



Variability in date palm fruits (*Phoenix dactylifera* L.) collected from Kachchh region of Gujarat

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(Received: 04.05.2020; Accepted: 19.06.2020)

Date palm (*Phoenix dactylifera* L.; family-Arecaceae) is one of the most important fruit trees for semi arid and hot arid regions of the country. It is an ancient fruit and believed to be indigenous to countries around Persian Gulf. Date palm groves in coastal region of Kachchh from Anjar to Mandvi have developed naturally through seeds, which probably brought by Turk settlers, traders, gardeners and Haj pilgrims. The seedlings are very old in Kachchh region and some new systematic plantations of date palm have also been developed either through suckers or tissue culture plants of cv. Barhee. Moreover, seedling populations of date palm are not found in other parts of country. The ripe fruits (*doka* or *khalal*) are used for fresh consumption and processing. Every part of the date palm plant is useful since its history of cultivation and utilization. Dried fruit pulp is used for flavoring the bakery products. Date palm leaves are also used for making handicraft items *viz.*, broom, hand-fan, mat, rope *etc.* Date is nutritious fruit having high calorific value in the form of sugar, minerals and vitamins (Zaid, 1999; Singh, 2018). It has high market potential for the production of soft dates (*pind khajoor*) and dry dates (*chhuvara*). However, processing is very less in our country. Presently, India imports about 3,11,575 MT dates every year from Gulf countries to meet out the domestic requirement.

At present, about 18,847 ha area is under date palm cultivation in the coastal region of Kachchh with estimated annual fresh fruit production 173997.60 MT (2017-18). Variability in date palm exists through out Kachchh region because the date groves have originated from seeds. The entire region exhibits great variability and diversity in many phenotypic characters *viz.*, colour, shape, size and taste of fruits. The climatic conditions of Kachchh region is also suitable for date production in India. It is a dioecious and monocotyledonous plant. The soil of the region is sandy loam and average annual rainfall is 425 mm. All fruit from Kachchh palms are harvested during mid June to July at *doka* or *khalal* stage (hard ripe yellow, red or dark red colour) of maturity because of early rains. Intercrops *viz.* pearl millet, cluster bean, forage and small fruit plants are grown in association with date palm in Kachchh region (Muralidharan *et al.*, 2008). Date palm plantations are economically important because it requires minimum care and has vast potential of cultivation arid regions in Rajasthan, Punjab and Haryana as well as in coastal belt of Gujarat. Limited work has been conducted on

post harvest management for proper utilization of fruits. Therefore, major emphasis should be given on processing and value addition in date palm (Sharma *et al.*, 2010). Now a days, consumer's preferred red colour fruit of date palm whereas these genotype/cultivars are limited in date palm repository at ICAR-CIAH, Bikaner.

Keeping in view, a survey was conducted to exploit genetic diversity in the country in date palm and to identify superior plus trees having early maturity, better quality of fruits at *doka* stage, good fruits yield, medium to heavy bearing types, suitability for processing, rain and *Graphiola* leaf spot disease tolerance, the details of survey, identification of elite type, fruiting and quality characters have been discussed in this paper.

A survey of date palm orchards was conducted during the year 2019 in Kachchh region of Gujarat to identify genotypes having early maturity, better quality and yield of fruits and also having rain tolerance characters. The orchards surveyed in villages near by Mundra, Anjar taluka of Bhuj district. Kachchh region of Gujarat, spread over 45,652 sq. km lies between 22° 5' to 24° 4' N latitude and 68° 9' to 71° 5' E longitude which is highly suitable for date palm cultivation in India. Palms having prolific bearing, attractive colour of fruit, sweet in taste and disease free were identified and marked. Plant population, fruiting behavior, number of bunch/palm and fruit characters along with status of uses, marketing *etc.* were recorded to assess date palm production and utilization. Nineteen fruit samples were collected from elite trees. Data on important fruit characters were assessed the extent of variability and compared over better palm for further multiplication and evaluation through clonally and raising seedling progenies.

