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00551 | Research Article

Comparison of Vegetative and Floral Indicators, Yield and Qualitative Characteristics of Barhi and Deglet Barhi Date Palm Cultivars

Hamza Abbas Hamza[1], Mohammed Ghayyib Faris*[2], Khaled Abdullah Sahar[3], Dhia Ahmed Taain[4], Samir Kamel Abdullah[5], Zainab Abd Ali[6]

[1]Department of Horticulture and Landscapes, College of Agriculture, University of Basrah, Iraq. Email: hamzah.hamzah@uobasrah.edu.iq | ORCID: https://orcid.org/0009-0006-0630-2466
[2]Department of Horticulture and Landscape, College of Agriculture, University of Samarra, Iraq. Email: mohammed.g.fa@uosamarra.edu.iq | ORCID: https://orcid.org/0009-0002-5272-9859
[3]Department of Horticulture and Landscape, College of Agriculture, University of Samarra, Iraq. Email: khalid.a.s@uosamarra.edu.iq | ORCID: https://orcid.org/0000-0002-7991-1143
[4]Department of Horticulture and Landscapes, College of Agriculture, University of Basrah, Iraq. Email: dhia.taain@uobasrah.edu.iq | ORCID: https://orcid.org/0000-0002-2318-4389
[5]Department of Horticulture and Landscape, College of Agriculture, University of Samarra, Iraq. Email: samerkamil@yahoo.com | ORCID: https://orcid.org/0009-0007-0207-5275
[6]Department of Food Sciences, College of Agriculture, University of Basrah, Iraq. Email: zainab.abdali@uobasrah.edu.iq | ORCID: https://orcid.org/0000-0002-7792-7985
Corresponding author

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Abstract

Palm trees are economic trees in the world, and the similarity in fruit characteristics may be since they are strains that belong to the same original variety. The current study was conducted during the growing season 2022-2023 on date palm tree cultivars "Barhi and Deglet Barhi", which were grown in one of the orchards in Balad location, north of Baghdad. The trees were subjected to the same agricultural practices and pollinated using pollen grains of the "Ghannami Ahmer" male cultivar. Fruit clusters per palm were adjusted to eight. A factorial experiment was designed using a randomized complete block design (RCBD) with two factors and the results showed that there were significant differences in the vegetative growth and floral indicators between the two cultivars, as Barhi was significantly superior to Deglet Barhi in circumference of trunk, leaf length and width, length of the pinnae zone, length of the spine zone and length and weight of spadix. As for changes in the physical and chemical characteristics of fruits, Deglet Barhi cultivar was superior to Barhi one in the fresh weight of the fruit, the fresh weight of the fruit flesh, the volume of the fruit, and water content of fruits, while the Barhi cultivar was the best in total soluble solids and total and reduced sugars. Regarding the yield and its components, the Barhi cultivar outperformed the Deglet Barhi cultivar in the number of spikes per cluster and the number of fruits per spike, cluster weight, and date palm yield. The current study aims to compare the vegetative and floral indicators, yield, and qualitative characteristics of date palm fruits of Barhi and Deglet Barhi cultivars.

Keywords

Phoenix dactylifera; Number of spikes; Fresh weight; Total soluble solids; Yield

Introduction

The date palm *Phoenix dactylifera* L., of the Arecaceae family, is a subtropical fruit tree, widespread in Iraq and some regions of the Middle East (Barreveld, 1993; Taain, 2013). Date palm is considered one of the most important fruit trees in Iraq due to its great nutritional and economic value. It is a sacred tree mentioned in all heavenly religions, as the evidence available at present indicates that the Sumerians were the first to be interested in cultivating the date palm, and used the fruits as a basic food in the Tigris and Euphrates Valley more than four thousand years BC (Ameer Abeed, Taain and Hamza, 2020; Al-Hamadani and Al Katila, 2021; Taain, Hamzah and Jasim, 2023).

