

A Scale for Assessing the Quality of Date and Date Palm Cultivars

Abdulridha A. Al-Mayah

Department of Ecology, College of Science, University of Basrah, Iraq

*Corresponding author: abdulalwan@yahoo.com

Abstract: In this research, a scale was developed to assess the quality of fruits of date palm cultivars. The scale was based on the evaluation of the fruiting characteristics of the date palm, which included the characteristics of Khalal, which given 10 degrees, Rutab characteristics which given 20 degrees, Tamer characteristics which given 20 degrees, production which given 5 degrees and ripening time which 5 degrees, with a total of 60 degrees for the quality of cultivar. The quality of cultivar was divided into five classes or levels of quality depending on the sum of the degrees of the five fruit characteristics, as follows: 1-14 Low quality, 15-24 Medium (average) quality, 25-34 Good quality, 35-44 Very good quality and 44-60 Excellent quality.

Keywords: Scale, Iraq, Date quality, Date cultivars

Introduction

Sources mention that there are more than 4000 cultivar names of date palms in the World, but in fact, not all of them are real distinct cultivars. Most of them are Duqals with unknown characteristics. Al-Baker (1972) mentioned 627 names of cultivar in Iraq, of that 200 names in Basrah, but most of these names were without description or even without mentioning the place of spread. Out of the total 627 cultivar names, there are 353 names without a description. These are taxonomically rejected names, and out of these 353 names, there are 183 names without mentioning the area of distribution. This is the case for most date producing countries. Ministry of Agriculture (2011) in Saudi Arabia mentioned that there are 263 cultivars, but the actual known varieties are in fact much less than this number. El-Sharabasy & Rizk (2019), in Egypt mentioned that there are 79 cultivars. In Kuwait, Al-Mudaires (2010) mentioned that there are 43 cultivars.

There are no direct studies on this subject, as it is a new research presented for the first time, but there are general studies on date palm cultivars that dealt with the stages of fruit development. There are five stages of development of the date palm fruit: Hababok, Jamri, Khalal, Rutab and date stages (Al-Helfi, 1993). The last three stages are those that are eaten, but the true maturity stage is the Rutab. Dates are classified into soft dates, semi-dry dates and dry dates (Ibrahim, 2013) and the

date palm classified into Khalal palm such as Zaqlol and Chibchab, or Khalal and Rutab palm such as Ashqar or Rutab and Tamer palm such as Barhee (Al-Mayah, 2012). There is a quality of Khalal, a quality of Rutab and a quality of dates, and the quality of cultivar depends on the total quality of these characteristics and other characteristics such as the quality of production and the date ripening (Mater, 1991; Bin-Salih & Ibrahim, 2018). Estimating the quality of the fruits and then the quality of cultivar is a relative thing that varies from person to person according to tastes and from region to region.

Cultivars differ in their quality from one region to another and from one country to another due to their being affected by environmental, soil and climate factors. Ibrahim & Zaid (2019) pointed out the importance of the quality of dates, the types of quality, their specifications and indicators, and how to pack, store and monitor them. However, they did not mention anything or specify a standard for how to assess or determine the quality of each cultivar. It is known that the quality of a certain fruiting characters such as dates, for example, does not mean the quality of the whole cultivar.

In the absence of a special measure to estimate the quality of date palm cultivars and dates in the World, a simple and easy approximate scale that can be used to estimate the quality of date and date palm cultivars, is established here.

Materials and Methods

Several field trips to date palm groves in Basrah were carried out during the fruit ripening season for the years 2019 and 2020. The date cultivars were identified, their names and places of distribution were recorded, and samples of Khalal, Rutab and dates were collected. The quantity of production and the date of maturation were recorded, and the cultivars were photographed. Quantitative and qualitative characters for the fruits were measured. Quantitative characteristics such as fruit size were measured by measuring the length and diameter of the fruit in centimeters, and the production quantity by calculating number of bunches and the weight of the bunch. The qualitative characteristics such as sweetness, bitterness and flavor were achieved by direct taste. As for the ripening time, it was determined by follow-up and direct observation.

Practical taste tests for date fruits were conducted in the Ecology Department, College of Science, University of Basrah, within a special questionnaire format with the names of cultivars hidden. A questionnaire was also conducted via social media, including a sample of 100 individuals for each time.

To confirm the identification of the cultivars, date palm and date, atlases in the World were used, such as Atlas dates varieties in Gulf (Al-Mudaires, 2010), most popular date varieties in the Kingdom of Saudi Arabia (Ministry of Agriculture, 2011), Atlas of date palm in Egypt (El-Sharabasy & Rizk, 2019) and palm cultivation and date production in Sudan (Dawood et al., 2019).

