

# Evaluation of some date palm cultivars grown under toshky conditions

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## ABSTRACT

**This study was carried out during two successive seasons of 2011 and 2012 on some date palm cultivars grown under the conditions of Toshky region. Seven date palm cultivars were evaluated and classified to two groups: dry date palm cultivars (Sakkoty, Bartamoda, Gondela, Malkaby and Balady [Maghal]) and soft date palm cultivars (Barhee and Sökkary). Sakkoty and Bartamoda (dry date palm cultivars) and Barhee (soft date palm cultivar) gave the highest number of leaves per palm/year, while Malakaby (dry date palm cultivar) and Sökkary (soft date palm cultivar) gave the highest number of leaflet per leaf in both seasons. Bartamoda (dry date plm cultivar) and Sökkary (soft date palm cultivar) gave the highest yield, fruit weight and flush weight in the two seasons. Balady [Maghal] (dry date palm cultivar) and Barhee (soft date palm cultivar) showed higher moisture content (%) in both seasons. Bartamoda (dry date palm cultivar) and Sökkary (soft date palm cultivar) gave the highest soluble solids content and total sugars (%) while Gondela (dry date palm cultivar) and Sökkary (soft date palm cultivar) gave the highest reducing sugars (%) in the two seasons. Evaluation study reevaluated that Sakkoty and Bartamoda were the best dry date palm cultivars. Wherever, Sökkary cultivar was the best soft date palm cultivars growing under Toshky conditions.**

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**Key words:** Date palm - Evaluation - Cultivar – Soluble Solids Content.

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## INTRODUCTION

Date palm (*Phoenix dactylifera* L.) is major and most important fruit crop grown in Toshki region, where high temperature and poor soil quality profound. It plays a great socioeconomic important role and is widely used for food and many other commercial purposes.

The most important commercial date palm cultivars (Sakkoty, Bartamoda, Gondela, Malkaby and Balady) cover a great proportion of the Aswan cultivation. In addition, there are few date palm cultivars ( Sökkary and Barhee) showed very good qualities in such location.

Date palm cultivars are of three main types according to its fruit moisture content, i.e. Soft, Semi-dry and dry cultivars (Selim *et al.*, 1968). Date palm trees could grow under unfavorable conditions where many of other fruit species could not grow. Date palm is the most common fruit tree grown in semiarid and arid- regions it plays an important role in the protection of interplant cropping systems and the stabilization of the ecological system (Hasnaoui *et al.* 2011). For this reason date palm is considered one of the suitable trees which could be cultivated in the new reclaimed desert regions. Date palm fruits are one of the most important export fruit crops in Egypt, where they are harvested and marketed at three stages of their development. The three stages are khalal (bistr), rutab and tamar ( Kassem 2012). The chemical composition of dates is variable due to various factors such as cultivar, region, climate, amount of fertilization and type of cultural practices (Al-Rawahi *et al.* 2005).

The differences between cultivars or strains of date palm may be due to either cytological difference between them, or to the more-genotypes that produced from seeds, (Al-Dose *et al.* 2001 and Al-Salih & Al-Sheik Hassain, 1980). Morphological characters for leaves and fruits could be used in identification and description of date palm cultivars. Vegetative growth

parameters represented 28% of variance between date palm cultivars. Also, spathe, length and weight of spathe, length of stand and number of flowers on stand represented 41% from the variance among date palm cultivars. Fruit properties such as fruit weight, length, size, total sugars, SSC, tannins and fibers content represented 31% from variance. (Ismail et al. 2008 and Rizk et al. 2007). Physical and chemical characteristics of date palm fruits depending on up cultivars and environmental conditions (Mohamed et al. 2004).

Moreover, the chemical compositions of 8 date's cultivars from different areas of Upper Egypt were evaluated. Total sugars content ranged from 73.65% to 81.77% for dry cultivars and from 75.10% to 87.27% for semi-dry cultivars. Non reducing sugars (41.85%-46.52 %) were the dominant sugars of dry cultivars, while reducing sugars (71.83%- 79.08%) were present in high amounts in the semi-dry cultivars (Youssef et al 1999).

The aim of this work is to survey and evaluation of date palm cultivars under toshky conditions to know the suitable cultivars to grow and product under these conditions.

## MATERIALS AND METHODS

The present study was carried out during the two successive seasons of 2011 and 2012 on evaluate vegetative growth, physic al and chemical fruit properties of some date palm cultivars grown under the conditions of Toshky, Aswan Governorate, Egypt. These cultivars are classified and nominated according to their moisture content into two groups as follows: a- dry date palm cultivars (Sakkoty, Bartamoda, Gondela, Malkaby and Balady) b- soft date palm cultivars (Sokkary and Barhee).

