons (2011 and 2012) to evaluate some physical and chemical fruit properties of chosen ten seeded date palm trees among 150 palms grown under El-Frafra Oasis conditions according to panel test survey. The obtained results cleared that all tested palm trees varied in their fruit physical properties, i.e., retained, fruit bunch weight, palm yield, fruit weight and fruit dimensions. They also varied in their fruit chemical properties, i.e., fruit content of TSS, acidity, total sugars, reducing sugars and non-reducing sugars. Evaluation results showed that tested palms were arranged into three groups according to eating stage and fruit sugar content i.e., 1) Rotab fruits (palms No. 1, 2, 3, 4 and 5), 2) Semi dry fruits, (palms No. 6 and 7), 3) Tamer fruits (palms No. 8, 9, and 10). Sensory analysis revealed that the accumulation scoring for all ten attributes studied was excellent for most of studied palms.

Key words: Palm • Dates • Evaluation • Sensory • Fruit properties

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) has a great economical importance and agricultural uses through human's history. In Egypt, distribution of date palms, covers a large area extended from Aswan to North Delta, beside the Oasis of Siwa, Bahriya, Frafra, Kharga and Dakhla. Numerous number of seeded palms are grown and covers large area of Egypt.

Morphological studies about different date palm cultivars and strains are still meager [1]. The differences between cultivars or strains of date palm may be due to either cytological differences between them or to many genotypes that produced from seeds [2, 3]. Morphological characteristics for leaves and fruits could be used for identification and description of date palm cultivars. The leaf length, leaf base width, spines length and width, pinnae width and percentage of pinnae base distance are considered the most important vegetative characteristics (which represented 28% of the variance between cultivars). Also, length and weight of spathe, length of strand and mean number of flowers on strand represented about 41% from the variances among cultivars. Fruits properties such as fruit weight, length, size, color and contents of TSS, total sugars, tannins and fruit fiber

represented 31% from variances [2-13]. In addition, EL-Kosary [14] concluded that differences of physical and chemical characteristics of date palm fruits are correlated to cultivars and environmental conditions.

MATERIALS AND METHODS

The present investigation was conducted to evaluate physical and chemical fruit properties of ten seeded date palm trees grown in a sandy soil under El-Frafra Oasis district, Egypt during two successive seasons (2011 and 2012). The tested palms were chosen among 150 palm trees grown in different areas of El-Frafra Oasis according to panel test survey. The ten seeded palms were chosen according their fruit quality i.e. fruit shape, fruit size, fruit weight, fruit color, flesh fruit weight and fruit TSS content. The selected palms were divided in to three groups according to their moisture content, as follows: 1) Soft: palms No. (1, 2, 3, 4 and 5), 2) Semi dry: palms No. (6 and 7) and 3) Dry: palms No. (8, 9 and 10).

All seeded date palm were in a good health without any infections. Palms age ranged from 10 to 25 years old, had the same number of spathes and always subject to the same horticultural practices.

The chosen female palms were hand pollinated 4 days after spathe cracking by using the same source of pollen grains. The following date parameters were recorded.

Fruit retained%, bunch weight and palm yield: At time of harvesting, fruit retained percentage was calculated using the following equation:

$$\text{Fruit retained\%} = \frac{\text{Total number of retained fruits per bunch}}{\text{Total scapes number per bunch}} \times 100$$

In addition, bunch weight (kg) and the yield weight (kg/palm) of all bunches on each palm tree was calculated and tabulated during both seasons.

Fruit Physical Properties: Thirty fruits were randomly taken, at harvest time, as a sample for each palm during both seasons of the study. Fruit samples were divided into three groups; each of 10 fruits treated as a replicate to determine the following characteristics:

Fruit Weight: It was calculated by weighing each of 10 fruits as a replicate. The average fruit weight, in grams, was tabulated.

Flesh Weight: It was calculated by weighing each of 10 fruits, as a replicate, after removing seeds. The average fruit weight, in grams, was tabulated.