Results

Scale to Assess the Quality of Date and Date Palm Cultivars

This scale is based on the quality of five fruit characteristics of the date palm, which are: The quality of Khalal, the quality of Rutab, the quality of dates, the annual production rate and the date of ripening. Each character is divided into groups of secondary characteristics. Each trait is given a specific degree out of the total of 60 degrees and according to the importance of the trait. The quality of the character was estimated based on the stage of the fruit being eaten and the percentage of its consumption by people.

Rutab and dates are the most used, so each of them was given a third of the degree, and the Khalal is less used so it was given one sixth of the degree and so on. Since each fruiting stage have several characteristics and each character has a range of variation, it has been divided into secondary characteristics with the determination of the upper, lower and middle limits according to taxonomic judgment as follows:

- 1- The quality of Khalal has a maximum of 10 marks: $\frac{1}{6}$ of the total score, and it is divided into:
 - A- The size of Khalal has 4 degrees as follows: Large size (over 4 cm length) 4 degrees, medium size (2.5-4 cm length) 2 degrees, small size (less than 2.5 cm length) 1 degree.
 - B- Khalal sweetness (astringency) has 4 degrees as follows: Very sweet without astringency 4 degrees, low astringency 2 degrees, bitter or astringent 1 degree.
 - C- The brittleness of Khalal has 2 degrees: Brittle 2 degrees, semi brittle or medium 1 degree, coarse 0 degree.
- 2- Rutab quality has a maximum of 20 marks: $\frac{1}{3}$ of the total score, and it is divided into:
 - A- The amount of fiber 5 degrees as follows: Fiber-free 5 degrees, medium, with some fiber, 3 degrees, thick fiber 1 degree.
 - B- The tenderness of Rutab 5 degrees as follows: Fresh or mushy 5 degrees, semi fresh 2 degrees, crusty or coriaceous 0 degrees.
 - C- The palatability of Rutab 5 degrees as follows: Delicious 5 degrees, medium or agreeable 3 degrees, not palatable 1 degree.
 - D- The attractiveness of Rutab 5 degrees: Attractive, 5 degrees, middle 2 degrees, unattractive 1 degree.
- 3- The quality of dates has 20 marks: $\frac{1}{3}$ of the total score, as follows:
 - A- The adhesion of the skin to flesh 4 degrees as follows: Adherent 4 degrees, semi-adherent 3 degrees, distinct skin 2 degrees.
 - B- The softness of dates 4 degrees as follows: Soft 4 degrees, semi dry 3 degrees, dry 1 degree.
 - C- The flavor of dates 4 degrees as follows: Distinct flavor 4 degrees, little flavor 2 degrees, without flavor zero degree.

D- The size of the flesh 4 degrees as follows: Small kernels 4 degrees, big or thick (small seed) 3 degrees, medium (middle seed) 2 degrees, little or thin (large seed) 1 degree.

E- Compressibility 4 degrees as follows: Compressible 4 degrees, middle 2 degrees, unsuitable for pressing 0 degree.

4-The average annual production of an adult date palm has 5 makes: 1/12 as follows: Profuse or very high 5 degrees, average 3 degrees, low 2 degrees.

5- Ripening date has 5 marks: 1/12 as follows: Very early 5 degrees, early 4 degrees, mid-late 2 degrees, late 3 degrees.

Depending on the grades obtained by the variety for all the characteristics, its total quality is determined according to the following qualitative scale: 1-14 low varieties, 15-24 ordinary (medium) varieties, 25-34 good varieties, 35-44 very good varieties, 44-60 excellent varieties.

Depending on the above scale, the finest cultivars can be determined in any country of the World or in the whole World (Table 1-3).

The scale was applied to the Iraqi, Saudi Arabia and World varieties. The results of the ten best cultivars are as in Tables 1-3, and Plates 1-3.

The result of the scale reliability ratio of the questionnaire for best three cultivars are as shown in Figure 1 and the results of the taste test of the varieties are in Figure 2.

Table 1: Top ten date palm cultivars in Iraq.

Cultivar name	Degree of character quality					Degree of cultivar quality	Quality type
	Khalal	Rutab	Tamer	Production	Ripening		
Barhee	8	20	18	5	2	53	excellent
Shwaithi Ahmer	7	16	15	5	2	45	excellent
Mir-Haj	4	16	20	3	2	45	excellent
Hasawi	8	17	13	3	2	43	very good
Qantar	3	11	17	3	2	43	very good
Hiwaiz	3	15	19	3	2	42	very good
Braim	8	11	16	3	4	42	very good
Maktoom	5	16	15	3	2	41	very good
Zubair	6	15	13	3	4	41	very good
Um Al-Dihin	5	14	14	3	2	38	very good

Table 2: Top ten date palm cultivars in Saudi Arabia.