Each cultivar was represented by 6 palms in three replication. The palms of about ten years old grown on sandy soil. The experimental palms were propagated with tissue culture and irrigated by (650 ppm). The palms were similar in vigor and received the same orchard management. The inflorescences of the trees under this study were manually pollinated by one source of pollen. The yield of Sakkoty, Bartamoda, Gondela, Malkaby and Balady trees (dry date palm cultivars) were harvested through the first half of September, while Sokkary and Barhee (soft date palm cultivars) were harvested through the first of August and the first half of July, respectively during the fruit ripening stage. Three fully grown leaves per tree were examined for leaf length, number of leaflet per leaf, leaf base zone width, spine zone length and trunk diameter.

For fruit properties fifty fruits were randomly taken from each palm. Physical properties of fruits were determined at the peak of the "full color" stage. Average weight of fruit, flesh and seed and fruit dimensions. Chemical properties of fruit juice (ten date fruits from each palm

tree were cut into pieces after omitting seeds. 50 gram portion was blended in 100 ml distilled water using special electric mixer, then filtered and the filtrate was taken for analysis) were determined as outlined by A. O. A. C. (1995) including moisture percentage, sugars (total, reducing and non-reducing sugars) and soluble solids content (SSC) in fruit juice was estimated using a hand refractometer.

All collected data were subjected to statistical analysis according to the procedure reported by Snedecor and Cochran (1980). Treatment means were compared using the Duncan least significant range (Duncan, 1955) at the 5 percent level of significance in both seasons of experimentation.

Date palm fruits obtained from the present study were numerically ranked according to some of the points (units) based on the rank number given to each fruit chemical and physical property. The maximum comprehensive total of points was defined to be a hundred points (Mousa, 1981 and Bakr *et al.*, 1985). The hundred points were distributed as follows: 20 points for the average fruit yield per palm, 20 the average bunch weight, 20 the average fruit weight, 20 the average total sugars, 10 average leaf length and 10 the average fruit flesh weight.

Generally, the fruits of a cultivar that surpass other fruits in a fruit parameter such as average fruit weight will be assigned the maximum points assigned to this parameter. For example, if the cultivar (X) recorded the maximum for fruit weight, it will take 10 points or units, while the fruits of the others will take points relative to this maximum. This can be calculated according to the following equation:

$$\text{Points of cultivar (a)} = (\text{fruit weight of (a)}/\text{fruit weight of (X)}) * 10$$

Thus, fruits of all studied cultivars can be ranked in the same way. This can be followed for the measurements obtained for the physical and chemical properties of studied fruits.

## RESULTS AND DISCUSSION

### I- Vegetative growth parameters:

Data presented in Table (1) show the average number of leaves per palm/year, leaf length, number of leaflet per leaf, leaf base zone width, spine zone length and trunk diameter during 2011 and 2012 seasons.

#### 1- Number of leaves per palm/year:

Results of the two seasons revealed that, in respect to dry date palm cultivars, Sakkoty and Bartmoda cultivars gave the highest number of leaves per palm/year in the two seasons. Regarding to soft date palm cultivars there were no significant differences between Barhee and Sokkary cultivars during 2011 and 2012 seasons.

## 2- Leaf length (m):

It is clear from data in Table (1) that no significant differences between dry date palm cultivars but Gondela and Mlakaby cultivars gave the highest leaf length as compared with other cultivars in the first and second seasons, respectively. Barhee (soft date palm cultivar) gave the highest leaf length as compared with Sökkary cultivar in the first season but no significant differences between them in the second season in this respect.

El-Bakr (1972), Sewy and Karama date palm cultivars lie under the group of short leaf cultivars. Oawshingbeat, Tagtaggt and Ghazal strains lies under the medium leaf cultivars, while the Freahy date palm cultivar lies under long leaf cultivars. Osman (2007) found that leaf length of Sakkoty date palm cultivar ranged between 206 - 216 cm. Rizk and Nahed, (2006) found that the Freahy cultivar the highest significant values regarding leaf length.

## 3- Number of leaflets per leaf:

Data presented in Table (1) indicated that significant differences in number of leaflets per leaf among the studied cultivars. Concerning dry date palm cultivars, Malakaby followed by Gondela cultivars gave the highest number of leaflet per leaf as compared with other dry date palm cultivars in the first and second seasons. Regarding soft date palm cultivars, Sökkary cultivar gave higher number of leaflets per leaf than Barhee cultivar in the two seasons.

