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Use of phenotypic markers to determine the genetic variability of some local and tissue cultured date palm *Phoenix dactylifera* L. cultivars.

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Abstract: This study was conducted during the growing season (2024) in one of the private orchards in Nasiriyah district, the center of Dhi Qar Governorate, at longitude (46.06) and latitude (31.90) on some date palm cultivars produced by tissue culture and their counterparts grown by the offshoots method (the traditional method). The aim of studying the phenotypic description (vegetative, floral and fruit) of the studied cultivars, which are (local Barhi and produced by tissue culture, local Balka and produced by tissue culture, local Sukkari and produced by tissue culture), in addition to the cultivars produced by tissue culture only (Khalas, Saqai and Majhool). Results of the phenotypic indicators (vegetative, floral and fruit) and the total chlorophyll content of the leaves showed that the local Barhi cultivar was superior in the average traits (the length of the leaves, the number of fronds, the number of thorn , the length of the thorn , the length of the thorns area, the length of the fronds area, the width of the leaf base, the diameter of the trunk, the number of spadix, Length of the spadix, the width of the spadix, panicle weight, number of flowers, fruit stalk length, fruit panicle length and fruit diameter), while the Barhi produced by tissue culture cultivar recorded the highest rate for the two traits (percentage of frond area and the length of fruit panicle), the Balka produced by tissue culture cultivar recorded the highest rate for the trait of percentage of frond, The local Balka cultivar recorded the highest rates for the following traits (frond length, thorn length, total chlorophyll, fruit length, and fruit cap height), while the local Sukkari cultivar recorded the highest rates for the traits (frond width, total chlorophyll, and number of spadix), the Khalas produced by tissue culture cultivar recorded the highest rate for the trait (thorn length), the Majhool produced by tissue culture cultivar recorded the highest rates for the following traits (thorn length, thorns area percentage, total chlorophyll, number of spadix, fruit diameter, fruit and seed weights, fleshy layer, and fruit size), while the Saqai produced by tissue culture cultivar recorded the highest rates for e traits (frond length, frond area percentage, number of panicles, fruit diameter, fruit weight, fleshy layer weight, and fruit size). The results of tree cluster analysis of phenotypic traits among studied cultivars showed that cultivars were distributed into two groups, the first group included cultivars (Saqai produced by tissue culture, local Balka, local Sukkari, local Barhi and produced by tissue culture), while the second group included cultivars (Sukkari, Majhool, Balka and Khalas produced by tissue culture). The Sukkari produced by tissue culture cultivar recorded furthest genetic distance of (14.2%), thus it is furthest genetically from the rest of studied cultivar. The percentage of genetic similarity between local Barhi and produced by tissue culture cultivar reached (100%), and between the local Balka and produced by tissue culture cultivars reached (99.9%). The results showed by analysis the main ingredients of variation of the appearance qualities that there are a range of appearance traits (Vegetable, floral and fruity) can be used to distinguish between the different cultivars of dates palm most important (The length of the fruity panicle , number of panicles, fruiting stalk length , panicle weight, number of flowers, spadix width, fruit diameter, number of spadix , leaf base width, spadix length, thorns area length, seed and fruit weights, the weight of the flesh layer, the length of the fronds area, the diameter of the

trunk, number of thorns , the size of the fruit, fruit cap height, number of fronds, fruit length, the ratio of the fronds area, the ratio of the thorns area, the length of the frond and the width of the frond), which represents these traits (85.13%) of the total variation.

Keywords: Date Palm, Vegetative traits, genetic variation, floral traits, fruity traits

I. INTRODUCTION

The date palm *Phoenix dactylifera* L. dates back to the palm family Arecaceae which has about 200 genders and 4,000 species, and known palm 4000 years ago BC in Mesopotamia from which it spread to the Arabian peninsula and is one of the most common fruit trees in the world (Al-Bakr ,1972 ; Hussein and Kader ,2009 and Haider *et al.*,2012).

Palm cultivation in Iraq is confined to the area between Mandali and Tikrit District at a latitude of 35 degrees north to FAO City at a line Display 30 degrees south and its cultivation is widespread in 13 Iraqi governorates: Basra, Missanowaset, Dhi Qar, Muthanna, Qadisiyah, Najaf, Karbala, Babyl, Al-Anbar, Baghdad, Diyala and Salah Al-Din (Ibrahim, 2019). Appearance qualities (vegetable and floral) are of great importance in determining the classification mattresses of the family genus and species, the specification of the shape of the palm head and the leaves of length, width and differences between them in the order of fronds and thorns on the axes of the leaves are considered to be among the most important vegetative traitsto distinguish between palm cultivars (Soliman, 2006 , Alghool and Benismail, 2007).