Studies have shown that the natural date palm fruit passes through four stages during growth and development. This includes, first, the "Kimri" stage, in which the fruit is green in color and is characterized by a rapid increase in weight and volume as a result of the process of cell division and elongation. After that, the fruit begins to change in color from green to a distinctive color. In the second stage, "Khalal", which is considered the stage of physiological maturity, the color of the fruit may be yellow, red, pink, or yellow with a reddish tone, depending on the cultivar. The rate of increment in volume and weight decreases significantly until the fruit reaches the maximum volume. Following this, the fruit enters the Rutab or ripening stage, characterized by enzymatic reactions that lead the fruit from a state of hard living tissues to a soft one, with significant moisture losses.

Attaha and Taain (2011) conducted a comparative study on the growth and ripening of fruits in date palm cultivar Shewaithy grown in Basrah and Thi-Qar Regions. The results showed that the fresh weight of the fruit and seed, fruit volume, length, diameter, and sucrose concentration in the fruit reached their highest values in the Khalal stage, except for the fruit diameter of Shuwaithi Dhi Qar, which continued to increase until the Rutab stage and then decreased in the Tamer one. Values of total soluble solids, total and reducing sugars continued to increase and recorded the highest values in the Tamer stage. In an extensive study conducted by Abd, Taain and Al-Thahab (2019) on twelve date palm male cultivars, including 21 vegetative appearance characteristics and 19 floral appearance characteristics, the results showed differences among the male cultivars in the vegetative characteristics of the plant, with the Bender cultivar recording the highest leaf length of 500 cm. Similar trait-based differentiation has been reported in other crops such as wheat, where yield and quality characteristics varied significantly depending on seed rates and agronomic management (Behzad, Omerkhil and Faqiryar, 2021; Konovalov *et al.*, 2024).

Finally, the fruit enters the "Tamer" stage, which is considered the "senescence stage" in which the vital activities of the fruits decrease with a significant loss of moisture (Ameer Abeed, Taain and Hamza, 2020; Ati, 2009). The rare “Deglet Barhi” cultivar, found growing in an orchard in Balad, north of Baghdad, is characterized by moderate sugar content and light skin. It is superior to the “Barhi” cultivar in terms of storage period and is not affected by extreme temperatures. Barhi cultivar is considered one of the sweet Iraqi cultivars because its fruits are free of astringent tannins in the yellow Khalal stage, making them edible at Khalal, Rutab, and Tamer stages (Taain, Al-Najjar and Al-Qatrani, 2021).

The influence of sowing dates, plant density, and nutrient application on plant growth and quality, as observed in crops such as beetroot and cucumber, demonstrates the importance of optimizing environmental and agronomic factors to enhance productivity (Dhital *et al*., 2025; Dhital, Sapkota and Thapa, 2025; Omari, Omerkhil and Sadiq, 2023). Likewise, technological elements such as seed treatment and cultivation practices have been found to significantly influence yield and seed quality in mustard and wheat, which parallels the role of cultivation conditions in date palm performance (Konovalov *et al.*, 2024; Mykolaiko, Lykhochvor and Tkalich, 2025).

The current study, conducted for the first time, aims to compare the vegetative and floral indicators, yield, and qualitative characteristics of date palm fruits of Barhi and Deglet Barhi cultivars. Although phenotypic indicators are affected by environmental factors, they are considered reliable traits for distinguishing between cultivars of the same species.

Materials and Methods

The current study was conducted during the growing season 2022-2023 on date palm tree cultivars. Barhi and Deglet Barhi are grown in one of the orchards in Balad location, north of Baghdad, Iraq. The trees were subjected to the same agricultural practices, as eight, ten-year-old trees were selected for each cultivar, as each palm tree was considered a replicate, spaced 5×5 m apart and grown on a clay soil irrigated by the Tigris River and pollinated using pollen grains of the "Ghannami Ahmer" male cultivar.

The characteristics of the trees were studied from the morphological aspects of the stem, leaves, and flowers, which included 17 vegetative indicators and 19 floral indicators. The phenotypic and flowering indicators were estimated according to Al-Bakr (1972), Abd, Taain and Al-Thahab (2013), and Kalaf, Abd and Humadi (2017).