In the respect, Abdella (1979) found that number of leaflets per leaf was greatest in Helwa (114-116 leaflets) and Sayer (97 leaflets). Leaflets of Samany, Barhee and Sayer were longer and narrower (53-55 cm in length and 2.3-2.5 cm in width)

## 4- Trunk dia meter (m):

Results in Table (1) indicated that there is no significant difference in trunk diameter among the studied cultivars in both seasons. Malakaby (dry date palm cultivar) gave the highest trunk diameter as compared with other cultivars, while Sökkary (soft date palm cultivar) gave higher trunk diameter than Barhee cultivar in both seasons.

## 5- Leaf base zone width (cm):

Data presented in Table (1) clearly indicated that the leaf base zone width was not significant among the studied cultivars. Malakaby cv. gave the highest width of leaf base zone as compared with other dry date palm cultivars in the first and second seasons. While Barhee (soft date palm cultivar) gave width of leaf base zone higher than Sökkary cultivar in both seasons.

## 6- Spine zone length (m):

Noticeable is that spine zone length was not significant differences between dry date palm cultivars in both seasons. Gondela cultivar gave the highest spine zone length as compared with other cultivars in the two seasons. However, data show that spine zone length significant differences between soft date palm cultivars in the second season only. Barhee cultivar gave higher spine zone length than Sökkary cultivar in the second season, Table (1).

Rizk and Nahed, (2006), found that spine zone length, Ghazal and Karama strains gave the least values. Regarding leaf base zone width, the Freahy cultivar significantly gave the least values, whereas the Oawshingbeat gave the highest significant values.

## II- Yield per palm (kg):

Data presented in Table (2) indicated that no significant differences on yield per palm among the studied cultivars. Regarding dry date palm cultivars, Bartamoda cultivar gave the highest yield as compared with other dry date palm cultivars in both seasons. Sökkary (soft date palm cultivar) gave the highest yield per palm in the first season. While, Barhee (soft date palm cultivar) gave the highest values in the second season.

According to Rizk and Nahed, (2006) found that Sewy cultivar gave the highest yield followed by the strain Ghazal, while the strains Karama and Tagtaggt showed the lowest significant values in both seasons.

## III- Bunch weight (kg):

Concerning the bunch weight, the obtained results indicated that there were significant differences between studied cultivars during the first season only. Bartamoda cultivar gave the highest bunch weight, while, Balady (Maghal) gave the lowest bunch weight as compared with other dry date palm cultivars. In the second season there were no significant differences among all dry date palm cultivars in bunch weight. Regarding soft date palm cultivars there were no significant differences in this respect in both seasons, Table (2).

These results are in agreement with what El-Makhtoune and Abdel-Kader (1990), mentioned in this regard, they stated that the average bunch weight ranged from 4.22 to 34.40 kg according the date palm cultivar.

## III- Fruit physical and chemical properties:

### A- Fruit physical properties:

#### 1- Fruit length (cm):

Concerning the fruit length in table (2) the results indicated that, there were significant differences among

the studied cultivars in both seasons. Gondela (dry date palm cultivar) gave the highest fruit length in the two seasons. However, Balady (Maghal) gave the lower values in fruit length as compared with other dry date palm cultivars in the two seasons of this study. On the other side, there were no significant differences between soft date palm cultivars in both seasons in this respect.

Generally, these results are in harmony with those obtained by Habib et al. (1984), Hussein et al. (1984), Al-Ghamdi (1996) and Hussein et al. (2001), they noticed that highly significant differences in fruit length among cultivars in most of fruit characteristics.

## 2- Fruit diameter (cm):

It is noticed from the results in Table (2) that during two seasons, the fruit diameter exhibits similar trend as the fruit length.

These results agreed generally with those found by Hussein and Hussein (1982) and Nour et al. (1986) on dry varieties under Aswan conditions, while Hussein et al. (2001) on different varieties under conditions of Siwa Oasis.

## 3- Fruit weight (g):

Regarding the fruit weight in Table (2) the results indicated that there were significant differences among the studied cultivars. The higher values were observed with Bartamoda as compared with comparable values obtained from other dry date palm cultivars in both seasons. On the other side, Sökkary (soft date palm cultivar) gave the highest fruit weight as compared with Barhee cultivar in the two seasons.