Cultivar name	Degree of character quality					Degree of cultivar quality	Quality type
	Khalal	Rutab	Tamer	Production	Ripening		
Anbara	6	16	17	3	2	44	very good
Safawi	7	15	16	3	2	43	very good
Khalas	5	18	13	3	2	41	very good
Khadhri	5	13	16	3	2	39	very good
Sagae	5	13	15	3	2	38	very good
Sukari	7	12	13	3	3	38	very good
Safrai	7	11	12	3	4	37	very good
Helwa	7	12	12	3	2	36	very good
Nabot Saif	4	12	15	3	2	36	very good
Ajwa	3	10	15	3	4	35	very good

Table 3: Top ten date palm cultivars in the World.

Cultivar name	Degree of character quality					Degree of cultivar quality	Quality type
	Khalal	Rutab	Tamer	Production	Ripening		
Barhee	8	20	18	5	2	53	excellent
Duqlat noor	6	20	16	3	2	47	excellent
Medjhool	5	15	20	2	4	46	excellent
Shwaithi Ahmer	7	16	15	5	2	45	Excellent
Mir-Haj	4	16	20	3	2	45	excellent
Anbara	6	16	17	3	2	44	very good
Safawi	7	15	16	3	2	43	very good
Shaheni	7	15	16	3	2	43	very good
Bayarum	6	13	17	3	4	43	very good
Khalas al-Hassa	5	18	15	3	2	41	very good



Plate 1: Top date palm cultivars in Iraq.



Plate 2: Top date palm cultivars in Iraq.



Plate 3: Top date palm cultivars in Iraq.

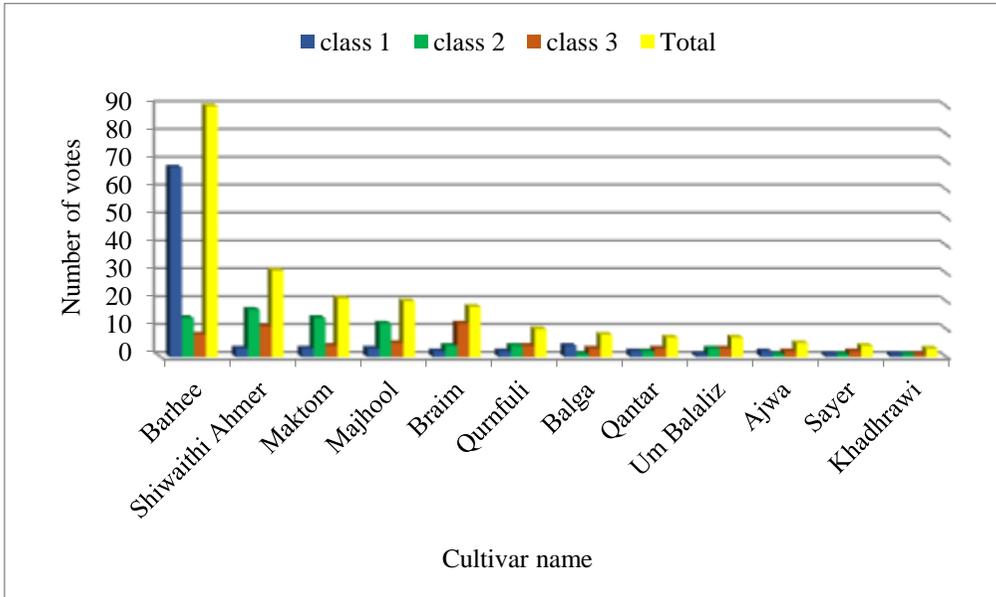


Figure 1: Questioner about top three cultivars of dates.

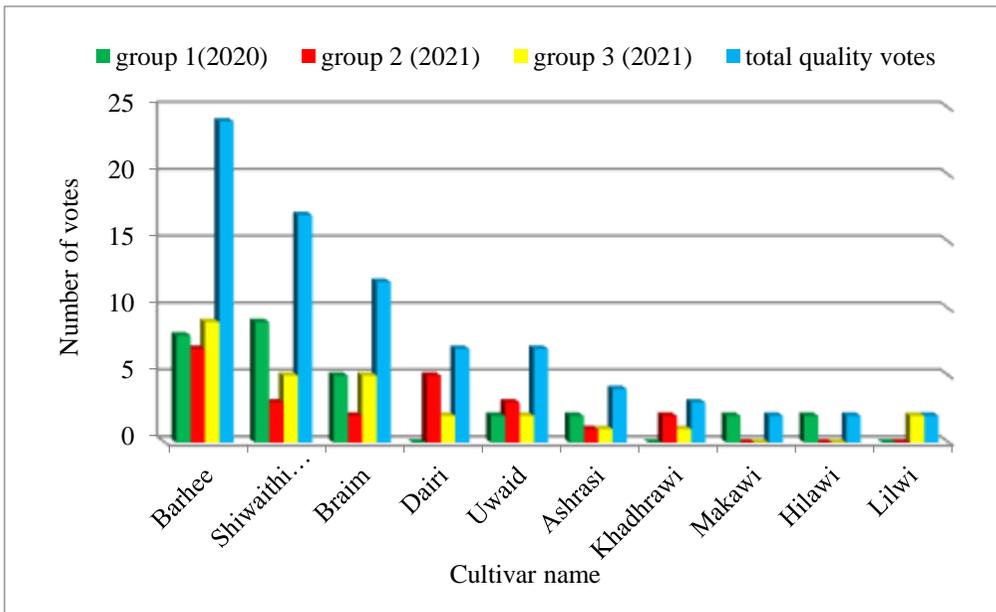


Figure 2: Practical test of the taste of some cultivars of dates.

