The Libyan Journal of Agriculture: volume 8, 1979

Sugar contents and physical characters of six leading date cultivars of southern Libya

MOHAMED Y. AL-SHURAFA[1], HUSAIN S. AHMED[1],
SAMIA A. NAGI[1]

ABSTRACT

Six leading date cultivars (Taleese, Taghiat, Tasfert, Adwi, Aspear, and Seloulou) at tamar stage, were collected from Al-Shatie, Sebha, and Ubari districts of southern Libya. Analysis of sugars showed that reducing sugars were the dominant form of sugars in all cultivars. Non-reducing sugars were relatively low or absent. The percentages of total sugars for the different cultivars were, 66.5–75.5 for Adwi, 67.1–74.4 for Taghiat, 63.0–74.7 for Seloulou, 64.0–74.0 for Aspear, 62.5–71.9 for Tasfert, and 62.7–70.2 for Taleese. A general conclusion was drawn that Libyan dates were as good as world leading cultivars in their sugar content. Physical characters of the fruits were also taken into account.

INTRODUCTION

Although date fruits are very important in many districts of Libya, very little work has been done in this field. Vivoli (15) in 1933, and Micheli (13) in 1937 roughly described the physical characters and the total sugars for some date cultivars of southern Libya. Dowson in 1955 (5), and Nixon in 1960 (14) reported some observations on the culture of Libyan dates. Dowson in 1960 (6) outlined a preliminary check list of 393 Libyan date cultivars.

Sugars are the most important component of dates. Moreover, the texture or degree of firmness is generally related to the proportions of reducing and non-reducing sugars present in data fruits. Soft date contain little or no non-reducing sugars; while dry dates contain considerable amounts. The semi-dry dates are in between (3,7).

In Libya, great attention has been recently given to date palm trees and their productivity. Therefore, studying the physical and chemical characters of the more important date cultivars is considered essential for verietal identification and industrial purposes.

This study was conducted to evaluate the physical characters, total sugars, and the form of sugars present during the tamar stage, in six leading date cultivars; namely, Tasfert, Taghiat, Taleese, Adwi, Aspear, and Seloulou grown in Sebha, Ubari, and El-Shatie districts of southern Libya.

[1] *Department of Horticulture, Faculty of Agriculture, University, of Alfateh Tripoli, S.P.L.A.J.*

MATERIALS AND METHODS

Date fruit samples were collected in October 1978, at tamar stage from three major date growing districts in southern Libya (Sebha, Ubari, and El-Shatie). Cultivars, collected were Taleese, Taghiat, Tasfert, Adwi, Aspear, and Seloulou. Samples were collected from seven orchards in Sebha and Ubari districts. About 3 kg. of each cultivar were collected at random from 3 trees in the orchard, and combined to make a composit sample for the cultivar. Samples of El-Shatie were supplied by farmers participating in the date exhibition held at Sebha in October 1978. But not from the exhibition tables, so the fruits were not sorted by the farmers. Only cell and inferior fruits were thrown away as in Sebha's and Ubari samples. Fifty fruits of the composit sample were taken at random and used to determine the physical characters and sugar content of fruits. Physical characters in concern, were average fruit weight, length, diameter, length/diameter, % flesh, % moisture, and seed weight.

The fruits of each sample were deseeded, dried in a draft oven at 65°C to a constant weight, and ground. Ten grammes of the ground samples were used for sugar analysis. Sugar extraction and non-reducing sugar hydrolysis were carried out according to Dowson (7). The reducing power of reducing and non-reducing sugars, after hydrolysis, was determined by Somogyi micro-copper method (1952 reagent) as cited by Wistler and Walform (16). The non-reducing sugars were taken as the difference between the total reducing power of soluble sugars and reducing sugars.

The extent of variation among cultivars was shown by conventional statistical procedures, using the means and standard deviation.

RESULTS AND DISCUSSION

Sugars

The percentages of reducing, non-reducing, and total sugars are presented in Table 1 and Fig. 1. Reducing sugars were the dominant form of sugar in all date cultivars used in this study, and in some cases were the only form of sugars found. The averages of non-reducing sugars were relatively low in all cultivars. Orchard to orchard variation as shown by the standard deviation was greater for the non-reducing sugars than for the reducing and total sugars. Thus, for a given cultivar, the proportion of non-reducing sugars could be markedly influenced by the growing conditions. In this regard, previous investigations showed that the non-reducing sugars were inverted to reducing sugars during the late stages of fruit development (1, 7, 8). The amount and

TABLE 1 The average percentages of sugars in six leading date cultivars of southern Libya.