Rizk et al. (2006) reported that the maximum values of physical characteristics of fruits were found in Siwy cultivar, while the lowest values were found in Freahy cultivar. In this concern, Selim et al. (1968) found variable results dealt with Siwy cultivar.

## 4- Flesh weight (g):

Concerning the flesh weight, the results indicated that it was significant differences among studied date palm cultivars during the two seasons. Bartamoda cultivar gave the highest flesh weight as compared with other dry date palm cultivars in both seasons. On the other hand, Sökkary (soft date palm cultivar) gave the highest flesh weight than Barhee cultivar in the two seasons, Table (2).

## 5- Seed weight (g):

The results in Table (2) indicated that significant differences in seed weight among the studied cultivars in both seasons. Balady (Maghal) gave the lowest weight of seed as compared with other dry date palm cultivars in the two seasons. While seed weight of soft date palm cultivars did not significantly differences in both seasons of this study.

However, Barhee cultivar gave the lowest seed weight as compared with Sökkary cultivar in the two seasons.

Rizk et al. (2006), reported that the highest values of seed weight was found in Siwy cultivar, while the lowest values were found in Freahy cultivar. In this concern, Selim et al. (1968) found variable results dealt with Siwy cultivar.

## 6- Flesh percentage (%):

Data presented in Table (2) indicated that significant differences in flesh percentage among the studied cultivars in the second seasons only. Bartamoda (dry date palm cultivars) gave the highest flesh percentage, while Balady (Maghal) cultivar show the lower values in flesh percentage as compared with other dry date palm cultivars in the second season. On the other hand, no significant differences between the two soft date palm cultivars in this respect during 2011 and 2012 seasons.

## B- Fruit chemical properties:

### 1- Moisture content (%):

Data presented in Table (3) indicated that significant differences in moisture percentage among dry date palm cultivars in the first season only and soft date palm cultivars in the two seasons. Concerning dry date palm cultivars, moisture percentage of fruits ranged from 15 to 19.98%. While soft date palms cultivars, moisture percentage of fruits ranged from 42.73 to 63.67%. Selim et al. (1968), found variable results dealt with Siwy cultivar.

### 2-Soluble solids contents (SSC %):

The results in Table (3) indicated that significant differences in soluble solids content among the studied cultivars. Concerning dry date palm cultivars Bartamoda cultivar gave the highest soluble solids content, while, Balady cultivar (Maghal) gave the lowest soluble solids content as compared with other dry date palm cultivars. On the other side, significant differences were found between soft date palm cultivars. Sökkary cultivar gave higher percentage of soluble solids content than Barhee cultivar in the first and second seasons.

Generally, differences between the all cultivars were significant; these findings are in agreement with those of Selim *et al.*, (1968) who reported that total soluble solids of dry date fruits ranged from 45-60%. While Hussein and Hussein (1982) reported that the total soluble solids of Sökkary fruits ranged between 64.20 and 70.30. Nour *et al.*, (1986) found that total soluble solidsof some dry date palm fruits ranged between 54 and 63.1%. Al-Ghamdi (1996) showed that significant differences among cultivars in total soluble solids. Hussein et al. (2001) who reported that total soluble solids of dry date fruits ranged from 13.7-19.8%,

semi-dry date palm cultivars ranged from 22.67-28.83% and soft date palm cultivars ranged from 41.50-66.10%.

### 3- Total sugars (%):

Data presented in Table (3) indicated that significant differences in total sugars content among the studied dry and cultivars in the two seasons. Bartamoda (dry date palm cultivars) gave the highest total sugars content as compared with other dry date palm cultivars. Concerning soft date palm cultivars, Sökkary cultivar gave the highest total sugars content than Barhee cultivar in the first and second seasons.

Many other studies reported that total sugars content of fruit in some of date palm cultivars on dry weight basis. Hussein and Hussein, (1982) reported that total sugars content of fruit ranged between 55.99 to 58.89% for Sökkary fruit. Hussein et al. (2001) reported that total sugars of fruit ranged between 51.45-56.10%, 53.64-56.50% and 36.30-60.20% of (dry date palm cultivars), (semi-dry date palm cultivars) and (soft date palm cultivars), respectively.

### 4- Reducing sugars (%):

The results in Table (3) indicated that significant differences reducing sugars among the studied cultivars. Fruits of Gondela (dry date palm cultivars) gave the highest reducing sugars content as compared with other dry date palm cultivars in both seasons. However, Sökkary cultivar (soft date palm cultivar) gave reducing sugars content higher than Barhee cultivar in the first and second seasons.