It is therefore necessary to rely on the exact technical appearance of the various parts of the palm and the fruit to verify and validate the classification Distinguish it from others through the leg (trunk), crown, the appearance of the leaves, length and arrangement, fronds, leaf base, and fruit traits such as color, shape, fruit cap and seed (Al-Ansari and Al-Salih, 2005).

Therefore, this study aims to use morphological and chemical indicators in the appearance characterization (Vegetable, floral and fruity) finding convergence or spacing between studied cultivars, especially those from textile agriculture and the like cultivated through separated shoots From her mothers.

II. MATERIALS AND METHODS

This study was conducted during the growing season (2024) in one of the private orchards in Nassiriyah district, the center of Thi-Qar governorate, On some dates palm cultivars resulting from textile farming and the like cultivated in a offshoots manner (traditional method), These varieties include (Barhi, Balaka, Sukkari, Khalas, Saqai, and Majhool). The trees studied for the Barhi, Balaka, and Sukkari cultivars were produced by tissue culture, as were their counterparts grown by traditional methods. As for the Khalas, Saqai, and Majhool cultivars, the trees studied were produced using tissue culture only, as there were no trees grown using traditional methods. (28) morphological (phenotypic) traits were studied, including (12 traits) for vegetative growth in addition to total chlorophyll, (6 traits for floral growth) and (9 traits for fruit growth). (3 palm) of each cultivar were selected, identical in age, growth strength, size and service operations, to taking measurements on them. The vegetative phenotypic measurements included (leaves length, fronds length and width, thorn length, fronds area length and thorn, trunk diameter, and leaf base width), all of which were measured using a metric measuring tape. Addition the traits (number of fronds and thorns, which were measured by manual counting), the percentage of fronds area and thorns area, and the measurement of total chlorophyll pigment in the leaves according to the method of Goodwin (1976).

Floral appearance recipes include the following experimental measurements (the number of spadix, the length and width of the spadix, the number of chronicles, the weight of the panicle and the number of flowers in the panicle).

Fruity qualities included (length, diameter, weight, size of fruit, weight of the flesh layer, weight of the seed, height of the fruit cap, length of fruit stalk and length of the fruity panicle).

III. STATISTICAL ANALYSIS

The study was designed according to the Completely Randomized Design (CRD). The results were statistically analyzed using analysis of variance for phenotypic traits (vegetative, floral and fruit) using SPSS statistical analysis program to ensure the presence of significant differences between the studied traits. Principal Component Analysis was used to identify the traits that influence variance (Mardia *et al.*, 1979). and then Principal Component Analysis was used to draw relationship between varieties using Cluster Analysis (Anderberg, 1973). The averages were compared using least significant difference L.S.D at the probability level 0.05 (Bashir, 2003).

IV. RESULTS AND DISCUSSION

1- vegetative morphological traits and total chlorophyll content of leaves:

From Table (1), find significant differences between the studied cultivars in the vegetative phenotypic traits, as the local Barhi cultivar significantly outperformed the rest of the cultivars in the traits (length of the leaves , number of fronds , number of thorns, length of the fronds area, length of the thorns area, width of the leaf base and trunk diameter) as it reached (447.87 cm, 209.20 frond, 36.90 thorn, 14.70 cm, 310 cm, 137.87 cm, 20.77 cm and 275.33 cm) respectively.

The local Balka variety significantly outperformed the other cultivars in the following traits (frond length, thorn length, and total chlorophyll content of leaves), reaching (59.47 cm, 16 cm, and 3.113 $mg.g^{-1}$) respectively. The majhool produced by tissue culture cultivar significantly outperformed the other cultivar in the following traits (thorn length, thorn area percentage, and total chlorophyll content of leaves) reaching (15.53 cm, 36.533%, and 3.185 $mg.g^{-1}$) respectively.