Table 1: List of morphological characteristics considered in this study

No.	*Vegetative characteristics*	*Floral characteristics*
1.	Leaf length	Number of spadices
2.	Width of leaf	Weight of spadix
3.	Length of the pinnae zone	Length of spadix
4.	Length of the spine zone	Width of spadix
5.	Length of the spine-free zone	Length of pedicel
6.	Circumference of trunk	Length of flower zone
7.	width of leaf base	Number of spikes
8.	Number of spines	Length of first spike
9.	Number of spines on the left	Length of the second spike
10.	Number of spines on the right	Length of the third spike
11.	Length of pinnae at the beginning of the leaf	Number of flowers for the first spike
12.	Length of the pinnae in the middle of the leaf	Number of flowers for the second spike
13.	Length of pinnae at the end of the leaf	Number of flowers for the third spike

No.	*Vegetative characteristics*	*Floral characteristics*
14.	width of the pinnae at the beginning of the leaf	Length of flower zone for first spike
15.	width of the pinnae in the middle of the leaf	Length of the flower zone for the second spike
16.	width of the pinnae at the end of the leaf	Length of the flower zone for the third spike
17.	Number of pinnae	Length of the flower-free zone for the first spike
18.	Number of pinnae	Length of the flower-free zone for the second spike
19.	Number of pinnae	Length of the flower-free zone for the third spike

Fruit samples were taken at the four stages (Kimri, Khalal, Rutab and Tamer) to determine the fresh weight of fruit, pulp, and seed, fruit length, and diameter. Fruit volume is determined by using the water replacement method. The percentage of total soluble solids was estimated using a hand refractometer, and the reading was corrected at 20°C (Taain, 2005). Total and reducing sugars and sucrose were estimated using the Lane Eynon method, and the total titratable acidity was determined according to (A.O.A.C., 2000). After harvesting the fruits of each palm tree separately, they were weighed using a field scale. A factorial experiment was designed using a randomized complete block design (RCBD) with two factors; the mean differences were compared by using the least significant difference (LSD) test at the probability level of 0.05 (Al-Rawi and Khalf Allah, 2000).

Results and Discussion

The results of Table 2 indicate a significant difference in the vegetative growth indicators of the two cultivars, Barhi and Deglet Barhi, as the Barhi cultivar was significantly superior in circumference of trunk, recording 197 cm compared to Deglet Barhi, which gave 145 cm. Thus, the trunk diameter of the Barhi cultivar was equal to 63 cm compared to 46 cm for the Deglet Barhi cultivar. The characteristic of trunk diameter plays a great importance in distinguishing between cultivars, although it is affected by environmental factors and tree agricultural operations (Kalaf, Abd and Humadi, 2017).

As for leaf length and width, length of the pinnae zone and length of the spine zone, the Barhi cultivar is significantly superior to Deglet Barhi one by recording (403, 112, 281, 97) cm, compared to (355, 94, 215, 115) cm for Deglet Barhi. There were no significant differences between the two cultivars in terms of the length of the spine-free zone and the width of the leaf base. It is noted from the same table that the Barhi cultivar was significantly superior to the Deglet Barhi one in the number of spines and the number of spines on the left and right, recording 36, 18, and 18, respectively, compared to the Deglet Barhi cultivar, which gave 28, 14, and 14, respectively. It is clear from the results that there are significant differences in the number of pinnae, which is one of the constant characteristics to distinguish between cultivars, as it is not affected by the age of leaves or the time of measurement (Abd, Taain and Al-Thahab, 2019). Barhi cultivar recorded the highest average number of pinnae, reaching 180, compared to the Deglet Barhi

cultivar, which gave 163. This result is consistent with Kalaf, Abd and Humadi (2017) for Halawi, Barhi, and Khasab date palm cultivars.