Seed Weight: It was estimated as the differences between fruit weight and flesh weight and the average seed weight (in grams) was tabulated.

Fruit /Seed Weight Ratio: It was calculated by dividing the average of fruit weight by the average of seed weight and tabulated.

Fruit Dimensions: Fruit length and diameter were measured using individual fruits of each replicate (10 fruits) by using vernier caliper. In addition, the ratio of fruit length (L) to fruit diameter (D) was calculated as L/D ratio for each palm.

Fruit Size: It was calculated by immersing each of 10 fruits (as a replicate) in a known quantity of water in a graduated jar from which the average volume (cm³) of fruits was tabulated.

Fruit Firmness: It was estimated by using pressure tester apparatus (lp/inch²) (drill diameter, 0.3 cm) for the

individual 10 fruits of each replicate per palm in both seasons. The average fruit firmness was tabulated.

Fruit Chemical Properties: Thirty fruits were randomly taken at harvest time as a sample for each palm during both seasons of the study. They were divided into three groups (10 fruits of each). Each group was treated as a replicate to determine the following characteristics:

Total Soluble Solids Percentage (TSS%): It was determined in fruit juice using Carl Zeiss Refractometer as described in A.O.A.C. [15].

Fruit Acidity Percentage: It was determined as the method described in A.O.A.C. [15] and the titratable acidity was calculated as citric acid [16].

Total Soluble Sugars: It was determined according to the method of Smith *et al.* [17] in the methanol extract using the phenol sulfuric acid method; and the concentration was calculated as g/100 g fresh weight.

Reducing Sugars: It was determined in the methanol extract according to the method of Nelson and Somogy [18] as described in A.O.A.C. [15]; and the percentage was calculated as g /100 g fresh weight.

Non-Reducing Sugars: It was determined as the differences between total and reducing sugars.

Sensory Analysis: To evaluate and compare all fruits of 10 date palms under study, a taste panel was conducted using the sensory procedure developed by Ismail *et al.* [19]. Ten adult volunteers with prior experience in sensory testing were underwent for sensory training to evaluate 10 defined quality attributes of fruits using a simple modifying as follows: (poor, satisfactory, good, very good and excellent) that later was transformed to quantities scores according to scoring guide for date fruits established by Ismail *et al.* [13] as shown in Table 2. Three training sessions were carried out at three different times (4 days apart) to anchor points.

Statistical Analysis: The obtained data were subjected to analysis of variance. The mean values were compared using LSD method at 5% level. The data were tabulated and statistically analyzed according to one way analysis method [20]. The percentages were transformed to the arcsine to find the binomial percentages according to Steel & Torrie [21].

Table 1: Quantitative scoring guide for date fruits

Attribute	Poor	Satisfactory	Good	Very good	Excellent
Color	3.4	7.0	10.0	13.5	17.0
Appearance	3.0	6.5	9.0	13.0	15.9
Fruit size	2.9	5.0	8.0	9.6	11.5
Shear force	1.2	2.5	3.7	5.0	6.2
Flesh thickness	1.4	2.8	5.0	6.6	9.0
Mouth feel	1.3	2.5	3.8	5.0	6.3
Chewiness	1.6	3.2	4.7	6.2	7.8
Sweetness	2.7	3.5	8.2	11.0	13.7
Solubility	1.4	2.8	4.2	5.6	7.0
Pit size	1.1	2.2	3.4	4.5	5.6
Total quality score	20	40	60	80	100

Table 2: Shows the fruit retained%, bunch weight (kg) and palm yield (kg) of 10 palm trees grown at El-Frafra Oasis during 2011&2012 seasons