The local Sukkari is morally superior to (the width of the frond and the leaves content of chlorophyll) and is 4 cm and 3.310 $mg.g^{-1}$) respectively. It also significantly outperformed the Saqai produced by tissue culture cultivar in the traits (frond length and fronds area ratio) and amounted to (61.30 cm and 70.147%) respectively. Balka produced by tissue culture was higher in the traits (thorn area ratio) and reached 36.477%. The sukkari produced by tissue culture cultivar has significantly outperformed (the width of the frond) and reached (4,100 cm), and the barhi produced by tissue culture cultivar significantly outperformed in (fronds area ratio) reaching (69,990%).

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Table (1) Effect of cultivar on some vegetative traits total chlorophyll content of leaves

Cultivar / Trait	Local Barhi	Tissue Barhi	Tissue Balka	Local Balka	Local Sukkari	Tissue Sukkari	Tissue Khalas	Tissue Majhool	Tissue Saqai	L.S.D= 0.05
Leaves length (cm)	447.87	431.67	275.67	396.20	329.10	299.30	298.90	273.43	399.67	2.728
Frond length (cm)	48.47	51.31	36.90	59.47	37.10	38.80	42.37	50.10	61.30	2.597
Frond width (cm)	3.600	3.733	3.433	2.733	4.000	4.100	3.367	3.500	3.200	0.2934
Fronds number (frond)	209.20	196.43	119.20	172.57	196.77	194.00	128.87	140.57	182.33	3.338
Thorns number (thorn)	36.90	34.00	20.70	28.67	23.00	23.80	23.43	28.43	25.33	2.232
Thorn length (cm)	14.70	12.90	10.43	16.00	11.87	12.00	14.67	15.53	13.63	1.334
Length of thorn area (cm)	137.87	128.90	100.57	128.77	102.20	99.53	97.57	99.90	119.33	3.079
Length of fronds area (cm)	310.00	302.43	174.43	267.43	226.90	199.77	201.33	173.53	280.3	3.239
Percentage of thorns area (%)	30.780	30.003	36.477	32.500	31.053	33.303	32.613	36.533	29.843	0.8231
Percentage of fronds area (%)	69.210	69.990	63.513	67.490	68.937	66.687	67.377	63.457	70.147	0.8231.
Leaf base width (cm)	20.77	19.33	12.80	15.47	13.33	12.10	12.03	12.80	16.03	1.345
Trunk diameter (cm)	275.33	197.33	164.33	211.33	183.33	178.33	180.67	185.67	223.00	4.562
Total chlorophyll ($mg.g^{-1}$)	2.890	3.010	2.950	3.113	3.310	2.917	3.073	3.185	2.940	0.2114

In this study, the studied cultivars differed significantly in most of the studied vegetative traits as mentioned (Ageez and Madboly, 2011) relied on some vegetative traits such as (trunk diameter, frond length, number and length of fronds, and number of thorns) to distinguish between the male date palms and the female cultivar Siwi grown in Egypt. The results of the study showed that the male date palms are characterized by longer fronds than some female cultivar, in addition to the superiority of the males in the number and length of both fronds and thorns.

The results of this study were consistent with what they found (Kalaf *et al*., 2017) during their study of some of the vegetative traits of cultivars (Hillawi, barhi and kasab) if they found morally differences between the studied cultivars, in the perimeter rate of the trunk and the length of the fronds, which underscores the importance of these traits in classification and differentiation between date palm cultivars.

Al-Najjar (2017) also explained that there are moral differences between (30 cultivars) are date palm in some appearance vegetative traits such as (leaves length, width, leaves blade length, fronds length, fronds width and number) which can be used to distinguish between date palm cultivars, and this result is consistent with what we found in this study.

Mabroukah and Al-Atrah (2022) also showed that there is a great diversity and significant differences between the date palm cultivars (Deglet Nour, Ghars, Deglet Beida, Takarmast and Hamraya) grown in the Souf Valley in Algeria in (trunk width, number of frond in leaves, leaves length, frond length and width), and this is consistent with the results of the current study of the cultivar has a significant effect on some vegetative phenotypic traits such as (leaves length, trunk width, number, length and width of fronds), etc.

This is also confirmed by Bahurmuz (2023 a, b) that the cultivars factor has a moral effect on the length and number of fronds, the number of leaves, trunk diameter, the length of leaves, the length and number of thorns, the length of the thorns area and the width of the fronds, during his study of the phenotypic and anatomical traits of three cultivars of date palm (Jazaz, Socotrai and barhi), and studies the comparison of some of the morphological traits of leaves and fruits for three cultivars (jazaz, magraf and maktoumi). These findings are also consistent with the findings of the current study that the cultivars differed morally between them in traits (the length of leaves, the length and width and number of the fronds, the number of thorns, the length of the thorn, the length of the thorns area, and the length of the fronds area, percentage of thorns, leaf base width and trunk diameter).

