

Fruit Quality and General Evaluation of Zaghloul and Samany Date Palms Cultivars Grown under Conditions of Aswan

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Abstract: This study was carried out during two successive years (2004 and 2005) at Kom-Ambo, Aswan and El-Badrashen, Giza governorate. This study aimed to evaluate fruit physical and chemical characteristics of Zaghloul and Samany date palm cultivars grown in the two previous regions conditions. The results reveal that, Samany date palm cultivar grown at El-Badrashen, Giza gave the highest yield, bunch, fruit and bunch weight, also recorded the highest moisture, acidity content in the fruit compared with the same cultivars grown at Kom-Ambo. On the other hand, the two experimented cultivars grown at Kom-Ambo recorded the highest value of total soluble solids, total and reducing sugars, while they recorded the lowest value of tannins content comparing with those planted under El-Badrashen conditions. Generally, it could be concluded that Zaghloul and Samany date palm cultivars grown at Kom-Ambo, under Aswan conditions gave a good vegetative growth, early yield and high quality of fruits.

Key words: Zaghloul • Samany date palm • Yield • Fruit properties

INTRODUCTION

Date palm (*Phoenix dactylifera L.*) is one of the important fruit species grown in Egypt. Zaghloul and Samany are the best soft type date palm cultivars. Date palms are distributed in Nile valley, Oases and desert districts. It can grow well under drastic environmental conditions which may be not suitable for many fruit species. Date palm cultivars divided into three main groups according to its fruit moisture content, i.e. soft, semi-dry and dry cultivars [1]. Several investigators studied and evaluated some date palm varieties that were reported by Cook and Furr [2], Ragab *et al.* [3], Khalifa [4], El-Azzouni *et al.* [5], Hussein and Hussein [6], Meligi *et al.* [7], Habib *et al.* [8], Hussein *et al.* [9], Sourial *et al.* [10-12], Moustafa *et al.* [13], Al-Gamdi [14], Hussein *et al.* [15] and Soliman [16].

The main objectives of this investigation are to study and evaluate the fruiting and fruit characteristics of Zaghloul and Samany date palms grown in Aswan and Giza Governorates.

MATERIALS AND METHODS

This study was conducted in two successive seasons 2004 and 2005 on nine female date palm of each

Zaghloul and Samany cultivars, of about 15 years old grown in Kom-Ambo, Aswan and El-Badrashen, Giza Governorates were used as the standard cultivars for comparison.

The experimental palms were healthy, and they were uniform in growth, vigor, height and fruiting capacity in the preceding years. The trees were subjected to the normal cultural practices. Only nine pollinated female spathes of nearly equal size were selected from each palm tree under study were recorded in order to facilitate fruit age calculation in Table 1.

The experimental palms were arranged in a randomized complete block design with three replicates, (three palms for each replicate). The yield of experimental palms was harvested through the second half of July for Zaghloul date palms grown at Kom-Ambo, Aswan and second half of August for Zaghloul grown at El-Badrashen, Giza in both seasons, respectively. On the other side, in the first half of August and the second half of September (Samany date palms grown at Kom-Ambo, Aswan and Samany grown at El-Badrashen, Giza) in both seasons, respectively. To determine the following parameters:

- The average palm yield (kg).
- The average bunch weight (kg).

Table 1: Fruit age (days), time of pollination and harvesting of Zaghoul and Samany date palms grown Aswan and Giza region.

Index	(Cultivar) (Region)	Zaghoul		Samany	
		Aswan	Giza	Aswan	Giza
2004					
Date pollination		15-02	01-04	11-02	07-04
Date harvesting		29-07	30-08	31-07	31-08
Fruit age		164	152	167	151
2005					
Date pollination		14-02	04-04	15-02	10-04
Date harvesting		31-07	31-08	05-08	25-09
Fruit age		175	171	173	172

* Season 2004: harvesting early 33 and 51 days (Zaghoul and Samany, respectively). ** Season 2005: harvesting early 32 and 53 days (Zaghoul and Samany, respectively).

- Fruit physical properties

Sample of five fruits was randomly taken from each bunch on the experimental palms. The fruit weight, flesh weight, seed weight, fruit size and fruit dimensions were determined.

- Fruit chemical properties:

Preparation of sample for chemical analysis: Ten date fruits from each treatment were cut into pieces and seed were omitted. Fifty grams of flesh pieces were mixed with 100-ml. Of distilled water using special electric mixer, then filtered and the filtrate was used for different determinations. Total soluble solids (TSS) percentages were determined using hand refractometer. Moisture content, acidity percentage as malic acid and total, reducing and non-reducing sugars percentages were determined according to A.O.A.C. [17].