Palm No.	Season 2011			Season 2012		
	Fruit retained%	Bunch weight (kg)	Palm yield (kg)	Fruit retained%	Bunch weight (kg)	Palm yield (kg)
1	55.18	8.580	102.960	46.73	8.030	80.300
2	82.15	8.768	52.608	79.65	7.867	78.670
3	54.00	7.525	105.350	40.61	7.682	92.184
4	65.52	4.218	42.180	58.50	3.425	41.100
5	79.15	9.229	110.748	64.09	6.265	75.180
6	62.16	10.763	86.104	54.63	7.558	75.580
7	52.64	7.586	121.376	53.30	8.263	99.156
8	80.25	5.052	85.884	51.43	5.724	68.688
9	81.78	10.507	84.056	74.82	10.064	100.640
10	66.66	8.317	66.536	67.65	6.315	50.520
LSD at 5% level	3.82	3.03	-----	3.49	3.66	-----

RESULTS AND DISCUSSION

Fruit Retained%, Bunch Weight and Palm Yield:

Table (2) shows the fruit retention, bunch weight and yield per palm during 2011 and 2012 seasons. Regarding fruit retention, results revealed that palms No. 2 and 9 recorded higher fruit retention, while as palms number 1,3 and 7 recorded in both seasons of study lower fruit retained%. Other palms were moderate in fruit retained%, especially in the second season. That it may be due to the balance of bunch number per palm in the second season. Concerning, bunch weight, data indicate that palm tree No. 4 produced the lowest bunch weight (4.218 and 3.425 Kg/palm in the first and second seasons). While as, palm number 9 produced the heaviest bunch in the two seasons comparing with the other palms under study. In this concern, the differences between bunch weights of tested palms were significant. This results due to palm genetic and the Subsequent competition between fruits and nutrition status of palm.

It is clearly noticed that palm No. 7 produced the highest yield (121.376 and 99.156 Kg /palm in the first and second seasons of study.

On the other hand, palm No. 4 recorded the lowest yield that was 42.180 and 41.100 Kg/palm in the first and second seasons of the study. The other tested palms produced moderate yield per palm in the two seasons of the study. This result coincided with Osman [22], 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 [14], in comparison study on Barhee cultivar and two strains of barhee palm seedling, found that Barhee strain number two produced the heaviest bunches (about 10kg) followed by Barhee cultivar (about 9kg) then strain number one (about 8 kg). Under Saudi Arabia condition, in two locations, Omar *et al.* [23] cleared that, yield of fruit per palm and average bunch weight were significantly differed according to region of palm growing and pollen grain source.

Fruit Physical Properties

Fruit, Flesh, Seed Weight and Fruit/seed Weight Ratio: Results in Table (3 and 4) cleared that weights of fruit, flesh and seed as well as fruit/seed weight ratio, significantly differed among all tested palms under study

Table 3: Shows the weights of fruit, flesh, seed (g) and fruit/seed weight ratio of 10 palm trees grown at El-Frafra Oasis during 2011 season

2011 season				
Palm No.	Fruit weight (g)	Flesh weight (g)	Seed weight (g)	Fruit/seed weight ratio
1	14.77	13.19	1.58	9.35
2	7.78	6.52	1.26	6.17
3	12.86	11.72	1.14	11.28
4	4.44	3.10	1.34	3.31
5	5.30	4.38	1.21	4.38
6	9.73	8.41	1.32	7.37
7	6.69	5.25	1.44	4.65
8	6.19	7.53	1.34	4.62
9	7.96	6.61	1.35	5.90
10	10.30	8.88	1.42	7.25
LSD at 5% level	1.11	1.23	0.09	0.61

Table 4: Shows the weights of fruit, flesh, seed (g) and fruit/seed weight ratio of 10 palm trees grown at El-Frafra Oasis during 2012 season