2- Floral morphological traits :

Table (2) shows that there are moral differences between the cultivars studied in some floral appearance traits, where the local barhi category is morally superior to the rest of the cultivars in the category (Number of spadix, length and width, weight of panicles and number of flowers) reached (13 spadix, 78.33 cm, 13 cm, 8.400 g and 54.03 flowers) respectively, and morally superior to Saqai produced by tissue culture cultivar (The number of panicles) was (103.77 panicles), while the balka produced by tissue culture cultivar was the lowest (38.67 panicles).

Table (2) Effect of cultivar on some floral traits

Cultivar / Trait	Local Barhi	Tissue Barhi	Tissue Balka	Local Balka	Local Sukkari	Tissue Sukkari	Tissue Khalas	Tissue Majhool	Tissue Saqai	L.S.D = 0.05
Spadixs number (spadix)	13	9	6.33	6.33	10	0	5	10	7	3.114
Spadix length (cm)	78.33	51.33	32.67	22.90	34.57	0	29.23	40.57	28.77	2.240
Spadix width (cm)	13	10.67	8.13	9.03	10.77	0	5.23	8.13	7.87	0.988
panicles number (panicle)	98	99.30	38.67	83.77	92	0	48.33	70.30	103.77	4.397
panicle weight (g)	8.400	5.267	3.200	4.400	4.367	0	1.833	4.100	3.300	0.5775
Flowers number (flower)	54.03	43.83	26.03	23.63	32.33	0	17.67	37.93	29.13	2.906

These results confirm that the cultivars are morally different and that the cultivar has a moral effect on some floral traits (Jaradat and Zaid, 2004) have confirmed that floral traits can be used to distinguish different date palm cultivars such as (length, width and weight of the purpose, length and weight of the floral panicle and number of flowers in the single panicles.

The results of this study were consistent with the findings (Abd *et al.*, 2013) during their appearance study of (25 seedling line) of date palm developing in Basra Governorate, which indicated that there are a range of floral appearance traits that can be used to distinguish between varieties such as (the length and weight of the spadix, the length of the floral panicle, and the number of flowers in the panicles), representing about (32.92%) variation between lineage. The results of this study also agreed with (Al-Najjar, 2017) when he studied (38 trait) of floral growth for (30 cultivars) rare of date palms growing in Basra Governorate, as the analysis of the main components showed the presence of a group of floral phenotypic traits that can be used to distinguish different cultivars, the most important of which are (weight, length and width of the spadix, weight panicle, weight and number of flowers, length and width of the flower stalk) which represented (30.697%) of the variance.

Bahurmuz *et al* (2021) also indicated that the cultivar factor has a moral impact on (the number of spadix, the number of flowers and the length of the panicle) When studying they compare some of the natural traits of the flowers and fruits of three cultivars of date palm developing in the Hadhramout Valley and Coast (Jazaz, Socotrai and barhi) This is consistent with the results of this study as well.

The results of this study also agreed with the results of the study (Dashri and Awani, 2021) that dealt with the biological diversity of four varieties of date palms growing in the Guemar, region of

Algeria (Deglet Nour, Deglet Baidha, Ghars and Tikrmust) which confirmed the presence of diversity in the cultivars and significant differences between them in some morphological traits such that these traits are specific to the cultivar and are represented in (length of the panicle and the number of flowers).

3- Fruity morphological traits :

Table (3) shows the presence of significant differences between the studied varieties in some fruit appearance traits, as the saqai and maghool produced by tissue culture cultivars outperformed the rest of the cultivars in the traits (fruit diameter, weight, size, and fleshy layer weight). The highest fruit diameter rates were (2.460 and 2.427) cm respectively, fruit weight (23.18 and 22.69) g respectively, fruit size (20.33 and 20) cm^3 respectively, and fodder layer weight (21.83 and 21.10) g respectively.

The local barhi cultivar was significantly superior in the traits (fruit stalk length and fruit diameter), achieving the highest percentages (205.81 cm and 2.427 cm) respectively, while the barhi produced by tissue culture cultivar was superior in the trait (fruit length) reaching (66.12 cm). The local balka cultivar exceeded the traits (the length of the fruit and the height of the fruit cap) and achieved the highest rates (4.803 cm and 3.533 mm) respectively.