Sugars	Cultivars					
	Tasfert	Taghiat	Taleese	Adwi	Aspear	Seloulou
Reducing	66.3±4.4	68.5±6.4	58.9±3.9	69.3±7.7	66.7±7.8	67.3±7.5
Non-reducing	1.0±1.6	2.2±5.0	7.5±5.8	2.7±3.8	2.3±3.0	1.6±2.3
Total	67.2±4.7	70.7±3.7	66.4±3.8	72.0±5.5	69.0±5.0	68.9±5.8

Values in each column represent the mean ± standard deviation.

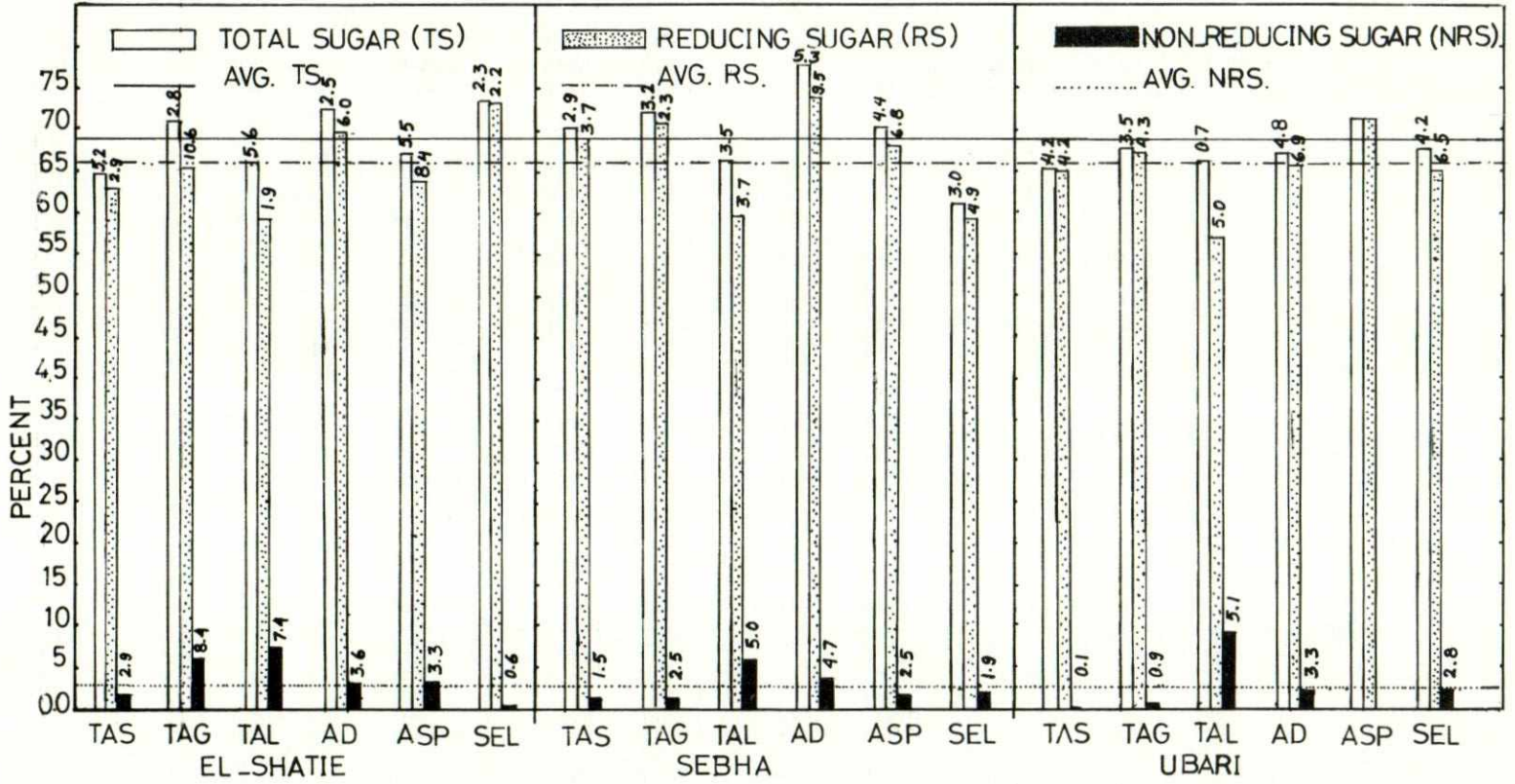

Fig. 1. The sugar content in six leading date cultivars grown in southern Libyan (TAS = Tasfert, TAG = Taghiat, TAL = Taleese, AD = Adwi, ASP = Aspear, SEL = Seloulou).
– Values shown on each column are the standard deviation values as ±.

Table 2 Moisture content and physical characters of six leading date cultivars of southern Libyan districts.

Character	District	Cultivar						Average
		Tasfert	Taghiat	Taleese	Adwi	Aspear	Seloulou	
Fresh weight of one fruit (gr)	Al-Shatie	9.6±0.6	8.2±1.9	9.4±1.2	10.4±3.0	10.3±2.7	12.7±3.2	10.1±1.4
	Sebha	7.2±1.1	8.5±1.0	8.8±1.4	8.7±0.4	9.2±0.9	8.3±1.3	8.5±0.6
	Ubari	7.0±0.8	8.7±1.3	8.7±2.1	7.7±1.5	7.8	9.2±2.4	8.2±0.7
	Average	8.0±1.2	8.5±0.2	9.1±0.3	8.9±1.4	9.1±1.0	10.4±2.4	
Fresh weight of one seed (gr)	El-Shatie	1.2±0.2	1.1±0.1	1.1±0.1	1.1±0.1	1.3±0.1	1.2±0.1	1.2±0.1
	Sebha	1.1±0.2	1.3±0.1	1.0±0.1	1.1±0.1	1.3±0.1	1.2±0.1	1.2±0.1
	Ubari	1.0±0.1	1.1±0.2	1.0±0.1	1.1±0.1	1.2	1.0±0.1	1.1±0.1
	Average	1.1±0.1	1.2±0.1	1.0±0.1	1.1±0.1	1.3±0.1	1.1±0.1	