2012 season				
Palm No.	Fruit weight (g)	Flesh weight (g)	Seed weight (g)	Fruit/seed weight ratio
1	14.75	13.18	1.57	9.39
2	7.77	6.51	1.26	6.17
3	12.85	11.7	1.15	11.17
4	4.45	3.12	1.33	3.35
5	5.40	4.19	1.21	4.46
6	9.69	8.39	1.30	7.45
7	6.71	5.26	1.45	4.63
8	6.31	4.97	1.34	4.71
9	7.92	6.57	1.35	5.87
10	10.16	8.74	1.42	7.15
LSD at 5% level	1.70	1.68	0.08	0.63

in two seasons. Whatever, palm No. 1 produced the heaviest fruit weight in the two seasons; whereas, palm No. 4 recorded the lightest fruit weight. Other palms produced fruit weight values between them. Flesh weight properties came in the same trend of fruit weight with significant differences between values in the two seasons of study. Concerning seed weight property, it was significantly differed among tested palms in the two seasons. Whatever, palm number one produced the heaviest seed weight; whereas, palm number three produced the lightest seed weight in the two seasons of study. The rest of tested palms produced seed weight values of their fruits in between the afore mention palms (1 and 3) in the two seasons of study. Regarding to fruit/seed weight ratio it was significantly differed between palms under study in the two seasons. Whatever, palm number 3 produced the highest ratio, in this respect, comparing with other palms under study. These results are in agreement with that found by El-Kosary [14] as fruits obtained from of Barhee strain two had the highest values in the two seasons.

Also, Omar *et al.* [23] indicated that pollen source significantly affected seed weight.

Fruit Dimensions, L/D Ratio, Fruit Size and Firmness (lp/inch²): The presented data in Tables 5 and 6 cleared that fruit length, diameter, L/D ratio were significantly differed among all tested palms under study in the two seasons. Fruit size and fruit firmness also significantly differed in both seasons of study. Palm number one produced the longest fruit length in the two seasons comparing with other palms under study. On the other side, palm number two produced the shortest fruit length comparing with fruits obtained from other palms under study in the two seasons. Regarding fruit diameter, palm number one had the highest value of fruit diameter; whereas, palm number 5 had the lowest value of fruit diameter in the two seasons comparing with other palms under study. Concerning fruit length to fruit diameter ratio (L/D ratio), as shown in Tables 5 and 6, fruits obtained from palm number 3 recoded the lowest ratio of L/D comparing to other palms under study.

Table 5: Shows the dimensions (L&D cm), L/D ratio, fruit size (cm³) and fruit firmness (LP/inch²) of 10 palm trees grown at El- Frafra Oasis during 2011 season

2011 season					
Palm No.	Fruit length (cm)	Fruit diameter (cm)	L/D ratio	Fruit size (cm ³)	Fruit firmness (lp/inch ²)
1	3.32	1.60	2.08	13.00	14.6
2	1.92	0.90	2.14	6.00	16.2
3	2.20	1.38	1.60	14.00	14.75
4	1.60	0.72	2.23	2.00	16.5
5	2.60	0.48	5.42	4.00	10.0
6	2.92	1.32	2.22	9.00	59.2
7	2.74	0.94	2.92	7.00	69.2
8	2.36	1.06	2.23	6.00	102.2
9	2.36	1.02	2.32	7.40	104.4
10	2.90	1.22	2.38	10.40	218.7
LSD at 5% level	0.11	0.22	0.42	2.49	3.45

Table 6: Shows the dimensions (L&D cm), L/D ratio, fruit size (cm³) and fruit firmness (LP/inch²) of 10 palm trees grown at El- Frafra Oasis during 2012 season

2012 season					
Palm No.	Fruit length (cm)	Fruit diameter (cm)	L/D ratio	Fruit size (cm ³)	Fruit firmness (lp/inch ²)
1	3.31	1.6	2.07	12.80	15.2
2	1.90	0.9	2.12	5.80	16.8
3	2.20	1.39	1.59	14.20	14.89
4	1.60	0.73	2.20	2.20	17.2
5	2.70	0.50	5.40	4.00	10.9
6	2.91	1.31	2.23	8.80	63.1
7	2.76	0.96	2.87	7.40	68.0
8	2.36	1.07	2.21	6.40	103.8
9	2.35	1.02	2.31	7.20	110.7
10	2.80	1.20	2.34	10.60	223.2
LSD at 5% level	0.18	0.26	0.22	1.29	3.79

On the other side, palm number 5 produced the highest ratio of L/D comparing with other palms under study. It is quite clear that, the fruits size were significantly differed between all tested palm trees in the two seasons as shown in Tables 5 and 6 palms No. 1 and 3 recorded the highest size of fruits in the two seasons of study. While, palm No. 4 produced the lowest fruit size during both seasons of study comparing with other palm trees.

