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SHORT COMMUNICATION

Diversity in Seed Characters for Morphological Characterization of Date Palm (*Phoenix dactylifera* L.) Varieties

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Date palm (*Phoenix dactylifera* L.; Family: Arecaceae) is a fruit tree suitable for dry and hot climatic conditions. The ripe fruits (*doka* or *khalal*) are used for fresh consumption and value addition. In India, date palm fruits 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. In many date growing countries, seed is an agricultural waste and used for several purposes. Besides raising saplings, its seed are used as feed additive for African catfish, oil extraction, cattle's feed and porus carbon preparation. Date fruit seeds comprise 6-12 per cent of total weight in *Tamer* stage fruit depending upon variety and quality grade. The plants are raised through suckers, seeds, and tissue culture in date palm and variations in seeds (stones) were observed. The diversity with respect to stone weight, size, shape, colour and presence of ridges and groove were observed in date palm seeds. The seeds were collected at *doka s*tage of maturity of fruits during 2016 from date palm germplasm repository for study. In general large, medium and small size seeds were grouped in date palm genotypes. Variation in groove like shallow, medium and deep was also noticed. In some cultivars, ridges on the seeds were also present. A significant difference in weight and size of seeds were observed in date palm genotypes. The study revealed that genetic diversity exit in seeds of date palm. A wide range of diversity was observed in seeds for morphological characterization of date palm genotypes.

Key Words: Date palm, Diversity, Genotypes, *Phoenix dactylifera*, Seed

Introduction

Date palm (*Phoenix dactylifera* L.; family-Arecaceae) is one of the most important fruit tree for semi arid and hot arid regions of the world. It is an ancient fruit and is believed to be indigenous to countries around Persian Gulf. It is commercially grown in many countries of the world (Zaid, 1999). Date palm groves in coastal belt 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 seedling populations are not found in other parts of country. The ripe fruits (*doka* or *khalal)* are used for fresh consumption and processing (Pareek and Sodagar, 1986). Every part of the date palm plant is useful since its history of cultivation and utilization (Chao and Krueger, 2007). Sawaya *et al. (*1984) reported that date palm seeds are nutritious in mineral constituents. Besides raising saplings, its seed are used as feed addditive for Juvenile African Catfish (Sotulu *et al.,* 2014) and as animal feed (Habibi *et al*., 2011) and seed characters for biochar preparation (Mahdi *et al.,* 2015). The agricultural waste like datepalm seeds is suitable for preparation of porus carbon (Reddy *et al.,* 2015). The significant difference in seed characters have been reported in date varieties and it may further serve as important constituents of functional foods (Habib and Ibrahim, 2009). Date palm seed is also used for several medicinal purposes. Date palm seeds contain 10-12% oil in different varieties and its oil could be used in cosmetics, pharmaceuticals and food products (Beabes *et al.,* 2004). Date fruit seeds comprise 6-12 per cent of total weight at full ripe (*Tamer)* stage fruit depending upon varieties and quality grade. It is also used for extraction of oil (Zaid, 1999). It has high market potential since the production of soft dates (*Pind Khajoor*) and dry dates (*Chhuhara*) in our country is very less (Singh and Dhandar, 2007). Presently, India imports about 3, 11 575 MT dates every year from Gulf and other countries (FAO database, 2013) to meet out the domestic requirement. At present, about 17,658 ha area is under date palm cultivation in the

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coastal region of Kachchh with estimated annual fruit production 16,5632 MT. Variability in date palm exists throughout Kachchh region because the date groves have originated from seeds. Date palm is a dioecious and monocotyledonous single stem plant. All the 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. (Muralidharan *et al.*, 2008). Limited work is reported on morphological characterization of date palm seed in the literature. Keeping it in view, the present study was carried out on morphological characterization of date palm varieties/genotypes seeds to assess genetic diversity under hot arid environment.

Materials and Methods

The study was carried out at ICAR-CIAH, Bikaner during the year 2016 on morphological characters of seeds of date palm varieties/genotypes. The fruits of varieties /genotypes were collected from date palm field during July-August month and seeds of 30 genotypes were extracted from fruits at *doka* stage of maturity. For seeds of Saggai and Zamli variety, mature fruit samples were collected from Centre of Excellence on Date palm, Bhojka, Jaisalmer during August, 2016. The freshly harvested *doka* fruits of different varieties were used to extract seed for study. The seeds were cleaned with tap water and dried under ambient condition in lab. Morphological parameters of five seeds sample were taken in each replication. Size was recorded with help of digital verneer caliper. The weight of five seed was taken to calculate average weight of seed. The seed groove, apex colour and presence of ridges were noted on visual observations. The data were subjected for statistical analysis in Completely Randomized Design (CRD) to see the level of significance of characters at 5%.

Results and Discussion

The morphological characters of seeds were observed in terms of average weight and length and breadth of seed/stone. The apex of seed was also noted in terms of acute and obtuse/round shape. The colour of seeds was noted after extraction of seed from fruit. Groove in seed were also present and categorize in three group *viz.* shallow, medium and deep groove. Likewise ridges were also present in few varieties seeds. During record of observations, in few date palm seeds, a seed out growth like two seed were also noted. The apex in stone was almost round and angular in all germplasm. The colours of seeds were observed as dark grey and white during record of observation.

The data on physical characters of seed weight, size, surface texture and groove is given in Table 1.