% Flesh	El-Shatie	87.9±1.0	85.2±2.5	88.5±0.9	88.4±2.7	88.3±1.2	90.5±1.6	88.1±1.2
	Sebha	84.5±1.5	85.1±1.3	87.9±1.9	88.0±0.5	86.3±1.8	85.9±2.2	86.3±1.3
	Ubari	86.3±2.2	87.4±1.1	88.2±2.3	85.2±2.4	85.2	88.8±3.3	86.8±1.4
	Average	86.4±1.4	85.9±1.1	88.2±0.2	87.4±1.2	86.6±1.3	88.4±1.9	
% Moisture	El-Shatie	12.6±1.7	15.0±6.1	17.4±3.0	16.7±4.8	16.5±3.4	16.4±2.1	15.8±1.6
	Sebha	7.6±2.4	18.8±3.0	15.2±2.0	18.6±5.1	14.0±1.7	11.6±1.5	14.3±3.9
	Ubari	9.0±1.1	14.5±3.3	16.6±3.5	15.6±3.6	11.0	13.7±2.4	13.4±2.6
	Average	9.7±2.1	14.8±2.2	16.4±1.0	17.3±0.9	13.9±2.2	13.6±1.6	
Length of Fruit (L) (cm)	El-Shatie	4.1±0.1	3.9±0.2	4.2±0.2	2.8±0.4	3.4±0.2	3.9±0.2	3.7±0.5
	Sebha	3.3±1.3	4.0±0.1	4.2±0.3	3.2±0.4	3.3±0.2	3.3±0.2	3.5±0.4
	Ubari	3.9±0.4	4.0±0.3	4.1±0.6	2.9±0.1	3.2	3.9±0.6	3.6±0.5
	Average	4.0±1.2	4.0±0.1	4.1±0.1	2.9±0.1	2.3±0.1	3.4±0.4	
Diameter of Fruit (D) (cm)	El-Shatie	2.1±0.1	1.9±0.2	1.9±0.1	2.2±0.2	2.3±0.1	2.2±0.1	2.1±0.2
	Sebha	2.0±0.1	1.9±0.1	2.0±0.1	2.1±0.1	2.2±0.1	2.1±0.1	2.1±0.1
	Ubari	2.0±0.1	2.1±0.2	2.0±0.1	2.0±0.1	2.1	2.2±0.2	2.1±0.1
	Average	1.9±0.2	2.0±0.1	1.9±0.1	2.1±0.1	2.2±0.1	2.2±0.1	
Fruit Shape (L/D)	El-Shatie	2.0±0.1	2.1±0.1	2.2±0.1	1.4±0.1	1.5±0.1	1.8±0.1	1.8±0.2
	Sebha	1.9±0.1	2.2±0.1	2.1±0.1	1.4±0.1	1.5±0.1	1.7±0.1	1.8±0.3
	Ubari	1.9±0.2	1.9±0.3	2.0±0.3	1.4±0.1	1.5	1.7±0.2	1.8±0.2
	Average	2.0±0.1	2.0±0.1	2.1±0.1	1.4±0.1	1.5±0.1	1.7±0.1	