The presented data clear that fruit firmness was significantly differed according to different palms under study in the two seasons (Tables 5 & 6). Whatever, fruits obtained from palms under study tended to classifies into three groups of date palms. The first one is soft group and the fruit firmness of this group was ranged from 10.0 to 16.8 lp/inch² in the two studied seasons. The second one is semi dry group and the fruit firmness of this group was ranged between 59.2 to 69.2 lp/inch² in the two seasons of study. The third group is dry date palm and the fruit firmness of this group was ranged between 102.2 to 223.2 lp/inch² in the two seasons of the study. Accordingly, all

tested palms during this study were distributed into three groups as mentioned above. Palms numbers 1,2,3,4 and 5 are considered soft date palms with lowest values of fruit firmness. Also, palms numbers 6 and 7 are consider semi dry date palms with moderate values of fruit firmness. Finally, palms numbers 8,9 and 10 are considered dry date palms with highest values of fruit firmness in both seasons of study.

Previously illustrated results in Tables (5, 6) were in agreement with Osman [22] who found that Zaghoul date palm grown in El-Badrasheen, gave the highest fruit size compared with those grown at Kom-Ambo, Aswan. While Samany date palm grown at El-Badrasheen, gave the highest fruit size compared with that grown in Kom-Ambo, Aswan. On the opposite, El-Kosary [14] found that fruit length (L), diameter (D) and L/D ratio did not affect significantly in related to Barhee strains or cultivar.

On the other hand, Salama *et al.* [24] found that, the average of fruit volume was inbetween 10.2cm³ to 14.7cm³ in Hayany fruits. Also, Omar *et al.* [23] studied the effect

Table 7: Shows the fruit TSS (%) and acidity content of 10 palm trees grown at El-FrafraOasis during 2011&2012 seasons

Palm No.	Season 2011		Season 2012	
	TSS%	Acidity%	TSS%	Acidity%
1	14.0	0.3	14.0	0.3
2	27.0	0.3	26.0	0.3
3	14.4	0.2	14.5	0.2
4	15.4	0.2	15.5	0.2
5	24.0	0.2	23.1	0.2
6	8.9	0.3	9.2	0.3
7	15.8	0.2	16.0	0.2
8	10.2	0.2	10.5	0.2
9	10.0	0.2	10.8	0.2
10	10.3	0.3	10.9	0.3
LSD at 5% level	1.40	n.s.	1.91	n.s.

Table 8: Shows the fruit total sugars, reducing and non-reducing sugars (g/100g fresh weight) content of 10 palm trees grown at El-Frafra Oasis during 2011 &2012 seasons.

Palm No.	Season 2011			Season 2012		
	Total sugars%	Reducing sugars%	Non-reducing sugars%	Total sugars%	Reducing sugars%	Non-reducing sugars%
1	55.26	29.89	25.37	55.73	31.98	23.75
2	54.94	31.40	23.54	55.87	30.07	25.80
3	59.13	42.77	16.36	59.16	42.79	16.37
4	62.25	35.07	27.18	63.90	36.10	27.80
5	63.05	34.01	29.04	63.09	34.04	29.05
6	65.45	36.73	28.72	65.47	39.75	25.72
7	67.73	34.88	32.85	67.72	37.87	29.85
8	79.78	26.41	53.37	79.71	26.36	53.35
9	88.51	22.98	65.53	89.80	23.05	66.75
10	84.86	23.79	61.07	84.81	23.76	61.05
LSD at 5% level	3.11	3.28	3.89	3.98	3.29	3.37

of pollen source and area distribution on 'Khalas' date palm, they found that the fruit size was in between 9.19 to 11.49 cm³ in 'Khalas' date palm.