Table (3) Effect of cultivar on some fruity traits

Cultivar / Trait	Local Barhi	Tissue Barhi	Tissue Balka	Local Balka	Local Sukkari	Tissue Sukkari	Tissue Khalas	Tissue Majhool	Tissue Saqai	L.S.D = 0.05
Length fruit stalk (cm)	205.81	186.62	93.94	126.37	128.27	0	65.31	103.61	93.95	3.239
Length fruit panicle (cm)	64.24	66.12	27.45	36.29	39.23	0	31.08	43.98	46.94	2.398
Length fruit (cm)	3.373	3.263	3.827	4.803	3.877	0	3.807	4.290	4.490	0.2582
Diameter fruit (cm)	2.427	2.360	1.847	2.177	2.097	0	1.757	2.427	2.460	0.1458
Weight fruit (g)	17.19	14.11	11.37	14.47	15.41	0	10.81	22.69	23.18	1.456
Weight seed (g)	1.250	1.087	1.027	1.163	1.213	0	0.820	1.590	1.350	0.1485
Fleshy layer (g)	15.94	13.02	10.34	13.30	14.20	0	9.99	21.10	21.83	1.403
Size fruit (cm^3)	12.67	12.50	12.50	15.17	16	0	11.83	20	20.33	1.467
Height fruit cap (mm)	2.433	2.300	3.300	3.533	1.800	0	2.267	2.667	3.167	0.1361

Ibrahim (2008) explained that the use of large and clear differences in fruit traits to distinguish between different varieties of date palms is a model for the key to date cultivars and their diagnosis. Fruit size is a distinctive feature of many cultivars of date palms, although it may be affected by several factors within the cultivar , such as differences in the type of pollen, the amount of fruit thinning, and means of service. However some cultivars are characterized by large fruit size such as (Jabjab, Awidi, and Shuwaithi), Therefore it is possible to separate these these cultivars from cultivars with medium-sized fruits such as (Um al-Dahn, Al-Hillawi, al-Khudrawi, and al-Ashqar) and from small-sized cultivars such as (Khalas, Dakl Musa, and al-Layluwi).

The difference between palm cultivars in fruit weight can be attributed to the genetic traits to which each variety belongs (Matar, 1991). The size of the fruit often corresponds to the weight of the fruit, as stated by Abdul Wahid (2011) to the existence of a strong direct correlation between the weight of the fruit and its size and this is consistent with the results of the current study. The results of the current study are consistent with those of the studies (Abdul-sahib and Abdul-sahib, 2020) which indicate that date palm fruits differ in the physical traits depending on the cultivar and that there are moral differences in the (length and diameter of the fruit, the length and diameter of the seed, the fresh and dry weight of the fruit, flesh and the weight of the seed) for the Barhi and Hillawi cultivars. Abdul Rahman study (2021) showed that the traits of the fruit are one of the most important phenomenon features through which the cultivars can be distinguished, including (the length, diameter, weight, color, appearance of the external crust and length of the seed, width and weight).

Bahurmuz *et al* (2022), which confirmed that the cultivar factor had a clear impact on the length and size of the fruit.

Table (4) shows the principal components analysis of the studied traits and cultivars, the contribution of each of the morphological traits (vegetative, floral, fruit) to the total variance, which was divided into five categories according to the degree of its contribution to the total variance. The traits of the first category contributed (0.609 and 0.951) and the chara of fruiting panicle length recorded the largest contribution (0.951).

They are followed by (number of panicles, length of fruit stalk, weight of panicle, number of flowers, width of the spadix, diameter of the fruit, number of spadixs, width of the leaf base, length of the thorn area, weight of the seed, weight of fruit, length of leaves, weight of the flesh layer, length of the frond area, trunk diameter, number of thorns, size of the fruit and height of the fruit cap) These are important traits in classification and this component represents the highest contribution to the total variance at (54.959%).

Category II qualities contributed 0.627 to 0.791, and the frond count was the largest contribution by 0.791. They were followed by traits (the length of the fruit, the proportion of the fronds area and the ratio of the thorns area), which are traits that can be used to classify and distinguish the varieties, but less than the traits of the first component and the second component contributes by (20.822%) of the variation. While the III traits contributed (0.714) to the frond width and (0.721) to the frond length, which are of little importance for discriminations between cultivars and contributed (9.349%) to the variance, IV contributed only (0.595%) to the total variance of the leafs total chlorophyll content and (6.125%). The V category (thorn length) contributed 0.656% of the total variance and 3.739%. The fourth and fifth categories contributed the least to the total variance and were not important for classification and discrimination between categories.

