

Fruit Physical Characteristics of Date Palm Cultivation Grown Under Jaisalmer Condition in Western Rajasthan

Birbal, R. N. Kumawat and R. S. Mertia

Abstract: Western Rajasthan is the future prospect area of date palm cultivation in India. In a field study conducted at Chandan Research farm of Central Arid Zone Research Institute, Regional Research Station, Jaisalmer from summer 2007- 2012 on 20 years old plantations of six date palm cultivars (Deglet Noor, Shamran, Barhee, Bayani, Khadrawi and Umshok) suggested wide variations in physical properties of their fruits (fruit weight, fruit dimension, seed weight, seed dimension, flesh weight and flesh width) in both doka and pind stages.

INTRODUCTION

Date palm (*Phoenix dactylifera*, L.) is grown in different part of the world [5]. It is a heat loving plant and requires a large amount of heat energy for its fruits to ripen [4]. It can tolerate more alkali or salt as compared to other fruit crop. Historically, the fruits of datepalm is being consumed at both Doka and pind stage. In fact, date palm is an irreplaceable tree in irrigable desert lands and can also be grown under unfavorable conditions where many of the other fruit species may not grow. Besides its use as fruits, it provides protection to under-crop from heat, wind and even cold weather and plays a big role to stop desertification and to give life to desert areas. Differences between date palm cultivars depends on accurate description of the part of date palm tree [1]. Description of the fruit characters is considered more common than the vegetative characters for differentiation between date palm cultivars [2].

In India, date palm is distributed mainly in western part of country. There are about 59 cultivars of date palm grown in India. Jaisalmer district of western Rajasthan represent the most important date palm cultivated area in the country where date palm cultivation was initiated in the eighties by

CAZRI RRS, Jaisalmer at its Chandan farm. The situation is beneficial in the Indian Thar desert due to early ripening fro the period of March to June which escape the fruit from spoilage during rain. The period from March to June in the arid north western India is usually free of rains and coincides with the period of fruit development and maturity [3]. Realizing the scope of date palm cultivation in western Rajasthan, the present work was undertaken with the objective to study the variations in the fruit characters of the most common date palm cultivars in Jaisalmer condition. Such study could provide valuable information that might promote production and quality of dates in study area.

MATERIALS AND METHODS

The study was conducted at Chandan Research farm of Central Arid Zone Research Institute, Regional Research Station, Jaisalmer from summer 2007- 2012 to evaluate morpho-physical characteristics of date palm (*Phoenix dactylifera* L.) fruits from six cultivars (Deglet Noor, Shamaran, Barahee, Hayani, Khadrawy and Umshok). The plants of 20 years age were selected from date palm orchard maintained with same cultural practices. The spathe in the male

* ICAR-Central Arid Zone Research Institute, Regional Research Station, Bikaner-334004

date palm plant (cv. Shamran) emerged in the second week of February. The mature pollens were manually collected from male plant and preserved at ambient temperature. Pollination of five female plants in each cultivar was done manually from the date of opening of spathe to one week till the spathes opens completely. Plants were irrigated regularly and maintained at optimum management level. After fruit setting, bunches were covered with net to protect them against bird damage. Hundred fruits from each cultivar were collected at *doka* and *pind* stages. The physical characters viz. fruit weight, fruit length and diameter, flesh weight and thickness, seed weight, seed length and diameter were recorded by using vernier caliper. The data were statistically analyzed by ANOVA and means were tested by LSD test at 5% level of significance.

RESULTS AND DISCUSSIONS

Doka stage

The cultivar effect on fruit characteristics viz. fruit size, stone dimensions, pulp thickness, pulp weight, stone weight and fruit weight at doka stage has been described in Table 1.

Fruit size: Deglet Noor showed significantly longer fruit (39.5mm) as compared to other cultivars. The fruit length of Shamran, Barahee and Bayani cultivars were 32.6 mm, 34.0 mm and 31.6mm, respectively without significant differences between each other. The Khadrawy cultivars showed the least value 25.1 mm which was significantly shorter than all other varieties. Deglet Noor exhibited the greatest diameter (25.9 mm) which was significantly higher than those of other cultivars. Least fruit diameter was recorded in Khadrawy (15.2 mm) which was significantly lower than all other cultivars (Table 1).