Fruit Chemical Properties

Total Soluble Solids and Fruit Acidity Percentage: Data in Table (7) showed that fruit content of TSS was significantly differed according to tested palms under study in the two seasons. Palm No. 2 recorded the highest TSS values during both seasons of study. On the other hand, palm No.6 had the least values of TSS in the two seasons, comparing with other palms under study. Also, Table 7, cleared that acidity content in all tested palm trees had the same statistical values during the studied seasons. Whatever, fruit acidity content of date palms No.1, 2, 6 and 10 were higher than that in palms number 3,4,5,7,8 and 9 in the two seasons of study.

These results are in agreement with Osman [22], who found that Zaghoul and Samani cultivars grown at Kom-Ambo recorded the highest value of total soluble solids (31.32%), while the lowest TSS was recorded with

those grown in El-Badrashen (26.30%). In the same trend, Badran and El-Shenawy [25] 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. The average acidity content ranged between 0.033% and 0.077% in fruits of six seeded date palm trees comparing with Sewi cultivar which recorded 0.084% fruit acidity regarding to soft seeded palms, fruits of seeded palm No. 9 recorded the highest acidity content (0.075%), whereas, fruits of palm No. 7 had the lowest value (0.037%) [26]. On the other hand, Salama *et al.* [24] 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%.

Total Soluble Sugars: The obtained results which cleared that tested palms were distributed into 3 groups, i.e. soft, semi and dry date as shown in Table (8). Palms number 1,2,3,4 and 5 produced fruits with low content of total

Table 9: Sensory attributes of 10 palm trees fruits grown at El-Frafra Oasis as recorded at harvest during 2012 seasons

Attribute	Tree (1)	Tree (2)	Tree (3)	Tree (4)	Tree (5)	Tree (6)	Tree (7)	Tree (8)	Tree (9)	Tree (10)	LSD at 5%
Color	17.0	17.0	10.0	7.0	10.0	17.0	10.0	13.5	17.0	17.0	2.8
Appearance	15.9	15.9	13.0	6.5	9.0	15.9	15.9	13.0	15.9	15.9	2.3
Fruit size	11.5	8.0	11.5	5.0	9.6	11.5	11.5	9.6	11.5	11.5	1.4
Shear force	6.2	6.2	5.0	2.5	3.7	6.2	6.2	3.7	6.2	6.2	2.1
Flesh thickness	9.0	6.6	9.0	2.8	5.0	9.0	9.0	5.0	9.0	9.0	2.7
Mouth feel	6.3	6.3	3.8	3.8	3.8	6.3	6.3	5.0	6.3	6.3	2.6
Chewiness	7.8	7.8	3.2	4.7	3.2	7.8	6.2	6.2	7.8	6.2	2.2
Sweetness	13.7	13.7	11.0	11.0	13.7	13.7	13.7	11.0	13.7	13.7	1.9
Solubility	7.0	7.0	5.6	4.2	5.6	7.0	7.0	5.6	7.0	7.0	1.8
Pit size	5.6	5.6	4.5	5.6	5.6	5.6	5.6	4.5	5.6	5.6	n.s.
Total score	100	94.1	76.6	53.1	69.2	100	91.4	77.1	100	98.4	-

sugars, which ranged from 54.94 to 63.90% comparing with other palms in the two seasons of study. Also, palms number 6 and 7 produced fruits with moderate values of total sugars content that ranged from 65.45% to 67.73% in the two studied seasons. In addition, palms numbers 8,9 and 10 produced fruits with the highest total sugars content (ranged from 79.71% to 84.81%) comparing with other palms under study in the two seasons.