As for the length of the pinnae at the beginning, middle, and end of the leaf, it is noted from the above table that there were significant differences between the two cultivars, as Barhi cultivar excelled in giving the highest values, reached 35 cm, 44 cm, and 26 cm, respectively, compared to Deglet Barhi cultivar, which recorded 29 cm, 38 cm and 22 cm. As for the width of pinnae at the beginning, middle, and end of the leaf, the two cultivars did not have any significant effect on these characteristics. The results are presented in the Table.3 indicates that the Barhi cv. was significantly superior in length and weight of spadix, as recorded 51.58 cm and 420 grams, compared to the Deglet Barhi cultivar, which recorded the lowest values of 45.22 cm and 398 g. Barhi cultivar also excelled significantly in the length of the second spike, with a recorded 45 cm compared to the Deglet Barhi cultivar, which gave 41 cm. No significant differences were recorded between the two cultivars. In the length of the first and third spikes, as well as in the length of the flower-free zone for the first, second, and third spikes, and the weight of the first, second, and third spikes.

Table 2: Vegetative characteristics of date palm trees of Barhi and Deglet Barhi cultivars

No.	*Character*	*Cultivars*		*R.L.S.D.*
		Barhi	*Deglet Barhi*	
1.	Leaf length	403	355	34.05
2.	Width of leaf	112	94	9.21
3.	Length of the pinnae zone	281	215	55.13
4.	Length of the spine zone	97	115	10.43
5.	Length of the spine-free zone	25	25	NS
6.	Circumference of trunk	197	145	11.22
7.	Width of leaf base	14.23	12.13	NS
8.	Number of spines	36	28	3.14
9.	Number of spines on the left	18	14	2.22
10.	Number of spines on the right	18	14	2.22
11.	Length of the pinnae at the beginning of the leaf	35	29	1.33
12.	Length of the pinnae in the middle of the leaf	44	38	3.05
13.	Length of the pinnae at the end of the leaf	26	22	1.13
14.	Width of the pinnae at the beginning of the leaf	1.5	1.2	NS
15.	Width of the pinnae in the middle of the leaf	3	2.5	NS
16.	Width of the pinnae in the middle of the leaf	2.21	2.02	NS
17.	Number of pinnae	180	163	12.08

As for the length of the flower zone in the first, second, and third spikes, Barhi cv. Excelled by recording the highest values, reaching 12.66, 24.25, and 27 cm, respectively, compared to Deglet Barhi, which recorded the lowest values for the same parameters, which gave 8.46, 17.44, and 22.89 cm. Barhi cultivar also outperformed Deglet Barhi

cultivar by recording the highest values in the number of flowers for the first, second, and third spikes, reaching 27, 33, and 33.12, respectively.

Table 3: Floral characteristics of date palm trees of the Barhi and Deglet Barhi cultivars

No.	*Character*	*Cultivars*		*R.L.S.D.*
		Barhi	*Deglet Barhi*	
1.	Length of spadix	51.58	45.22	5.51
2.	Weight of spadix	420	398	15.11
3.	Length of first spikes	25	23	NS
4.	Length of the second spikes	45	41	3.15
5.	Length of third spikes	48	46	NS
6.	Length of the flower-free zone for first spikes	12.34	14.54	NS
7.	Length of the flower-free zone for second spikes	20.75	21,56	NS
8.	Length of the flower-free zone for third spikes	21	23.11	NS
9.	Length of the flower zone for the first spikes	12.66	8.46	2.07
10.	Length of the flower zone for the second spikes	24.25	17.44	5.55
11.	Length of the flower zone for the third spikes	27	22.89	3.27
12.	Weight of first spike	3.68	3.12	NS
13.	Weight of the second spike	5.66	5.25	NS
14.	Weight of the third spike	6.54	5.89	NS
15.	Number of flowers for the first spikes	27	25	1.14
16.	Number of flowers for the second spikes	33	28	3.05
17.	Number of flowers for the third spikes	33.12	30	1.67
18.	Weight of the flower for the first spikes	3.15	3.03	NS
19.	Weight of the flower for the second spikes	5.02	4.66	NS
20.	Weight of the flower for the third spikes	6.07	5.43	NS

The results of table 4 indicate the changes in the color of the fruits of Barhi and Deglet Barhi cultivars during their growth and ripening. It is clear from the table above that the color of the fruits of the two cultivars at the Kimri stage was green and then turned to yellow at the Khalal stage for both, while at the Rutab stage, the color of the Barhi fruits became dark brown, while the color of the Deglet Barhi fruits turned to light brown. During the tamer stage, the changes in the color of the fruits of the two cultivars changed into reddish brown for Barhi and blonde brown for Deglet Barhi.