Seed weight: Analysis of data in Table 1 reveals that weight of seed significantly differed among date palm germplasm. The maximum seed weight was observed in cv. Nagal Hillali (1.72 g), Medjool (1.54 g) followed by Sewi (1.29 g) and Saggai (1.24 g). However, minimum weight of seed was in cv. Barhee (0.53 g) followed by Khunezi (0.63 g). Variation in seed weight was observed from 0.53 to 1.72 g. Fruit and stone characters vary greatly depending on variety, environmental conditions and technical care given like pollination, etc. (Zaid, 1999). The variation in physical properties (weight, length, and density) were determined by Habib and Ibrahim (2009) in eighteen date varieties. Stone/seed weight and size is governed by genetic makeup of the cultivars besides growing sites.

Size of stone: The stone size (length and breadth) differed significantly among germplasm studied. The maximum length of seed was observed in Nagal Hilali (2.78 cm) followed by Saggaai (2.38 cm) and Hamara (2.37cm). Significantly higher seed length was observed in many germplasm like Kotho, Shamran, Dayari and Punjab red. However, breadth of seed differed significantly among the germplasm. The lower breadth of seed was observed in cvs. Halawy (0.73 mm) Barhee (0.74 mm.), Khairpur Pakistan (70 mm) and Khuneizi (0.63 mm.). The finding is similar to the earlier reports on stone: pulp ratio (Zaid,1999).

Seed surface, ridges and apex

In date seeds, the surface was found both smooth and rough type. In some varieties ridges were also present in stones. On visual observation, smooth and rough type seeds were characterized among the germplasm. In maximum seeds of date varieties, surface was smooth and ridges were absent. The seed apex was angular and round in most of germplasm except in few pointed apex.

Stone groove: The date palm seeds were also characterised on the basis of deep, shallow and moderate groove in stone. In maximum date palm varieties, shallow groove were present. In few varieties groove were broader. Variation in groove in stone may be due to genetic makeup of germplasm. The observation on variation in groove is similar to earlier findings (Chao and Krueger, 2007) while study on date fruits.

Table 1. Morphological characterization of seeds of date palm genotypes/varieties.

S.No.	Name of cultivars/ genotypes	Weight (g.)	Length (cm)	Breadth (mm)	Seed apex	Groove	Ridges	Surface of stone
1	Halawy	1.05	2.19	0.73	Angular	D	A	smooth
2	Khalas	0.82	2.15	0.76	Angular	S	A	smooth
3	Khadrawy	0.98	2.14	0.97	round	S	At	smooth
4	Shamran	1.07	2.34	1.07	round	S	P	rough
5	Zahidi	0.91	1.95	0.80	round	S	P	rough
6	Braim	0.97	1.62	1.01	round	D	P	rough
7	Chip-chap	1.03	2.26	1.03	Angular	S	P	smooth
8	Sewi	1.29	1.98	1.29	Angular	S	A	smooth
9	Khuneizi	0.63	1.82	0.63	round	S	A	smooth
10	Binte-a-isha	0.92	1.99	0.92	Angular	D	A	rough
11	Nagal Hilali	1.72	2.78	1.75	Angular	S	A	smooth
12	Medjool	1.54	2.23	1.54	Angular	S	A	smooth
13	Hamara	0.98	2.37	0.98	Angular	D	P	rough
14	Tayar	0.82	2.05	0.81	Angular	S	P	rough
15	Sayar	1.21	2.18	1.21	Angular	S	P	rough
16	Hayani	1.12	2.21	1.09	Angular	S	Pt	rough
17	Dayari	1.23	2.31	1.23	round	S	A	smooth
18	Suriya	1.18	2.00	1.18	round	S	A	smooth
19	Khoto	0.94	2.25	0.94	Angular	D	P	rough
20	Khairpur Pakisthan	0.70	1.62	0.70	round	S	A	smooth
21	Sabiah	0.79	1.96	0.79	Angular	M	P	rough
22	Saddmi	1.04	1.87	1.04	round	D	A	smooth
23	Gulchari	0.90	1.69	0.90	round	S	P	rough
24	Muscat	1.14	2.30	1.14	Angular	D	P	rough
25	Medini	1.19	2.13	1.19	round	S	A	rough
26	Javantri	1.04	1.79	1.04	round	S	A	smooth
27	Umshok	0.76	1.72	0.76	Angular	S	P	rough
28	Punjab red	1.14	2.17	1.14	Angular	S	P	rough
29	Saggai	1.24	2.38	1.21	Pointed	M	A	smooth
30	Bikaner Local	0.96	2.06	0.97	round	S	P	rough
31	Zamli	1.24	1.75	0.91	round	S	P	rough
32	Barhee	0.53	1.64	0.75	round	M	P	rough
SEm+		0.058	0.079	0.053	–	–	–	–
C.D. at 5%		0.164	0.225	0.150	–	–	–	–

1. Ridges: P =present, A=absent 2. Groove D= Deep S= Shallow M=Medium

Conclusion

The seed of date palm may be an approach for identifying the variety since a lot of variation is available among germplasm. Looking to the scarcity of planting material, it can be used for raising saplings for creation of variability and also as forest plantation. Date palm stone is not a waste material it can be utilized in several ways for animal feed, oil extraction, biochar preparation, etc. The study will help for proper utilization of date seeds to the growers/ researchers.

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