Reducing Sugars: Previously illustrated results in Table (8) exhibited that reducing sugars content of tested palms fruits was significantly differed affecting by palm strain in the two studied seasons. Palms number 1,2,3,4 and 5 that laying under soft date palm group and numbers 6 and 7 that laying under Semi dry dates produced fruits lower in their reducing sugars content comparing with those laying in dry dates group (palms numbers 8,9 and 10). Whatever, palm number 2 produced the lowest fruit reducing sugars content comparing with palms numbers 1,3,4 and 5 under soft date palm group. On the other hand, palm number 9 produced the lowest values of reducing sugars content (22.98% and 23.05%) comparing with palms numbers 8 and 10 in dry date palm group in the two studied seasons.

Non Reducing Sugars: Concerning, non-reducing sugars (Table 8), it was clearly noticed that palms belonged to dry dates group are dominant in containing the highest values of non-reducing sugars content comparing with soft and semi dry dates palms in the two seasons of study. Whatever, palm number 3 produced the lowest non-reducing sugars content comparing with other palms belonged to soft group of date palm (palms numbers 1, 2, 4 and 5) in the two studied seasons. On the other hand, palm number 9 produced the highest non-reducing sugars content comparing with palms belonged to dry date palm group (palms numbers 8 and 10) in the two studied seasons.

These results are in harmony with those reported by El-Kosary [14] who found that highest fruit total sugars content was recorded with strain two in the two seasons of study comparing with strain one and Barhee cultivar in the two seasons of study. He also added that reducing and non-reducing sugars content was affected significantly by different Barhee sources in the two seasons of study. EL-Kosary [27] found that Zaghoul fruits contained the highest total sugars percentage than Samani fruits in both seasons% (53.23). EL-Wakil and Harhash [28] found that Oshikagbil had the highest significant value of reducing sugar% (49.8), while Ghorm Ghazal (30.2) and Kakwengeb (29.7) had the lowest values with insignificant difference between them. The intermediate values of cultivars, i.e., Siwy, Tagtagt, Ghorm Ghazal and Ferehy showed 39.7, 37.5, 35.4 and 32.4 percent respectively. They also found that dry group, i.e., Ghazal, Ferehy and Kakwengeb had the highest value of non reducing sugar (Sucrose), 26.3,24.6 and 20.7% respectively. While the soft cultivar Tagtagt had the lowest value 2.7%. The semi dry group i.e., Ghorm Ghazal, Siwy and Oshikagbil had intermediate values as follows 20, 10.7 and 2.9%, respectively. The differences between these semi dry means were highly significant.

Sensory Analysis: Taste panel scores, during second season of study, (Table 9) for each sensory attribute had differed significantly in color, appearance, fruit size, shear force, flesh thickness, mouth feel, chewiness, sweetness and solubility between all tested palms under study. Whereas, pit size of fruit sensory attribute did not differ significantly among all palms under study. However, all fruits of palms under study recorded the highest score (excellent in most of attributes illustrated in Table 1 and the obtained results in Table 9). In addition, palms numbers 1,6 and 9 were superior and achieving the excellent 100% in total score. Also palms number 2,7 and 10 achieved more than 90% of total score of sensory and equal score excellent also.

On the other hand, palms number 3,5 and 8 achieved very good score under sensory test. Finally, fruits of palm number 4 only was the lowest in sensory test, which achieved grade (good) during this study.

Sensory analysis revealed that all seeded date palm trees under study were similar in all studied light attributes. Despite of presenting significant differences in most attributes, as mentioned before, nevertheless, the accumulation scoring for all ten studied attributes was excellent for most of studied palms as previously detected by Ismail *et al.*, 2001 & 2008 and EL-Kosary (2009).

CONCLUSION

It is admitted according to the results of the current study that the selected palms are classified into 3 groups, Rotab group including palms No. (1,2,3,4 and 5), Semi dry group including palms No. (6 and 7) and dry group including palms No. (8,9 and 10). Also, the results cleared that palm number one (as a Rotab dates), palm number 6 (as a Semi dry dates) and palm number 9 (as a Tamer dates) are considered promising to be a new strain, which obtained from seeded palms grown under EL-Frafra Oasis conditions.

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