Values in each column represent the mean ± standard deviation.

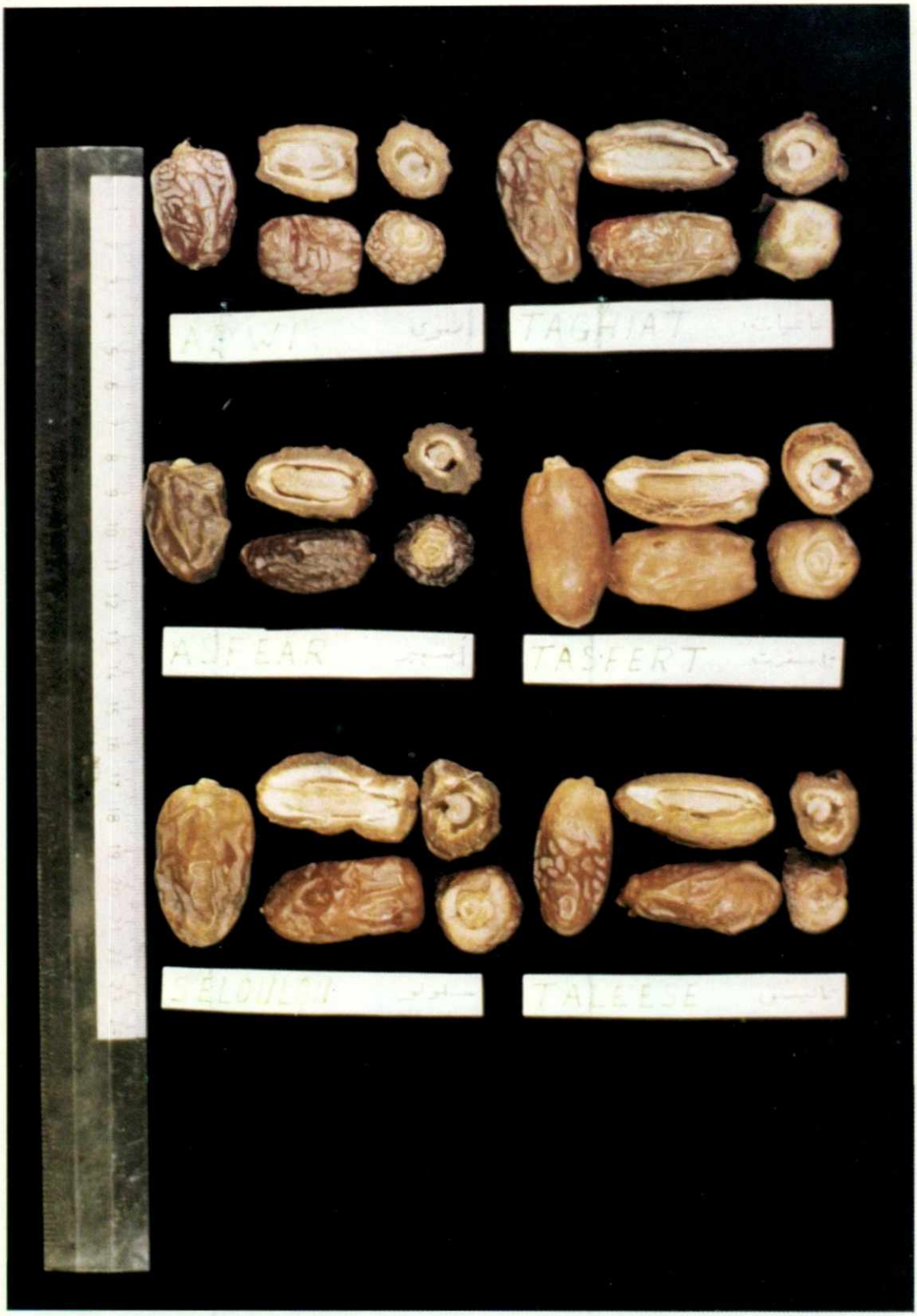

Fig. 2. Some Physical Characters of the Six Cultivars used in the study.

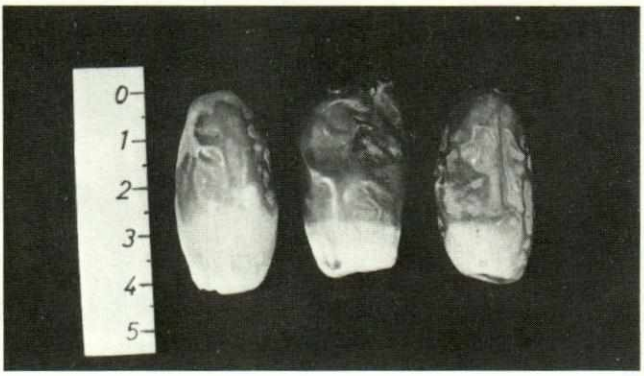

Fig. 3. 'Abu-Khshaim' Phenomenon in the Fruits of Taleese.

rate of inversion were influenced by cultural practices such as irrigation, and climatic factors (3, 7).

As to classification of dates according to the form of sugars (3, 7), date cultivars used in this study could be classified as soft type dates, since the reducing sugars were dominant. The non-reducing sugars were proportionally low in all cultivars, except Taleese. Taleese relatively contained higher amount of non-reducing sugars. This could have been due to a physiological dried base of the fruits generally observed in the fruits of Taleese. This phenomenon is referred to as 'Abu-Khshaim' (7) (Fig. 3). Similar results were reported by Cavell (2) who found that Basra's dates with dry base, contained larger amounts of non-reducting sugars.

It could be concluded that the sugar content of the cultivars used in this study were up to world standards. Sugars content as found ranged from 66.4% for Taleese to 72.0% for Adwi. Sugar content of dates reported for some world leading cultivars ranged between 60% and 88% (3, 4, 7, 8, 9, 10, 17). Early studies on some Libyan dates by Vivoli (15) and Micheli (13) showed lower amounts of sugars for the same cultivars used in this study, or in comparison to results reported on world leading cultivars.

Moisture:

The percent moisture content varied according to cultivars. Tasfert's moisture content was found lower than of other cultivars. However, among these cultivars Adwi was found highest in moisture content. Tasfert contained 9.4% while Adwi contained 17.2% moisture (Table 2). Moisture content as found in this study was in line with reports else where (3, 7, 9, 11, 17).

Physical characters of fruits

Flesh %: No great variations among cultivars were found in the percentages of flesh (Table 2).

Fruit weight: According to fruit weight, cultivars could be arranged descendingly as follows: Seloulou, Aspear, Adwi, Taleese, Taghiat, and Tasfert. District to district variation as shown by the standard deviation was highest for Seloulou, and lowest for Taghiat; Meaning that Taghiat's fruit weight was least and Seloulou's most influenced by the change in growing conditions.

Seed weight: The fresh weight of seeds of the different cultivars was almost the same. Standard deviation values of seed weight were very small for all cultivars (Table 2).

Fruit dimensions: The fruits of Taghiat and Taleese were the greatest in fruit length and in length/diameter. They were generally, ablong in shape. On the other hand, fruits of Aspear and Adwi had small length and length/diameter. They were oval in shape. Tasfert's and Seloulou's fruit shape was in between (Table 2 and Fig. 2).