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Table 4: Changes in color of Barhi and Deglet Barhi fruits

Stages of growth and ripening of fruits	*Barhi cultivar*	*Deglet Barhi cultivar*
Kimri	Green	Green
Khalal	Yellow	Yellow
Rutab	Dark brown	Light brown
Tamer	Reddish brown	Blonde brown

Table 5 shows the effect of cultivar, growth and ripening stage, and the interaction between them on the physical characteristics of the fruits of Barhi and Deglet Barhi cultivars. It is noted that the Deglet Barhi cultivar was significantly superior to the Barhi in the fresh weight of the fruit, the fresh weight of the fruit flesh, and the volume of the fruit, as it recorded the highest values of 12.08 g, 10.49 g, and 12.1 g. cm^3 in arrangement compared to the Barhi cultivar, which recorded the lowest values of 10.06 g, 8.75 g, and 10.92 cm^3. The data presented in the table indicates that there are no statistically significant differences between the two cultivars regarding fruit length, diameter, and fresh seed weight. The weight of the fruit is one of the important qualitative characteristics that has a significant impact on the marketing value of the fruit. The weight of the fruit is affected by environmental factors and agricultural operations, as well as the genetic factors (Ameer Abeed, Taain and Hamza, 2020; Attaha and Taain, 2011; Matar, 1991; Taain, Hamza and Jaber, 2019).

Tale 5: Changes in the physical characteristics of the palm fruits of Barhi and Deglet Barhi cultivars during their growth and ripening stages

Growth and ripening stages	*Fresh weight of fruit (g)*		*Fresh weight of flesh (g)*		*Fresh weight of seed (g)*		*Fruit length (cm)*		*Fruit diameter (cm)*		*Fruit volume (cm^3)*	
	Barhi	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*
Kimri	11.03	13.15	9.66	11.53	1.37	1.62	3.4	4.0	2.2	2.7	12.03	13.46
Khalal	11.21	13.75	9.76	12.01	1.45	1.74	3.7	4.1	2.3	2.8	12.09	14.18
Rutab	10.41	12.11	9.18	10.55	1.23	1.56	3.6	4.0	2.2	2.7	10.64	13.32
Tamer	7.62	9.32	6.41	7.87	1.21	1.45	3.5	3.9	2.1	2.6	8.94	9.48
Mean values of cultivar	10.06	12.08	8.75	10.49	1.31	1.59	3.55	4	2.2	2.7	10.92	12.61
Mean values of the stage												
Kimri	12.09		10.59		1.49		3.7		2.45		12.74	
Khalal	12.48		10.88		1.59		3.9		2.55		13.13	
Rutab	11.26		9.86		1.39		3.8		2.45		11.98	
Tamer	8.47		7.14		1.33		3.7		2.35		11.76	
RLSD P≤0.05	Cultivar= 1.01 Stage=1.02 Interaction=3.45		Cultivar= 1.11 Stage=0.79 Interaction=3.67		Cultivar= Stage=0.14 Interaction=0.22		Cultivar= NS Stage=0.23 Interaction= NS		Cultivar= NS Stage=0.11 Interaction= NS		Cultivar=1.11 Stage=1.04 Interaction=3.14	