All data were subjected to statistical analysis according to the procedure reported by Snedecor and Cochran [18]. Treatments means were compared using the

Duncan Multiple range test at the 5 percent level of probability in both seasons of the experiment.

RESULTS AND DISCUSSION

Data presented in Table 2 show the average yield, weight of bunches and fruit physical properties of Zaghoul and Samany date palm cultivars.

1- Yield (Kg): Data indicated significant differences in yield of Zaghoul date palm cultivars in the second season only, while Samany date palm in both seasons in Kom-Ambo, Aswan and El-Badrasheen, Giza regions. Zaghoul date palm grown in El-Badrasheen, Giza produced the highest fruit yield (155.35 kg) as compared with the same cultivar grown at Kom-Ambo, Aswan (138.69 kg) in the second season only. Concerning Samany date palm grown at El-Badrasheen, Giza, it produced the highest fruit yield (161.55 kg) and (172.89 kg) in the first and second seasons respectively, as compared with the Samany date palm grown at Kom-Ambo, Aswan (140.20 kg) and (151.47 kg) in both studied seasons.

2- Bunch weight (Kg): In both seasons the weight of bunch exhibits similar trend as the fruit yield, Habib *et al.* [8], Hussein *et al.* [9], Hussein *et al.* [15] and Soliman [16] reported that the weight of bunches were affected by cultivar and district.

3- Fruit physical properties.

3-1- Fruit dimensions (cm):

3-1-1- Fruit length (cm): Data indicated that there were significant differences, concernin fruit length between Samany and Zaghoul date palm cultivars grown at Kom-Ambo, Aswan and those grown at El-Badrasheen, Giza in the first and the second seasons, respectively.

Samany date palm grown at El-Badrasheen, Giza gave the highest fruit length (5.75 cm) as compared with the

Table 2: Fruit physical properties of Zaghoul and Samany grown at Aswan and Giza regions through 2004 and 2005 seasons

Season	2004				2005			
	Zaghoul		Samany		Zaghoul		Samany	
Region	Aswan	Giza	Aswan	Giza	Aswan	Giza	Aswan	Giza
Yield (kg)	128.10a	141.57a	140.20b	161.55a	138.69b	155.35a	151.47b	172.89a
Bunch weight (kg)	14.23a	15.73a	15.58b	17.95a	15.41b	17.26a	16.83b	19.21a
Fruit length (cm)	5.29a	5.30a	5.42b	5.75a	5.39b	5.70a	5.50a	5.60a
Fruit diameter (cm)	2.20a	2.15a	2.61b	2.98a	2.31b	2.60a	2.81a	2.90a
Fruit weight (g)	16.89b	22.60a	28.99b	34.71a	15.65b	20.95a	25.87b	31.44a
Flesh weight (g)	14.86b	20.45a	26.70b	31.88a	13.68b	18.81a	23.62b	28.68a
Seed weight (g)	2.03a	2.15a	2.29b	2.83a	1.97a	2.14a	2.25b	2.76a
Fruit size (cm ³)	17.30b	24.00a	31.01b	36.03a	16.20b	21.45a	26.88b	33.14a

same cultivar grown in Kom-Ambo, Aswan (5.42 cm) in the first season. On the other side, Zaghoul date palm grown in El-Badrasheen, Giza gave the highest fruit length (5.70 cm) than that the same cultivar grown at Kom-Ambo, Aswan (5.39 cm) in the second season only. These data are in partial agreement with those reported by Soliman [16], who found that length of fruit was significantly differed in the second season only.

3-1-2- Fruit diameter (cm): Data showed that the fruit diameter recorded similar trend as shown with fruit length. Since Zaghoul date palm grown in El-Badrasheen, Giza gave the highest fruit diameter (2.6 cm), while as Zaghoul date palm grown at Kom-Ambo, Aswan recorded 2.31 cm in the second season only. As for Samany date palm grown at El-Badrasheen, Giza, it gave the highest fruit diameter (2.98 cm) than those grown in Kom-Ambo, Aswan (2.61 cm) in the first season.

These results were in line with those of Selim *et al.* [1], Khalifa [4], Sourial *et al.* [11], Hussein *et al.* [15] and Soliman [16], who worked on various soft date palm cultivars grown under Egyptian conditions.

Samany date palm grown at El-Badrasheen, Giza gave the highest flesh weight (31.88 and 28.68 g) while that grown in Kom-Ambo, Aswan gave 26.70 and 23.62 g in the first and second seasons, respectively.