Through results in the blueprint for cluster analysis between the cultivars for traits studied in figure (1), it appears that the cultivars were distributed in two groups. The first group included cultivars (Al-Saqai produced by tissue culture, local balaka, local sukkari, local Barhi and produced by tissue culture). A cultivar record (Al-Saqai produced by tissue culture and Local balka) recorded a genetic distance of (5.8%) and a genetic similarity of (94.2%). They were followed by two cultivar (local Barhi and produced by tissue culture) with a genetic distance of (8.95%) and a genetic resemblance of (91.05%) , followed by cultivar (Local sukkari) with a genetic distance of 9.9% and a genetic resemblance of (90.1%).The second group included cultivars (sukkari, maghool, balka and khalas produced by tissue culture). The (Balka and khalas produced by tissue culture) cultivars recorded the lowest genetic distance of the group (5.9%), with a genetic similarity rate of (94.1%), followed maghool produced by tissue culture cultivar (6.1%) and genetic similarity (93.9%), while the (Sukkari produced by tissue culture) category had the greatest genetic distance (14.2%) and genetic similarity (85.8%).

It appears that the local Barhi and produced by tissue culture varieties have covered the same genetic distance (8.95%). This indicates that they are a same cultivar and that their genetic similarity is the same (100%) and that they are genetically similar to the other studied cultivars (91.05%). The local Balka and produced by tissue culture also cut a very close genetic distance of (5.9-5.8%) This confirms that their genetic similarity between them is (100%) and their genetic similarity with other studied varieties is (94.1-94.2%). In both groups, local Sukkari and produced by tissue culture recorded the largest genetic distance in both groups (14.2-9.9%) respectively, and a genetic similarity between them (95.97%).

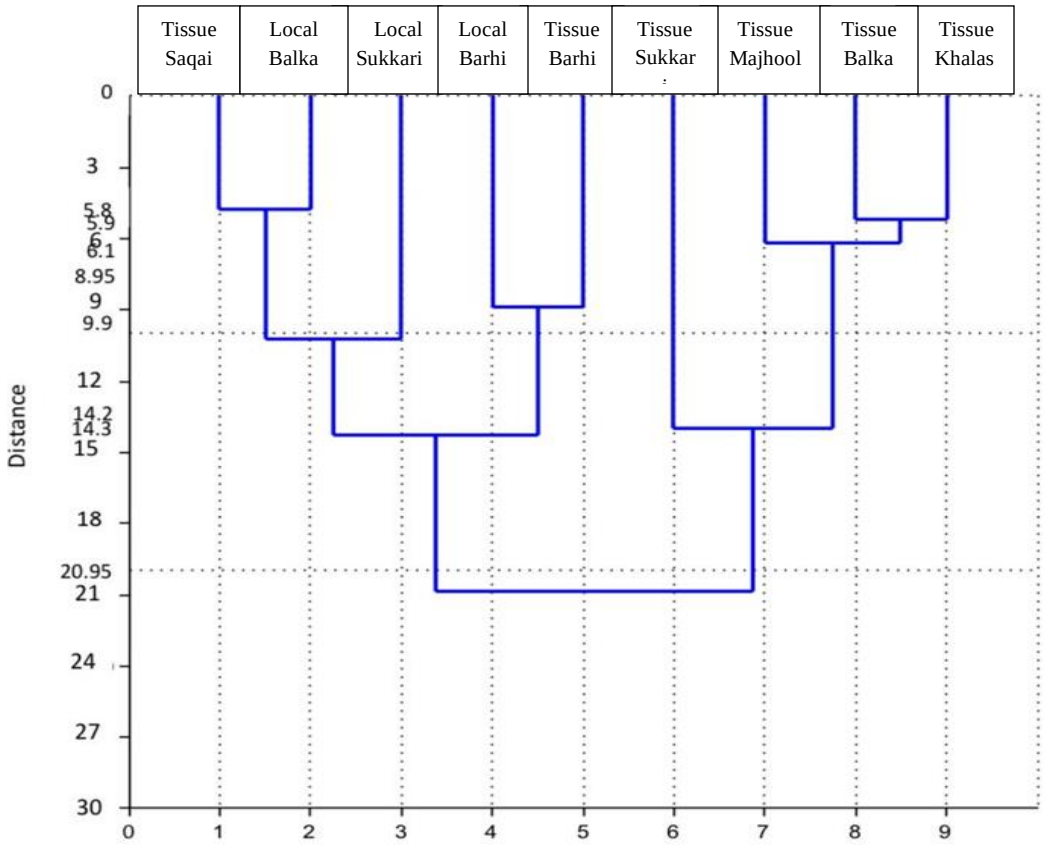
This confirms how strong the morphological (vegetative, floral and fruitful) are as indicators to determine the variation and distinction between the cultivars.