As for the effect of the stages of growth and ripening, it is noted that the fresh weight and volume of the fruit increased as the fruit progressed in growth from Kimri stage to Khalal one, which recorded the highest values for the fresh fruit weight and volume to be 12.48 g and 14.18 cm^3, then decreased in Rutab and Tamer stage until the values reached 8.47 g and 9.48 cm^3, respectively. The date palm fruits of most cultivars follow a single sigmoid growth curve, as it is noted that there was a rapid increase in the fresh weight of the fruit in the Khalal stage, which is considered the stage of maturity in which the volume of the

fruit reaches the maximum value at the end of it. The increment in the volume and weight of the fruits may be due to the division and elongation of fruit cells, thus increasing the volume of the fruits and filling them with water and nutrients (Taain, 2019). As for the decrease in the weight and volume of the fruits at the Rutab and Tamer stages, it is due to the loss in the water content of the fruits (Rygg, 1977; Taain, 2010). The findings of the present study align with the research conducted by Tafti and Fooladi (2005), Jassim, Taain and Hamza (2016), Taain, Hamza and Jaber (2019), Ameer Abeed, Taain and Hamza (2020), as well as Al-Arab (2025). These correlations suggest a consistent pattern throughout the literature that warrants further investigation. It is noted from the same table that the pattern of changes in the fresh weight of the flesh, the fresh weight of the seed, and the length and diameter of the fruit is similar to what was mentioned above. An increase in these characteristics is observed when fruits convert from the Kimri stage to the Khalal stage, reaching maximum values, followed by a decrease in the values of these parameters in the Rutab and Tamer stages. The results resemble the results obtained by Taain, Hamza and Jaber (2019), Ameer Abeed, Taain and Hamza (2020). As for the effect of the interaction between the cultivars and, the stages of growth and ripening, it was significant for all studied characteristics except for the length and diameter of the fruit, as it is noted that the highest values are for the fresh weight and volume of the fruit, fresh weight of the flesh and the fresh weight of the seed were in Deglet Barhi cultivar at Khalal stage, which was recorded 13.75 g, 14.18 cm^3, 12.01 g and 1.74 g in arrangement. As for the lowest values for these characteristics, it was recorded by the Barhi cultivar at the Tamer stage, which amounted to 7.62 g, 8.94 cm^3, 6.41 g, and 1.21 g, respectively.

Table 6 shows the effect of cultivar, growth and ripening stage, and the interaction between them on the chemical characteristics of the fruits of Barhi and Deglet Barhi cvs. The Deglet Barhi cultivar was significantly superior to the Barhi one in terms of the water content of the fruits, with a recorded value of 72.45% compared to the Barhi having a value of 66.50%. The Barhi cultivar was significantly superior to the Deglet Barhi in terms of total soluble solids and total and reduced sugars, recording the highest values of 25.82%, 54.17%, and 40.95%, respectively. In contrast, the Deglet Barhi cultivar had the lowest values, which were 23.05%, 47.87%, and 33.92%, respectively. There were no significant differences at $P \leq 0.05$ between the two cultivars in the percentage of sucrose and total titratable acidity.

It is also noted from the table that the effect of the stages of growth and ripening on the percentage of total titratable acidity was significant, as the results indicated that the content of organic acids in fruits decrease as ripening process progresses, and the reason behind this is probably due to the consumption of organic acids during respiration or their conversion into sugars (Burton, 1982; Taain, 2013). As for the interaction between the cultivars and the stages of growth and ripening, results indicate that Deglet Barhi cultivar recorded the highest water content of fruits at the Khalal stage amounting to 77.4%, while Barhi cultivar accrued the highest content of total soluble solids and total and reducing sugars at Tamer stage to be 25.82%, 54.17%, and 40.95%.

Table 7 shows the production components for Barhi and Deglet Barhi cultivars. It is noted from Table 7 that the Barhi cultivar outperformed the Deglet Barhi cultivar in the number of spikes per cluster and the number of fruits per spike, as recorded 142 spikes per cluster, 45 fruits per spike, compared to 130 spikes, 42 fruits for the Deglet Barhi

cultivar. As for a cluster weight and date palm yield, the Barhi cultivar also outperformed the Deglet Barhi one, recording 15 kg and 100 kg per tree, compared to 12 kg and 90 kg per tree for the Deglet Barhi cultivar.