The data pertaining to physico-chemical characters of date palm fruits are presented in Table 1. The date palm orchards were surveyed nearby Mundra, Kachchh region to identify elite type germplasm. The maximum seedling population exists on field or farm boundary, road side, river belt and depressions. The seedling palms are natural and very old, which are estimated to be around 1.9 million in Kachchh region. However, some seedlings have been planted at close spacing at farmer's field. The palm trees are having good

potential in natural population which should be multiplied. Among dates groves some palms are high yielding while others are unproductive because of high palm height, improper pollination, small size inferior quality fruits and poor management.

The plant characters basically depend upon genetic composition as well as soil and climate condition of the growing site. In general, 15-20 feet trees height was observed while some old date groves are very high and naturally grown. The palm had good foliage, vigorous growth and 5-10 offshoots per palm. However, some date groves are well managed by removing suckers for new plantations or better fruiting. But the maximum date groves are in natural condition. Now tissue culture plantations of cv. Barhee have been done in which suckers has not been allowed to grow for early fruiting. The tissue culture plantations are under drip system and spaced at 8 x 8 and 9 x 9 m. Branching in date palm is rare (Zaid, 1999) but at a place 3-4 palms were growing in groves. Some times the growth of aerial suckers also looks like branch in date palm. The maturity and ripening in local genotype is early in Kachchh region in comparison to other parts of the country.

The fruit yield in date palm is directly depends upon size of bunch and berry, number of bunches/palm and number of fruits/strand. Variation in number of bunches from 4 to 10 per tree was observed. Variation in number of bunches, size of

bunches and berries might be due to genetic features of the type, soil types, plant density per unit area and management practices employed. Genetic diversity in date palm has also been reported by Jain (2018) under climate change scenario. The bunch weight also varies from 5-10 kg depending on size of berries and thinning practices. Fruit thinning improves the size of berry in date palm is known practice to growers. However, all the growers do not practice thinning of fruits. From perusal of data, a significant variation (8-34 fruits/strand) in number of fruits per strand was observed. Variation in number of fruits, bunches and yield has also reported by Murlidharan *et al.* (2008).

The significant variation was observed in date palm fruits with respect to weight of berry (4.59 to 15.4 g), fruit size (2.65-4.62 cm length and 1.52-2.83 cm width) and pulp content (3.61-14.5 g) besides stone weight and size. Variations in size, berry colour, length of bunch, weight and yield have also been described by Muralidharan *et al.* (2008). As far as fruit weight is concerned, DP-06, DP-09 and DP-12 were found superior in size and quality characters in comparison to other germplasm. The maximum fruit weight (15.39 g) was recorded in DP-19 but TSS was very low possibly due to improper maturity and ripening. The TSS of fruits was greatly varied from 14.8 to 36.69 °Brix. The variations in colour of fruits at *doka* stage of maturity from yellow to light, dark red were observed, which is very useful to popularize date for