3-2- Fruit weight (g): Data indicated significant differences in fruit weight of Samany and Zaghoul date palm cultivars grown at Kom-Ambo, Aswan and El-Badrasheen, Giza in both seasons. Zaghoul date palm grown in El-Badrasheen, Giza gave the highest fruit weight, (22.60 and 20.95 g) compared with (16.89 and 15.65 g) for those grown at Kom-Ambo, Aswan in the first and second seasons, respectively. Samany date palm grown at El-Badrasheen, Giza gave the highest fruit weight (34.71 and 31.44 g) comparing with that grown in Kom-Ambo, Aswan (28.99 and 25.87 g) in the first and second seasons, respectively.

The average fruit weight for each cultivar may be a heritable character. Hussein and Hussein [6] reported that the average fruit weight was ranged between (6.11-8.84 g), (12.00-12.30 g) and (8.30-8.60 g) for Sakkoti, Shamia and Dagna cultivars, respectively. Habib *et al.* [8] and Hussein *et al.* [9] found that the average fruit weight differed with cultivars. While, Nour *et al.* [19] found that the average weight of Malakabi, Sakkoti, Gargouda and Balady cultivars were (16.90 and 17.20 g), (6.50 and 7.00 g), (6.60 and 6.40 g) and (6.70 and 6.80 g) in the first and second seasons, respectively. Soliman [16] found that the average weight of Samany cultivar grown in El-Kanater

was (35.58 and 31.21 g) as compared with the same cultivar grown at Kom-Ambo (29.50 and 26.41 g) in the first and second seasons, respectively.

3-3- Flesh weight (g): Concerning flesh weight, the results indicated that there are significant differences in Zaghoul and Samany cultivars grown in the two regions in both seasons. Zaghoul date palm grown at El-Badrasheen, Giza gave the highest flesh weight (20.45 and 18.81 g) compared to (14.86 and 13.68 g) for those grown at Kom-Ambo, Aswan. While Samany cultivar grown at El-Badrasheen, Giza, it gave the highest flesh weight (31.88 and 28.68 g) than those grown at Kom-Ambo, Aswan (26.70 and 23.62 g) in the first and second seasons, respectively. These data are in partial agreement with those reported by Soliman [16], who found that flesh weight of fruit was significantly differed in both seasons.

3-4- Seed weight (g): Regarding the seed weight, the results indicated significant differences in both seasons for Samany cultivar only in the two regions. Samany date palm grown in Kom-Ambo, Aswan gave the lowest seed weight (2.29 and 2.25 g) than the same cultivar grown at El-Badrasheen, Giza in the first and second seasons, respectively.

Sourial *et al.* [11] found that the seed weight ranged between (1.88-2.39 g) for four soft date palm cultivars. While Hussein *et al.* [15] found that the seed weight ranged between (1.18-1.67 g) for five soft date palm cultivars. While, Soliman [16] found that the seed weight ranged between (2.30-2.40 g) for Samany date palm cultivar grown at Kom-Ambo and (2.67-2.89 g) for the same cultivar grown at El-Kanater.

3-5- Fruit size (cm³): Data indicated significant differences in fruit size of Samany and Zaghoul date palm cultivars grown at Kom-Ambo, Aswan and at El-Badrasheen, Giza in the two seasons. Zaghoul date palm grown in El-Badrasheen, Giza gave the highest fruit size (24.00 and 21.45 cm³) compared with (17.30 and 16.20 cm³) for those grown at Kom-Ambo, Aswan. While Samany date palm grown at El-Badrasheen, Giza gave the highest fruit size (36.03 and 33.14 cm³) compared with that grown in Kom-Ambo, Aswan (31.01 and 26.88 cm³) in the first and second seasons, respectively. These results agreed generally with those found by Soliman [16] on Samany date palm cultivar.

4- Fruit chemical properties: Data presented in Table 3 show the moisture percentage, total soluble solids percentage, total acidity percentage, sugars content

Table 3: Fruit chemical properties of Zaghloul and Samany grown at Aswan and Giza regions through 2004 and 2005 seasons