LITERATURE CITED

1. Anonymous 1976. Physico-chemical changes during different stages of ripening. II-Chemical changes in Zahdi and Sayer cultivars. Iraq's Palms and Dates Res. Cent. Tech. Bull. No. 1/76.
2. Cavell, A. J. 1947. Basra dates: Relationship between ripening and sugar content of twelve varieties. J. Soc. Chem. Ind. Lond. 66:195–198.
3. Cook, J. A., and J. R. Furr. 1952. Sugars in the fruit of soft, semi-dry, and dry commercial date varieties. Ann. Rep. Date Grower's Inst. 29:3–4.
4. Copertini, S. 1977. Analisi di datteri saydi dell'oasi Giolo e Gicherra, Agricoltura colon, 31:422–425. (FOA Agricultural Development Paper No. 72).
5. Dowson, H. W. 1955. Date Growing in Somaliland and Libya. Ann. Rep. Date Grower's Inst. 32:10–13.
6. ——— 1960. Preliminary check list of Libyan date varieties, FOA, Tripoli.
7. ———, and A. Aten. 1962. Dates handling proceesing and packing. FAO Agricultural Development Paper No. 72.
8. El-Shurafa, M. Y. 1978. Studies on the sugars, starch and alcohol insoluble solids content in fruit and pinnae of date palm in Basrah, Libyan J. Agric. VII:89–96.
9. Fattah, M. T. 1927. Chemical studies of dates. Ann. Rep. Date Grower's Inst. 4:10–12.
10. Hussein, F. and A. A. El-Zeid. 1975. Chemical composition of 'Khalas' dates grown in Saudi Arabia, Egypt. J. Hort. Vol. (2):209–214.
11. Pygg, G. L. 1948. Acidity in relation to quality of the date fruit. Ann. Rep. Date Grower's Inst. 25:32.
12. ——— 1954. Quality of dates in some american markets. Ann. Rep. Grower's Inst. 31:20–27.
13. Micheli, A. 1937. Considerazioni sulla cultivazione della palma da datteri nelle oasi di Gialo, Augila, Gicherra e Marada e proposte per un miglioramento della coltura. Instituto Agricolo Coloniale Italiano, Firenze.
14. Nixon, R. W. 1960. Observations on date culture in Libya and Tunisia. Ann. Rep. Date Grower's Inst. 37:22–24.
15. Vivoli, G. 1933. I Datteri Del Fezzan. Instituto Agricolo Coloniale Italiano, Firenze.
16. Wistler, R. L., and M. L., Walform. 1962. Methods in carbohydrates chemistry. Acad. Press, New York. U.S.A.
17. Yousif, A. K., N. D. Benjamin, S. M. Alddin, and S. W. Ali. 1976. Nutritive value of commercial Iraqi date cultivars 1. chemical composition. Tech. Bull. No. 7/76. Palms and Dates Res. Center. Baghdad, Iraq.

مستخلص

المحتوى السكرى والصفات الطبيعية لستة أصناف رئيسية من التمور الليبية

د. محمد يوسف الشرفا ، د. حسين سالم أحمد ، م. سامية أبو ناجى

تم تحليل ستة أصناف رئيسية من تمور (تاليس ، تاغيات ، تاسفرت ، اضوى ، اسبير ، سلولو) سبها ، أوبارى ، والشاطىء وتبين أن السكريات المختزلة كانت هى السائدة في جميع الأصناف . أما السكريات غير المختزلة فكانت نسبيا منخفضة أو معدومة .

وقد كانت النسب المئوية للسكريات الكلية للأصناف المذكورة كما يلى :—

اضوى ٦٦,٥–٧٥,٥ ، تاغيات ٦٧,١–٧٤,٤ ، سلولو ٦٣–٧٤,٧ ، اسبير ٦٤–٧٤ ، تاسفرت ٦٢,٥–٧١,٩ ، تاليس ٦٢,٧–٧٠,٢ .

واستنتج أن التمور الليبية في مستوى جودة التمور العالمية من حيث المحتوى السكرى . هذا وقد اشتمل البحث على دراسة للصفات الطبيعية للأصناف المدروسة .