Table (4) Morphological traits that contributed to the most important key ingredients of variation

Component I	Component II	component III	component IV	component V
% 54.959	% 20.822	% 9.349	% 6.125	% 3.739
Morphological traits and proportions of their contribution to total variation				
Contribution ratio for the first category	Contribution ratio percentage for the second category	Contribution ratio percentage for the third category	Contribution ratio percentage for the fourth category	Contribution ratio percentage for the fifth category
0.951 Length fruit panicle	0.791 Number frond	0.721 Length frond	total 0.595 chlorophyll content of leaves	0.656 Length thorn
0.945 panicles number	0.683 Length fruit	0.714 Width frond		
0.912 Length fruit stalk	0.627 Percentage of fronds area			

0.906 panicle weight	0.627 Percentage of thorns area			
0.904 Flowers number				
0.903 Spadix width				
0.892 Fruit width				
0.866 Spadixs number				
0.824 Leaf base wifth				
0.821 Spadix length				
0.797 Length of the thorn area				
0.795 Weight seed				
0.781 Weight fruit				
0.777 Length leaves				
0.777 Weight fleshy layer				
0.759 Length of the fronds area				
0.749 Diameter trunk				
0.745 Number thorns				
0.679 Size fruit				
0.609 Height fruit cap				

Figure (1) Cluster analysis between varieties for studied morphological traits



The results of Abdul (2013) when studying the effect of physical traits of the fruit of (34 cultivars) of date palm indicated the contribution of their traits to the components of total variance and that the cluster analysis of the studied cultivars showed the distribution of cultivars on the axes according to their weight and the percentages of contribution they contain in showing the cultivar and its distribution on the axes. And that the lineage (29) differed significantly with the lineage (20) as well as the lineage (15) with the lineage (2). The cluster analysis also recorded a convergence between the lineages (19, 33, 15) and also recorded a convergence between the lineages (12, 20).

The results of the cluster analysis of Abdul et al. (2013) on the seed palm lineages in Basra Governorate to identify the most important vegetative phenotypic traits that distinguish them through studying (59 traits) of vegetative growth for (34 lineage), indicated the presence of clear differences between the studied lineages, as they fell into two main groups. The analysis of the main components also showed the presence of a group of phenotypic traits of the leaves that can be used to distinguish between the different date palm cultivars, the most important of which are (Leaves length, Leaf base width, and the longest thorn).

The results of the cluster analysis of a study conducted by Al-Najjar (2014) on male date palms growing in central and southern Iraq to identify the most important floral morphological traits that distinguish them through studying (28) floral growth traits of (40) male cultivars showed that there are clear differences between those cultivars as they fall into two main groups. The principal components analysis also showed the presence of a group of morphological traits of the spadix that

can be used to distinguish between different date palm varieties, the most important of which are (the length and weight of the spadix, the length of the panicles and the number of flowers in the panicle), for being part of the first component containing the most important classification traits. That (the length, diameter and size of the fruit is the weight of the pulp and the weight of the fruit) is the most important traits that greatly contribute to the creation of total variation.

The results of this study also agreed with (Al-Najjar, 2017) when he studied (38 traits) for the floral growth of (30 cultivars) rare from the developing date palm in Basra governorate, since analysis of the main ingredients showed that there is a range of floral appearance traits that can be used to distinguish the different cultivars most important (The weight, length and width of spadix , weight, length of panicle , number and weight of flowers, weight, length and width of the floral carrier) represented (30.697%) of the variation.

We conclude from this study that some morphological traits (vegetative, floral, and fruit) can be used as indicators to determine the variation and differentiation of cultivars, in particular those within component I, II and III in the analysis of key ingredients. Statistical methods can also be used to help study variation and homogeneity among cultivars, such as cluster analysis and principal components analysis.

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