Discussion

For the purpose of facilitating the evaluation of quality of date and date palm cultivars, there must be a standard or a scale for conducting this assessment.

Depending on field follow up of the date palm cultivars and knowing their distinctive characteristics, it is useful to develop a quantitative measure to assess the quality of the varieties and cultivars. This scale is based on an approximate relative estimate of the quality of the fruit characters.

Through this scale, it is possible to estimate the quality of each character separately, for example, to estimate the quality of Khalal only or the quality of Rutab or dates alone in addition to measuring or estimating the overall quality of the cultivar. For example the quality of the Barhee cultivar or the Medjool or Ajwa cultivar, noting that the quality of a specific trait (for example, the good quality of dates) it may not necessarily mean the good quality of the cultivar and the same case with the quality of Rutab. For example, the excellent quality of Rutab of Ashqar, the Tebarzal, the Khalas or the Qantar, does not mean that these varieties are the finest quality cultivars (Al-Helfi, 1993; Al-Mayah, 2012).

By comparing the results of quality of the cultivars resulting from the application of the scale for the ten best cultivars with the results of the questionnaire and the practical application of fruit tasting, the match rate was 70-90% according to the cultivars. This is a good percentage for assessing the reliability of the scale and its application. When applying this scale to the internationally known cultivar of Barhee, it has obtained a score of 53 out of 60, as in Table 3, which is the highest quality score of all cultivars, with a clear differences from the rest of the cultivars. Thus, Barhee is really the king of all cultivars of dates (Al-Baker, 1972; Mater, 1991).

In general, this scale is approximate and not absolute, and it is affected by the difference in the evaluator's taste or the accuracy of his assessment. Nevertheless, it is a good tool to reach the best relative evaluation of the cultivar that reduces differences in personal, publicity and regional assessments.

References

- Al-Baker, A.J. (1972). The date palm is its past, present and new in its cultivation, manufacture and trade. Al-Ani Press, Baghdad: 1084 pp.
- Al-Helfi, M.A.A. (1993). Morphological and chromosomal studies of some cultivars of date palm *Phoenix dactylifera* L. (Palmae) in Basrah. M. Sc. Thesis, Coll. Sci., Univ. Basrah: 161 pp. (In Arabic).
- Al-Mayah, A.A. (2012). Deterioration of date palms and biodiversity in Iraq: Al-Mukhraq, AlMamaamer and Al-Dora villages, southern Basrah case study. Supreme Commission for Agriculture Initiative, Prime Minister Office, Baghdad: 78 pp. (In Arabic).
- Al-Mudaires, J.M. (2010). Atlas date varieties (*Phoenix dactylifera* L.) in Gulf, 4th edition. Index of Kuwait National Library, Kuwait: 180 pp. + XII.
- Bin-Salih, M. & Ibrahim, A. (2018). Atlas of most important cultivars of date palm in Arab Gulf State. ICARDA, Beirut: 156 pp.
- Dawood, D.H.; Ahmed, F.A. & Zaid, A. (Coordinator). (2019). Date palm cultivation and date production in Republic of Sudan. Khalifa International

- Award for Date Palm and Agricultural Innovation, Abu Dhabi: 344 pp. (In Arabic)
- El-Sharabasy, S.F. & Rizk, R.M. (2019). Atlas of date palm in Egypt. Egypt, FAO, Cairo: 544 pp.
- Ibrahim, A.O. (2013). Date palm cultivation and date production in the Arab world. Jumat Al-Majed Center for Education, Dubai: 514 pp. (In Arabic).
- Ibrahim, A.O. & Zaid, A. (Coordinator). (2019). Date palm cultivation and date quality between environmental factors and programs of service and care. Khalifa International Award for Date Palm and Agricultural Innovation, Abu Dhabi: 432 pp. (In Arabic).
- Mater, A.M. (1991). Palm cultivation and production. Dar Al-Hikmah Press, Univ. Basrah: 420 pp. (In Arabic).
- Ministry of Agriculture (2011). Most popular date varieties in the Kingdom of Saudi Arabia. Hala Printing Press, Riyadh: 237 pp. (In Arabic).