Stone Dimension: Barhee showed the greatest stone length (24.9 mm) followed by Bayani (23.1 mm). Each of one them exhibited insignificant differences. Khadrawy and Deglet Noor showed the least stone length 19.4 mm and 20.3 mm respectively with insignificant differences between them but both were significantly lower compared to all other cultivars except Shamran (21.9). Khadrawy showed

the significantly lower stone length (19.4 mm) than all other varieties (22.5-24.9 mm) (Table1). Barhee recorded the greatest, stone diameter (10.1 mm) which was significantly greater than Khadrawy and statistically at par with all other cultivars. Khadrawy showed the significantly lower than all cultivars.

Pulp thickness: Deglet Noor showed the greatest pulp thickness (16.3 mm) which was significantly superior to all other varieties. Khadrawy (6.6mm) and Bayani (7.4mm) exhibited the least pulp thickness with insignificant differences compared to each other and significantly inferior to all other cultivars. Other cultivars showed pulp thickness ranging between 9.5- 11.8 mm (Table 1).

Pulp weight: Deglet Noor cultivar exhibited the greatest flesh weight (15.0 g). This value was significantly higher than those of other cultivars. Conversely, Khadrawy cultivar showed the least pulp weight (2.9 g), which was significantly lower than all other cultivars. The pulp weight of Shamran and Barhee exhibited significant differences compared to other cultivars (Table 1).

Stone weight : Fruits of Khadrawy cultivars exhibited the least stone weight (0.9 g) which was significantly lower than all other cultivars except Deglet Noor (1.1 g). On the other hand, Barahee cultivar showed the greatest stone weight (1.4 g) followed by Bayani (1.3 g) and Shamran (1.2 g).

Fruit weight: Deglet Noor had the maximum fruit weight (16.1g) which was significantly higher than those of all other cultivars. The differences between Shamran (9.7 g) and Barahee (9.8 g) were insignificant. The range of fruit weight for other cultivars were between 3.8 and 7.11 g (Table 1). Khadrawy cultivar showed significantly lower fruit weight than other cultivars.

Pind stage

All the six cultivars of date palm reached the pind stage. The results of testing the use of fruit characters to differentiate between the six cultivars was as follows:

Fruit dimension : Deglet Noor had the maximum fruit length (32.3mm) followed by

Table 1
Varietal effect on fruit characteristics at doka stage

Cultivar	Fruit Dimension (mm)		Stone Dimension (mm)		Pulp Thickness (mm)	Fruit weight (g/fruit)		
	Length	Dia- meter	Length	Dia- meter	(mm)	Pulp	Stone	Total
Deglet Noor	39.4	25.9	20.4	9.6	16.3	15.0	1.1	16.1
Shamran	32.7	21.2	21.9	9.8	11.5	8.5	1.2	9.7
Barahee	33.3	21.7	23.7	10.1	11.8	8.4	1.4	9.8
Bayani	31.7	16.9	23.1	9.5	7.4	4.2	1.3	5.5
Khadrawy	25.1	15.2	19.5	8.8	6.6	2.9	0.9	3.8
Umshok	29.9	19.3	22.6	9.7	9.5	5.8	1.3	7.1
CD (0.05)	2.8	1.2	1.9	0.9	1.2	1.2	0.3	1.0

Barahee (30.2 mm), Shamran (30.1 mm) and Umshok (30.1 mm) with insignificant differences between each other. Khadrawy had the least fruit length (22.8 mm) which was significantly lower than all other cultivars. Deglet Noor had maximum fruit diameter (21.4 mm) followed by Barahee (20 mm) and Umshok (19.9 mm). This value was significantly higher than other cultivars. Bayani exhibited the least fruit diameter (13.9 mm) followed by Khadrawy (14.2 mm), which was significantly lower than those of others.