Tale 6: Changes in the chemical characteristics of palm fruits of Barhi and Deglet Barhi cultivars during their growth and ripening stages

Growth and ripening stages	*Water content (%)*		*Total soluble solids (%)*		*Total sugars (%)*		*Reducing sugars (%)*		*Sucrose (%)*		*Total tetratable acidity (%)*	
	Barhi	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*	*Barhi*	*Deglet Barhi*
Kimri	67.8	74.5	17.3	16.3	41.2	38.9	24.4	21.6	16.8	17.3	0.39	0.40
Khalal	73.2	77.4	4.19	17.6	47.7	42.6	33.1	27.3	14.6	15.3	0.36	0.37
Rutab	69.4	71.6	25.2	23.1	51.4	48.8	37.6	34.7	13.8	14.1	0.32	0.33
Tamer	55.6	66.3	41.4	35.2	76.4	61.2	68.7	52.1	7.70	9.10	0.21	0.24
Mean values of cultivar	66.50	72.45	25.82	23.05	54.17	47.87	40.95	33.92	13.22	13.95	0.32	0.33
Mean values of the stage												
Kimri	71.15		16.8		40.05		23.00		17.05		0.39	
Khalal	75.30		18.5		45.15		30.20		14.95		0.36	
Rutab	70.50		24.15		50.10		36.15		13.95		0.32	
Tamer	60.95		38.3		68.80		60.40		8.40		0.22	
RLSD P≤0.05	Cultivar= 4.21 Stage=6.11 Interaction=15.23		Cultivar= 1.56 Stage=5.33 Interaction=11.55		Cultivar= 4.32 Stage=15.11 Interaction=12.15		Cultivar=5.05 Stage=13.12 Interaction=15.17		Cultivar= NS Stage=6.61 Interaction=7.33		Cultivar= NS Stage=.0.15 Interaction=0.11	

Table 7: Production components of the Barhi and Deglet Barhi cvs. for the season

Cultivar	*Number of spikes per cluster*	*Number of fruits per spike*	*Weight of cluster(kg)*	*Date Palm yield (kg)*
Barhi	142	45	15	100
Deglet Barhi	130	42	12	90
RLSD P≤0.05	7.9	1.4	1.5	3.5

Conclusion

The current study aims to compare the vegetative and floral indicators, yield, and qualitative characteristics of date palm fruits of Barhi and Deglet Barhi cultivars. Barhi was significantly superior to Deglet Barhi in circumference of trunk, leaf length and width, length of the pinnae zone, length of the spine zone, and length and weight of spadix, while the Deglet Barhi cultivar was superior to Barhi in the fresh weight of the fruit, the fresh weight of the fruit flesh, the volume of the fruit, and water content of fruits. Regarding the yield and its components, the Barhi cultivar outperformed the Deglet Barhi cultivar in the number of spikes per cluster and the number of fruits per spike, cluster weight, and date palm yield. The standard quality factors of fruits, represented by the external appearance and its components of fruit volume, weight, and color, as well as the fruit content of sugars, organic acids, nutritional elements, vitamins, and others, play a fundamental role in determining the quality of fruits and their marketing value. Through the above indicators, it is clear that the Barhi cultivar is superior to the Deglet Barhi one in most of these indicators. This enhances the marketing importance of the Barhi cultivar so that it cannot be replaced by the Deglet Barhi cultivar.

However, we recommend expanding the conduct of other studies to compare the two cultivars using molecular indicators, as well as studying the shelf life of fruits.

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Authors' Declarations and Essential Ethical Compliances

Authors' Contributions (in accordance with ICMJE criteria for authorship)

Contribution	*Author 1*	*Author 2*	*Author 3*	*Author 4*	*Author 5*	*Author 5*
Conceived and designed the research or analysis	Yes	No	Yes	Yes	No	No
Collected the data	Yes	Yes	No	Yes	No	Yes
Contributed to data analysis & interpretation	Yes	No	Yes	Yes	Yes	Yes
Wrote the article/paper	Yes	Yes	No	Yes	No	No
Critical revision of the article/paper	No	Yes	No	No		No
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