Season	2004				2005			
	Zaghloul		Samany		Zaghloul		Samany	
Region	Aswan	Giza	Aswan	Giza	Aswan	Giza	Aswan	Giza
Moisture content (%)	60.560a	66.170a	67.610b	70.400a	57.310b	62.800a	63.400b	68.700a
Total soluble solids (%)	33.690a	29.980b	29.760a	26.900b	31.320a	30.350a	28.000a	26.300b
Total acidity (%)	0.316b	0.371a	0.418b	0.476a	0.335b	0.390a	0.399b	0.450a
Total sugar (%)	32.120a	28.580b	34.440a	29.650b	33.920a	30.060b	35.210a	33.970a
Reducing sugar (%) (g/100g D.W.)	21.640a	18.110b	22.730a	17.190b	20.920a	17.910b	21.210a	18.570a
Non-reducing sugar (%) (g/100g W.)	10.480a	10.470a	11.710a	12.460a	13.000a	12.150a	14.000a	15.400a
Tannins content (%)	0.440a	0.500b	0.450a	0.520b	0.470a	0.460a	0.490a	0.470a
Crude fiber (g/100g D.W.)	1.350a	1.270a	1.600a	1.540a	1.300a	1.280a	1.510a	1.490a

percentage, tannins percentage and crude fibers of Zaghloul and Samany date palm cultivars.

4-1- Moisture content (%): Significant differences were detected in moisture percentage in the two seasons for Samany, while in the second season only for Zaghloul date palm cultivar. Samany dates grown at El-Badrasheen, Giza gave the highest moisture content than the same cultivar grown in Kom-Ambo, Aswan in the two seasons. While, Zaghloul dates grown in El-Badrasheen, Giza gave the highest moisture percentage as compared with those grown at Kom-Ambo, Aswan in the second season only. These results are in agreement with those obtained by Selim *et al.*[1], Hussein and Hussein [6], Hussein *et al.*[15], Soliman [16] and Nour *et al.* [19].

4-2- Total soluble solids (TSS %): Data showed that the total soluble solids percentage was significantly differed in both cultivars. Samany date palm grown at El-Badrasheen, Giza gave the lowest total soluble solids percentage (26.90 and 26.30%) compared with the same cultivar grown in Kom-Ambo, Aswan (29.76 and 28.00%) in the first and second seasons, respectively. While, Zaghloul date palm grown at Kom-Ambo, Aswan gave the highest total soluble solids percentage (33.69%) as compared with that grown in El-Badrasheen, Giza (29.98%) in the first season only.

Hussein and Hussein [6], Al-Ghamdi [14], Hussein *et al.*[15], Soliman[16] and Nour *et al.* [19], showed significant differences among cultivars in total soluble solids percentage.

4-3- Total acidity (%): Data indicated that the total acidity percentage was significantly differed among Samany and Zaghloul date palm cultivars grown at Kom-Ambo, Aswan and the same cultivars grown at El-Badrasheen, Giza in the two seasons. Zaghloul date

palm grown in El-Badrasheen, Giza gave the higher total acidity % (0.371 and 0.390%) as compared with the same cultivar grown at Kom-Ambo, Aswan (0.316 and 0.335%), while Samany date palm grown at El-Badrasheen, Giza gave the higher total acidity % (0.476 and 0.450%) as compared with Samany date palm grown in Kom-Ambo, Aswan (0.418 and 0.399%) in the first and second seasons, respectively.

Khalifa [4], El-Azzouni *et al.*[5], Sourial *et al.* [12] and Soliman [16] worked on various date cultivars and found that total acidity percentage varied between 0.082-0.207% due to the differences between cultivars and environmental conditions as compared with tested ones.

4-4- Sugars contents:

4-4-1- Total sugars (%): Data indicated that the total sugars percentage was significantly differed among Zaghloul date palm cultivar grown at Kom-Ambo, Aswan and the same cultivar grown at El-Badrasheen, Giza in the two seasons. While, Samany date palm cultivar showed significant differences between Kom-Ambo, Aswan and El-Badrasheen, Giza in the first season only. Zaghloul date palm grown in Kom-Ambo, Aswan gave the highest total sugars percentage (32.12 and 33.92%) as compared with the same date palm grown at El-Badrasheen, Giza (28.58 and 30.06%), in the first and second seasons, respectively.

Regarding Samany date palm cultivar grown at Kom-Ambo, Aswan, it gave the highest total sugars percentage (34.44%) as compared with Samany date palm grown at El-Badrasheen, Giza (29.65%) in the first season only. These results are in partial agreement with those reported by Soliman [16].

4-4-2- Reducing sugars (%): In both seasons the reducing sugars percentage exhibits similar trend as the total sugars percentage.

