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## Performance assessment for fruit associated characters in Palmyrah (*Borassus flabellifer* L.)

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### Abstract

The experiment was conducted at the Department of Horticulture, VOC Agricultural College and Research Institute, Killikulam of Thoothukudi district, Tamil Nadu, India under the ICAR funded All India Coordinated Research Project in Palms during the year 2023-24. The Palmyrah germplasm material consisted of 265 accessions collected from different parts of the country viz., Tamil Nadu, Andhra Pradesh, Karnataka, West Bengal and Odissa. The present study aimed at understanding the variability in fruit associated characters for sixteen bearing accessions of palmyrah. The results revealed that a wide variability existed among the different bearing accessions for different fruit associated characters. Maximum fruit weight (1.44kg), flesh weight with epicarp (0.61kg) and nut weight per fruit (0.83 kg) was recorded in the accession 41. Maximum weight per nut (0.18 kg) was registered in the accession 41, 10 and 3 which was on par with each other. Acc.2 recorded maximum fruit length (16.92 cm), fruit diameter (36.67 cm), seed length (13.84 cm) and seed circumference (18.75 cm), respectively. The maximum number of fruits was registered in the accession 26 (352 fruits/tree).

**Keywords:** Palmyrah, variability, accessions, heritability and fruit characters

### Introduction

Palmyrah (*Borassus flabellifer* L.; Botanical family: Arecaceae), is a tree that is native to tropical Africa and spread in the drier parts of India, Sri Lanka, Thailand, Malaysia, Vietnam, and Indonesia. In India, where almost 102 million palms are found, nearly half of them are located in the southern districts of Tamil Nadu. It has been designated as the state tree of Tamil Nadu since 1978. Out of 51.9 million palms in Tamil Nadu, over 50% can be found in the southern districts of Thoothukudi, Tirunelveli, Virudhunagar, and Ramnad, with Thoothukudi district alone having a major share of 10 million palms. Palmyrah trees are tall that can grow up to a height of 13-14 meters, dioecious with separate male and female trees and are perennials that may take 15 years to attain sexual maturity to produce fruits (Krishnaveni *et al.*, 2020) <sup>[11]</sup>. Its trunk is black, cylindrical, and has a circumference of 1.5 meters, and it is able to withstand adverse climate conditions (Mohan *et al.*, 2016) <sup>[13]</sup>.

The tree's flowers are small and densely clustered on spikes, developing into large, brownish, round fruits. The male flowers are typically smaller than the female flowers. The fruits of this palm are large and fibrous, consisting of nut-like portions containing seeds. When young, the fruits are three-seeded, eventually becoming semi-spherical to spherical in shape and covered with sepals at the base (Gummadi *et al.*, 2016) <sup>[10]</sup>. When ripe, the fruit turns a deep brown to black color (Ramachandran *et al.*, 2004) <sup>[16]</sup>.

Each part of the palmyrah tree has unique pharmaceutical and health-beneficial properties. Palmyrah roots are high in calories and rich in Vitamin E. They also contain phytochemicals such as flavonoids and phenolic acids that exhibit antioxidant activity (Sahni *et al.*, 2014) <sup>[18]</sup>. Its trunk is used as timber and leaves are used for thatching and for handy crafts; endosperm of young fruits are nutrient-rich and famous as a summer delicacy; the inflorescence sap, known as 'neera' is consumed raw or processed into palm sugar. Thus, Palmyrah is vital for the livelihoods of many people in the state, especially those from economically and socially disadvantaged sections.

Hence, it is crucial to make the most of large Palmyrah population available in the state. Unfortunately, due to its extremely long duration to sexual maturity (approximately 15 years), its dioecious nature and other botanical traits such as tall stature, research in this crop is limited. There is currently no database regarding their natural variability present in the state and elsewhere. As a result, efforts have been made to study the variation in Palmyrah based on

their morphology, flower biology and yield potential (Kumari *et al.*, 2020) <sup>[12]</sup>. In this study, efforts have been made to fill the gap by assessing variability among different accessions in Palmyrah with special attention to the fruit characters being maintained at the field gene bank under ICAR-All India Coordinated Research Project in Palms of VOC Agricultural College and Research Institute, Killikulam.