### 5- Non-reducing sugars (%):

Concerning the non-reducing sugars content, the obtained results indicated that there were significant differences among dry date palm cultivars in the first and second seasons and between soft date palm cultivars in the first season only. Fruits of Bartamoda cultivar (dry date palm cultivars) contain the highest non-reducing sugars content as compared with other dry date palm cultivars in both seasons. While fruits of Sökkary cultivar recorded non-reducing sugars higher than Barhee cultivar in the first season only but no significant differences between the two cultivars were found in the second season in this respect.

## V- The final evaluation:

Data in table (4) clearly indicated that Sökkary (soft date palm cultivars) was recorded the highest units in bunch weight and yield, followed by Barhee (soft date palm cultivars), while Gondela (dry date palm cultivars) was recorded the lowest units in this respect. Concerning total sugars percentage, Bartamoda (dry date palm cultivars) recorded the highest units in total sugars percentage, but Barhee (soft date palm cultivars) was recorded the lowest units in this respect. Regarding fruit weight, Bartamoda followed by Gondela (dry date palm cultivars) recorded the

highest units in fruit weight, while Sökkary (dry date palm cultivars), was recorded the lowest units in fruit weight.

On the other side, leaf length, Barhee cultivar was recorded the highest units in leaf length followed by Sökkary (soft date palm cultivars). However, Bartamoda (dry date palm cultivars) followed by Barhee (soft date palm cultivars) was recorded the highest units in flesh percentage. Finally, Sökkary and Barhee (soft date palm cultivars) were the best soft date palm cultivars and the addition of common of all dry date palm cultivars under conditions of Toshky.

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## Tables:

**Table (1):** some vegetative growth parameters of the date palm cultivars studied at Toshky during 2011 and 2012 seasons.

Cultivars	Number of leaves/palm	Leaf length (m)	Number of leaflet/leaf	Trunk diameter (m)	Leaf base zone width(cm)	Spine zone length(m)
<b>The first season</b>						
<b>Dry cultivars:</b>						
Sakkoty	34.67 A	2.92 A	124.3 B	0.9733 A	12.00 A	1.00 A
Bartamoda	33.00 AB	2.98 A	129.0 B	0.9833 A	12.02A	0.97 A
Gondela	30.33 C	3.07 A	130.3 A	0.9600 A	12.33 A	1.10 A
Malakaby	30.67 BC	3.00 A	133.0 A	1.0233 A	12.33 A	1.07 A
Balady	30.61 C	2.97 A	130.1 A	0.9700 A	12.01 A	0.99 A
<b>Soft cultivars:</b>						
Sokkary	90.00 A	4.07 B	214.0 A	1.6500 A	18.00 B	1.30 A
Barhee	90.33 A	4.17 A	194.0 B	1.6000 A	20.00 A	1.50 A
<b>The second season</b>						
<b>Dry cultivars:</b>						
Sakkoty	35.00 A	3.00 A	124.33 C	0.9766 A	11.00 A	1.00 A
Bartamoda	34.00 AB	3.01 A	127.70 BC	0.9733 A	11.67 A	0.98 A
Gondela	31.33 BC	2.99 A	130.00 AB	0.9800 A	11.67 A	1.07 A
Malakaby	30.00 C	3.10 A	133.67 A	1.0300 A	13.00 A	0.95 A
Balady	30.09 C	3.00 A	127.00 BC	0.9700 A	11.69 A	0.97 A
<b>Soft cultivars:</b>						
Sokkary	90.00 A	4.10 A	212.67 A	1.64 A	19.00 A	1.32 B
Barhee	90.33 A	4.13 A	196.00 B	1.59 A	20.00 A	1.52 A

**Table (2):** some fruit physical properties of the date palm cultivars studied at Toshky during 2011 and 2012 seasons.

Cultivars	Yield (kg/palm)	Bunch weight (kg)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Flesh weight (g)	Seed weight (g)	Flesh percentage
<b>The first season</b>								
<b>Dry cultivars:</b>								
Sakkoty	69.03 A	7.7 AB	1.66 C	1.78 C	7.40 C	6.43 C	1.05 B	87.00 A
Bartamoda	78.03 A	8.7 A	2.02 B	2.02 B	11.29 A	10.81 A	1.02 B	95.77 A
Gondela	60.03 A	6.7 B	2.31 A	2.31 A	10.81 A	9.53 B	1.31 A	88.40 A
Malakaby	63.00 A	7.0 AB	2.12 AB	2.12 B	10.06 B	8.59 B	1.31 A	85.30 A
Balady	56.40 A	4.70 C	1.54 D	1.69 D	4.70 D	3.70 D	1.00 B	78.72 A