Stone dimension: The average stone length of Barahee and Umshok cultivars was same (21.9 mm) and considered highest without showing the significant differences compared to each other. Khadrawy had the least stone length (16.6 mm) followed by Deglet Noor (17.4 mm) which was significantly lower than all other cultivars. Barahee and Umshok cultivars showed greatest stone

diameter (8.5 mm) followed by Bayani (8.4 mm), Deglet Noor (8.3 mm) and Shamran (7.8 mm) without significant differences between each other. On the other hand Khadrawy had the least stone diameter (7.1 mm) which was significantly lowest except Shamran.

Fruit weight: Deglet Noor showed the maximum fruit weight (10.2 g) which was significantly higher than all other cultivars. Khadrawy had the least fruit weight (3.4 g) which was significantly lower than those of other cultivars except Bayani (3.6 g) (Table2).

Pulp thickness: Deglet Noor showed the greatest pulp thickness (13.1 mm) which was significantly higher than those of other cultivars. The pulp thickness of Shamran , Barahee and Umshok were statistically at par, while the least pulp thickness was in Bayani (5.5 mm) with significant differences from all cultivars.

Table 2
Varietal effect on fruit characteristics at pind stage

Cultivar	Fruit Dimension (mm)		Stone Dimension (mm)		Pulp Thickness (mm)	Fruit weight (g/fruit)		
	Length	Dia- meter	Length	Dia- meter	(mm)	Pulp	Stone	Total
Deglet Noor	32.3	21.4	17.4	8.3	13.1	9.4	0.8	10.2
Shamran	30.1	19.2	18.9	7.8	11.4	6.8	0.8	7.6
Barahee	30.2	20.0	21.9	8.5	11.5	8.2	1.1	9.3
Bayani	28.6	13.9	18.6	8.4	5.5	2.6	1.0	3.6
Khadrawy	22.8	14.2	16.6	7.1	7.1	2.9	0.6	3.4
Umshok	30.1	19.9	21.9	8.5	11.4	4.5	0.9	5.4
CD (0.05)	2.6	1.6	1.7	0.9	1.4	0.6	0.1	0.7

Pulp weight: Deglet Nioor had the greatest pulp weight (9.4 g) which was significantly higher than all other cultivars. Bayani showed the least pulp weight (2.6 g) followed by Khadrawy which were significantly lower than those of other cultivars. All other cultivars showed significant differences between each other.

Stone weight: The highest stone weight (1.19 g) was recorded in Barahee which was significantly higher than all other cultivars while Deglet Noor and Shamran were statistically at par. Khadrawy cultivar exhibited low seed weight (0.6 g) with significant differences to all cultivars.

Nutritive value

The detail of nutritive analysis is presented in Table 3. Date palm fruits of various cultivars grown at Chandan farm were analyzed for nutritive values. Pind dates from different date palm cultivars showed variation in total sugar content (54.13-70.10%), Thiamine (0.004-0.030), Riboflovin (0.01-0.031 %) and Nicotinic acid (0.19-0.40 %). Maximum sugar content was recorded in Umshok followed by Barahee.

Table 3
Nutritive analysis of pind dates from different date palm cultivars

Cultivar	Total sugar (%)	Thiamine (%)	Riboflovin (%)	Nicotinic acid (%)
Deglet Noor	56.63	0.030	0.027	0.30
Shamran	59.26	0.013	0.019	0.31
Barahee	65.90	0.021	0.010	0.40
Bayani	61.44	0.026	0.014	0.16
Khadrawy	54.13	0.009	0.023	0.19
Umshok	70.10	0.004	0.031	0.29
Average	61.95	0.018	0.021	0.026

References

- AL- Baker, A. (1972), The date palm; a review of its past and present status and the recent advances in its culture; industry and trade AL- Ani press Baghdad.
- AL-Akaidy, H. K. M. (1994), Science and technology of date palm cultivation. Ekal press, Baghdad.
- Atul Chandra and Pareek, O.P. (1992), A note on the performance of different date palm cultivars under Bhojka (Jaisalmer) condition of Rajasthan. Haryana Journal of Horticulture Science. 21: 205-207.
- Cook, R.E. (1956), A study of the relationship of heat units to the ripening time of Dates. Date Growers Institute Report. 33: pp. 13.
- Tisserat, B. (1983), Development of new tissue culture technology to aid in the cultivation and crop improvement of date palm. Proc. 1st symposium on the date palm. Saudi Arabia pp 126-139.