### Materials and Methods

The experiment was conducted at the field gene bank of the College Orchard, Department of Horticulture, VOC Agricultural College and Research Institute, Killikulam, Thoothukudi district (8.7063° N, 77.855° E) under the ICAR funded All India Coordinated Research Project in Palmyrahto study the variability in the sixteen bearing accessions for yield and yield attributing characters among the total collection of two hundred and sixty five accessions from different parts of India *viz.*, Tamil Nadu, Andhra Pradesh, Karnataka, West Bengal, Bihar and Odissa. Fruit samples were collected from these sixteen accessions during the month of August and September for the year 2023-24. Observations were recorded for nine characters *viz.*, number of fruits per tree, fruit weight, flesh weight with epicarp, nut weight per fruit, weight per nut, seed length, fruit length, fruit diameter, and seed circumference. The list of accessions studied and their source is given in Table 1.

**Table 1:** Different accessions of Palmyrah and their source of collection being maintained at VOC Agricultural College and Research Institute, Killikulam

S. No.	Genotypes	Source of collection
1.	Accession 1	Killikulam, Tamil Nadu
2.	Accession 2	Killikulam, Tamil Nadu
3.	Accession 3	Killikulam, Tamil Nadu
4.	Accession 10	Killikulam, Tamil Nadu
5.	Accession 17	Ananthanambikurichi, Tamil Nadu
6.	Accession 22	Ananthanambikurichi, Tamil Nadu
7.	Accession 26	Ananthanambikurichi, Tamil Nadu
8.	Accession 27	Ananthanambikurichi, Tamil Nadu
9.	Accession 41	Seerudaiyarpuram, Tamil Nadu
10.	Accession 48	Anaikudi, Tamil Nadu
11.	Accession 51	Anaikudi, Tamil Nadu
12.	Accession 52	Anaikudi, Tamil Nadu
13.	Accession 63	Thisaiyanvilai, Tamil Nadu
14.	Accession 65	Ampalacherry, Tamil Nadu
15.	Accession 91	Pillayarapuram, Andhra Pradesh
16.	Accession 252	Orissa

### Statistical analysis

Mean, Standard Error, Critical Difference (CD) and Coefficient of Variation (CV) were estimated as per standard protocols (Gomez and Gomez, 1984) <sup>[9]</sup>.

### Results and Discussion

All the accessions showed significant difference among them for different fruit and fruit associated characters in Palmyrah. Thirteen accessions of palmyrah were studied for fruit traits. The data collected were analyzed statistically and given in Table.2. Variation was observed among the different genotypes. The weight of fruits ranged from 1.44 kg to 0.52 kg. Maximum fruit weight was seen in the accession 41 with 1.44 kg which was followed by accession 10 and minimum

fruit weight was recorded in the accession 252 (0.52 kg). The flesh weight with epicarp ranged from 0.61 kg to 0.21 kg. The highest flesh weight with epicarp was seen in the accession 41 (0.61 kg) which was followed by the accession 63 (0.41 kg). Minimum flesh weight with epicarp was seen in the accession 252(0.21 kg).

The nut weight per fruit ranged from 0.31 kg to 0.83kg. The maximum nut weight per fruit was recorded in the accession 41 with 0.83kg which was followed by the accession 10, accession 27 and accession 52 (0.65 kg). The above findings are in agreement with the findings of Ponnu swami and Chitra (2011) <sup>[15]</sup>. The fruit weight among the thirteen accessions which had come into bearing in the field gene bank ranged from 0.716 to 3.34 kg and the mean value was 1.42 kg (Anon., 2001) <sup>[3]</sup>. A wide variation for mean fruit weight was recorded among the accessions and ranged from 320 to 1810 g. The accession TN10-04, which was collected from Kunjaravalasai in Mandapam block of Ramanathapuram district outperformed other accessions in terms of fruit weight (1810 g). Aman *et al.* (2018) <sup>[2]</sup> concluded and reported that among the selected fifteen accessions, accession 1 was found best in regard to fruit weight and it could be used to develop an index for the selection of best accession in future breeding programme.

The weight per nut was ranged from 0.15 kg to 0.18 kg. The maximum weight per nut was recorded in the accession (0.18 kg) and on par with accession 41, accession10 and accession 3 which was followed by the accession 1, accession 17, accession 22, accession 51 and accession 91 (0.17 kg). Minimum weight per nut was registered in the accession 252 (0.15 kg) which was on par with the accession 26. Seed length ranged from 11.03 cm to 13.84 cm. The maximum seed length was recorded in the accession 2 (13.84 cm) which was followed by the accession 10 (13.51 cm). Minimum seed length was seen in the accession 52 (11.03 cm). Similar findings were also reported by Ponnuswami and Chitra (2011) <sup>[15]</sup>.