Table 1. Physico-chemical characters of fruits of date palm germplasm

Germplasm	Fruit colour at doka stage	No. of fruit/ strands	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	Pulp weight (g)	Stone weight (g)	Stone length (cm)	Stone width (cm)	TSS (° Brix)
DP-1	Red	34	3.75	1.81	7.40	6.35	1.08	2.40	0.80	18.48
DP-2	Dark red	24	3.46	1.52	4.92	3.62	0.52	2.32	0.74	31.43
DP-3	Yellow	16	4.26	1.85	10.13	9.46	1.06	2.79	0.75	23.55
DP-4	Dark red	18	3.11	2.35	9.77	8.03	1.31	2.17	0.94	24.25
DP-5	Reddish green	8	3.38	2.46	12.83	11.90	1.30	2.11	1.09	23.65
DP-6	Red	10	3.89	2.18	12.06	10.87	1.13	2.33	0.94	36.69
DP-7	Dark red	27	3.10	1.92	7.52	6.45	1.05	2.09	0.92	28.55
DP-8	Light red	8	4.63	2.30	12.54	11.82	1.14	2.70	0.82	14.80
DP-9	Red	20	4.13	2.25	12.79	12.40	0.90	2.23	0.88	25.31
DP-10	Red	28	3.46	2.04	7.85	7.30	1.51	2.67	0.92	17.48
DP-11	Dark red	10	3.27	1.84	8.52	7.64	1.30	2.28	0.88	28.90
DP-12	Light red	11	3.65	2.29	13.42	12.02	1.04	2.26	0.85	20.48
DP-13	Green	11	3.28	2.34	11.60	10.51	1.18	2.11	0.93	21.81
DP-14	Dark red	22	3.06	1.79	6.46	5.82	1.01	2.12	0.85	19.52
DP-15	Dark red	19	3.57	2.24	11.56	10.12	1.27	2.39	0.91	21.51
DP-16	Yellow	18	3.42	1.94	7.87	6.43	1.05	2.27	0.89	20.55
DP-17	Dark red	12	2.71	2.03	6.38	5.11	0.99	1.64	0.96	23.51
DP-18	Dark red	14	3.50	1.70	6.97	6.04	0.88	2.29	0.77	35.65
DP-19	Greenish red	09	3.73	2.83	15.39	14.50	1.04	2.03	0.94	16.54
SEm+	---	2.02	0.21	0.16	0.41	0.34	0.06	0.13	0.05	0.84
CD (5%)	---	5.82	0.63	0.48	1.16	0.97	0.17	0.38	0.15	2.41

fresh consumption. Early maturity was noted maximum in red colour type. A perusal of data presented in Table 1 revealed that the difference between the genotypes in fruit size, pulp weight, pulp stone ratio and seed size were varied. Fruit characters vary greatly depending on variety, environmental conditions and technical care given like fertilization, pollination, *etc.* (Zaid, 1999). The palm bearing big size dark red colour sweet in taste fruits were considered promising. The fruit yield vary from 50-100 kg per tree which depends upon the age of tree, extents and pattern of rainfall, pollination, number of bunches/tree, number of berries/strand, management practices besides soil and climatic conditions. In general, 50-60 kg fruits/palm is harvested at *doka* stage by the farmers. The quality of *doka* fruits varied greatly because of genetic variability in seedling palms. The elite palms, which bear good quality, sweet fruits fetches good price in the market. In Mundra area, fruit bunches were harvested and packed with berry strand in carton for sale in local market. The wholesale price of *doka* fruits varied and depends upon quality of fruits, grading, packing, *etc.* Use of date fruits for processing and value addition is very less as told by the date palm growers of the region.

The seedling populations are abundantly found in Kachchh region of Gujarat showing variability with respect to berry shape, colour, weight, pulp content, fruit size, taste, bunch size and yield potential in date palm. The genotypes showed significant variation in morphological and physico-chemical characters of fruits. The colour of berry at *doka* stage

was yellow, red to dark red and greenish red. The significant differences were noted in number of berries/strand, fruit weight from 4.92 to 15.40 g, stone weight 0.52-1.30 g and TSS 14.8 -36.8 °Brix. The seeds of collected material have been used for raising seedlings for further evaluation. The suckers of marked genotypes DP-06, DP-09 and DP-12 would be procured for multiplication and evaluation under hot arid region and it can be further utilized for date palm improvement programme.

References

- Jain, S.M. 2018. Date palm (*Phoenix dactylifera* L.) genetic diversity and conservation under climate change. Book DOI:10.13140/RG.2.2.1371660804. May, 2018.
- Muralidharan, C. M, Tikka, S.B.S. and Verma, P. 2008. Date palm cultivation in Kachchh, Tech. Bulletin- 2, Date palm Research Station, SDAU, Mundra, pp.36.
- Sharma S.K., Sharma, B.D., Singh, D., Shivalingam, P.N., Bhargava, R., Singh, R.S. and Meena, S . R . 2010. Souvenir of National Workshop on Date palm, CIAH, Bikaner, pp.188.
- Singh, R.S. 2018. Date palm: An ideal fruit for health and wealth. *Indian Hort.*, 63 (5): 17-21.
- Zaid, A. 1999. Date palm cultivation, F.A.O., Rome, pp.238.