Table 4: Heat requirement of Zaghloul and Samany date palms grown under Aswan and Giza conditions during 2004 and 2005 seasons

Region		Month								Total
		Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	
First season										
Aswan	Mean daily temperatures	18.70	22.45	28.13	31.74	34.34	34.50	34.10	-	
	Heat requirements	20.15	99.45	253.42	426.00	494.50	506.50	89.90	-	1889.92
Giza	Mean daily temperatures	-	-	21.29	27.33	29.53	31.57	29.22	27.57	
	Heat requirements	-	-	169.21	98.70	337.15	517.65	347.95	189.26	1659.92
Second season										
Aswan	Mean daily temperatures	19.70	25.92	28.34	31.92	31.89	34.45	34.19	-	
	Heat requirements	47.50	140.90	245.40	431.60	493.71	501.85	97.60	-	1958.60
Giza	Mean daily temperatures	-	-	21.10	27.26	28.00	30.44	29.70	28.78	
	Heat requirements	-	-	88.75	277.50	362.10	385.60	343.50	290.11	1747.56

4-4-3- Non-reducing sugars (%): No significant difference was obtained in non-reducing sugars percentage in Samany and Zaghloul date palm cultivars grown at Kom-Ambo, Aswan and the same cultivars grown at El-Badrasheen, Giza in both seasons. On the other side, Samany date palm grown at El-Badrasheen, Giza gave the highest non-reducing sugars percentage (12.46 and 15.40%) as compared with that grown in Kom-Ambo, Aswan (11.71 and 14.00%), while Zaghloul date palm grown in Kom-Ambo, Aswan gave the highest non-reducing sugars percentage (10.48 and 13.00%) as compared with the same cultivar grown at El-Badrasheen, Giza (10.47 and 12.15%) in the first and second seasons, respectively.

Many other studies indicated that the sugars content of fruit in some dry date palm cultivars was determined as dry weight basis. Cook and Furr [2] reported that total sugars ranged between 68.00-85.00% for fifty one cultivars. Selim *et al.*[1] found that sugars percentage ranged between 39.17-56.45%. Hussein and Hussein [6] found that fruit sugars percentage ranged between 55.99-58.89% for fruit of Sakkoty date palm cultivar. While, Soliman [16] found that non-reducing sugars percentage ranged between (19.96-25.40 %) for Samany date palm cultivar.

5- Tannins content (%): Concerning tannins content, results indicated that there are significant differences in Samany and Zaghloul date palm cultivars grown at Kom-Ambo, Aswan and the same cultivars grown at El-Badrasheen, Giza in the first season only. Zaghloul date palm grown in Kom-Ambo, Aswan gave the lowest tannins content (0.44%) as compared with Zaghloul date palm grown at El-Badrasheen, Giza (0.50%). While Samany date palm grown in Kom-Ambo, Aswan gave the lowest tannins content (0.45%) as compared with Samany date palm grown at El-Badrasheen, Giza (0.52%) in the first

season. These values are in agreement with those obtained by Ragab *et al.* [3], Moustafa *et al.* [13] and Bondok [20] on some Egyptian soft date cultivars.

6- Crude fibers content: No significant difference were detected in crude fiber for Samany and Zaghloul date palm cultivars grown at Kom-Ambo, Aswan and the same cultivars grown at El-Badrasheen, Giza in the two seasons. Zaghloul date palm grown in Kom-Ambo, Aswan gave the highest values (1.35 and 1.30 g/100g D.W.) as compared with Zaghloul date palm grown at El-Badrasheen, Giza (1.27 and 1.28 g/100g D.W.). While Samany date palm grown in Kom-Ambo, Aswan gave the highest values (1.60 and 1.51 g/100g D.W.) as compared with Samany date palm grown at El-Badrasheen, Giza (1.54 and 1.49 g/100g D.W.) in the first and second seasons, respectively.

These results agreed generally with those found by Hussein *et al.*[21] worked on "Barhee" dates in Saudi Arabia and indicated that crude fibers content was 2.18% of the dry weight at "Rutab" stage. While, Kamel *et al.*[22] found that crude fibers content of "Hallawy" and "Sayer" fruits at harvest was 1.82 and 1.74%, respectively. Melegy [23] found that the crude fibers content had no remarkable trend in relation to different pollen sources. Soliman [16] found that crude fiber percentage ranged between 1.25-1.31 % for Samany date palm cultivar.

- Heat requirement: Concerning they the heat requirements, were about 1659.92-1747.56 at Giza and 1889.92-1958.60 at Aswan in the two seasons of this study (Table 4). Zaghloul and Samany date palm cultivars can be growing, fruiting and harvesting at Aswan faster than at Giza by about 32-33 days for Zaghloul cultivar and 51-53 days for Samany cultivar in the first and second seasons, respectively (Table 1).

CONCLUSION

In conclusion, Zaghloul and Samany date palm cultivars grown at Kom - Ambo under Aswan conditions gave a good vegetative growth, early yield and high quality of fruits.

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