Cultivars	Yield (kg/palm)	Bunch weight (kg)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Flesh weight (g)	Seed weight (g)	Flesh percentage
<b>Soft cultivars:</b>								
Sokkary	96.00 A	10.3 A	3.80 A	3.13 A	20.10 A	17.81 A	2.12 A	88.67 A
Barhee	92.97 A	10.3 A	3.88 A	2.77 A	15.91 B	14.37 B	1.45 A	90.33 A
<b>The second season</b>								
<b>Dry cultivars:</b>								
Sakkoty	72.00 A	8.0 A	1.73 C	1.73 C	7.42 C	6.19 C	1.15 AB	83.53 B
Bartamoda	78.03 A	8.7 A	1.97 B	1.97 B	11.54 A	10.63 A	0.99 B	93.43 A
Gondela	63.00 A	7.0 A	2.35 A	2.35 A	11.00AB	9.89 AB	1.27 A	88.63 AB
Malakaby	72.00 A	8.0 A	2.04 B	2.04 B	9.63 B	8.53 B	1.36 A	85.87 AB
Balady	64.80 A	5.4 A	1.66 D	1.60 D	4.77 D	3.74 D	1.03 C	78.41 C
<b>Soft cultivars:</b>								
Sokkary	102.7 A	10.67 A	3.77 A	3.17 A	20.50 A	18.11 A	2.39 A	87.53 A
Barhee	110.3 A	10.3 A	3.87 A	3.00 A	15.93 B	14.45 B	1.48 A	89.97 A

**Table (3):** some fruit chemical properties of the date palm cultivars studied at Toshki during 2011 and 2012 seasons.

Cultivars	Moisture content (%)	TSS %	Total sugars (%)	Reducing sugars (%)	Non-reducing sugars (%)
<b>The first season</b>					
<b>Dry cultivars:</b>					
Sakkoty	18.00 A	59.60 C	55.43 C	24.87 B	30.57 B
Bartamoda	15.00 B	62.87 A	59.33 A	24.80 B	34.53 A
Gondela	19.00 A	58.83 C	55.00 C	26.87 A	28.13 C
Malakaby	18.00 A	61.27 B	58.13 B	23.90 C	34.23 A
Balady	19.98 A	53.13 D	50.00 D	23.00 D	27.00 D
<b>Soft cultivars:</b>					
Sokkary	42.33 B	49.40 A	40.80 A	27.50 A	13.30 A
Barhee	63.67 A	44.00 B	30.00 B	20.90 B	9.10 B
<b>The second season</b>					
<b>Dry cultivars:</b>					
Sakkoty	17.77 A	59.27 C	55.47 B	24.83 B	30.63 B
Bartamoda	15.00 A	63.27 A	59.13 A	24.73 B	34.40 A
Gondela	18.77 A	58.93 C	55.10 B	26.27 A	28.83 C
Malakaby	18.33 A	61.00 B	56.57 B	23.83 C	32.73 A
Balady	19.90 A	52.17 D	51.12 C	23.12 D	28.00 C

Cultivars	Moisture content (%)	TSS %	Total sugars (%)	Reducing sugars (%)	Non-reducing sugars (%)
<b>Soft cultivars:</b>					
Sokkary	46.67 B	49.50 A	41.53 A	27.67 A	13.87 A
Barhee	63.67 A	44.43 B	30.60 B	20.83 B	9.77 A

**Table (4) The evaluation units of some date palm cultivars grown under Toshky conditions.**

Characters	Bunch weight (kg)	Palm yield (kg)	Total sugars (%)	Fruit weight (g)	Leaf length (m)	Flush percentage	General evaluation
Units specified	20	20	20	20	10	10	100
<b>Dry cultivars:</b>							
Sakkoty	14.9	14.9	18.6	6.4	7.1	9.0	71.0
Bartamoda	16.5	16.8	19.9	9.9	7.2	10.0	80.3
Gondela	13.0	13.0	18.5	9.4	7.3	9.4	70.6
Malakaby	14.3	14.3	19.3	8.5	7.3	9.0	72.7
Balady	14.0	14.1	16.0	8.3	7.2	9.2	68.8
<b>Soft cultivars:</b>							
Sokkary	20.0	20.0	13.8	17.5	9.8	9.3	90.5
Barhee	19.7	19.7	10.2	13.7	10.0	9.5	82.8