The fruit length ranges from 11.05 cm to 16.92 cm. The maximum fruit length was seen in the accession 2 (16.92 cm) which was followed by the accession 10 (16.63 cm) and minimum fruit length was recorded in the accession 26 (11.05 cm). The diameter of fruit ranged from 33.42 cm to 36.67 cm. The maximum diameter of fruit was recorded in the accession 2 (36.67 cm) which was followed by the accession 1 (36.14 cm). Minimum diameter of fruit was seen in the accession 52 (33.18 cm). The seed circumference was ranged from 16.00 cm to 18.75 cm. Maximum seed circumference was seen in the accession 2 (18.75 cm) which was followed by the accession 10 (18.47 cm) and minimum seed circumference was seen in the accession 52 (16.00 cm). Similar findings were reported by Ponnuswami and Chitra (2011) <sup>[15]</sup>.

The number of fruits per tree was ranged from 352 to 244. The highest number of fruits per tree was recorded in the accession 26 (352 fruits/tree) followed by the accession 1 and accession 27 (244 fruits/tree). Lowest number of fruits/tree was recorded in the accession 252 with 12 fruits /tree. The above finding comes in accordance with the findings of Kumari *et al.*, (2020) <sup>[12]</sup>. Bhaskar, 2017 in his findings concluded that a single tree in Nellore district of Andhra Pradesh produced 50 to 300 fruits.

**Table 2:** Mean Performance for Yield and Yield Attributing Characters in Palmyrah Germplasm under Killikulam Condition

Sl. No	Genotypes	Traits								
		Fruit weight (kg)	Flesh weight with epicarp (kg)	Nut weight per fruit (kg)	Weight per nut (kg)	Seed Length (cm)	Fruit Length (cm)	Fruit Diameter (cm)	Seed Circumference (cm)	Number of fruits per tree
1	Acc.1	1.28	0.40	0.64	0.17	13.10	16.05	36.14	18.44	240.00
2	Acc.2	1.04	0.40	0.64	0.16	13.84	16.92	36.67	18.75	196.00
3	Acc.3	1.04	0.40	0.64	0.18	13.15	16.18	36.01	18.11	84.00
4	Acc.10	1.05	0.39	0.65	0.18	13.51	16.63	36.08	18.47	110.00
5	Acc.17	1.04	0.40	0.64	0.17	13.25	16.21	35.52	18.00	99.00
6	Acc.22	1.01	0.39	0.62	0.17	12.22	15.11	35.35	17.56	24.00
7	Acc.26	0.91	0.31	0.60	0.15	12.86	11.05	35.99	17.91	352.00
8	Acc.27	1.00	0.34	0.65	0.16	12.23	15.27	35.67	17.65	240.00
9	Acc.41	1.44	0.61	0.83	0.18	12.59	15.54	35.78	17.79	410.00
10	Acc.48	0.97	0.34	0.64	0.16	12.00	14.90	34.49	17.79	104.00
11	Acc.51	1.02	0.40	0.62	0.17	12.18	15.06	35.14	17.25	35.00
12	Acc.52	0.95	0.30	0.65	0.15	11.03	14.25	33.18	16.00	138.00
13	Acc.63	0.93	0.41	0.55	0.15	11.41	15.10	34.22	17.10	144.00
14	Acc.65	0.94	0.30	0.64	0.15	12.14	15.12	35.28	17.46	24.00
15	Acc.91	1.01	0.40	0.61	0.17	11.30	14.92	33.99	16.95	60.00
16	Acc.252	0.52	0.21	0.31	0.15	11.11	14.77	33.42	16.50	12.00
	Mean	1.01	0.38	0.62	0.16	12.37	15.19	35.18	17.61	142.00
	Std. Dev	0.18	0.08	0.10	0.01	0.88	1.32	1.29	0.78	114.29
	S.E.	0.01	0.01	0.01	0.00	0.17	0.22	0.54	0.24	3.15
	C.D. (5%)	0.04	0.02	0.03	0.01	0.50	0.62	1.57	0.68	9.09
	CV (%)	2.30	2.43	3.00	3.29	2.44	2.47	2.67	2.33	3.84

## Conclusion

A wide variability was observed among the sixteen bearing accessions of Palmyrah for fruit and fruit associated characters and hence it is concluded that these characters could be used as an index for future breeding programme.

## References

- Allard RW. Principles of plant breeding. John Wiley and Sons, New York; c1960.
- Aman A, Sengupta S, Prasad M, Sinha S, Kumari S. Evaluation of the fruit characteristics of some accessions of *palmyrah palm* grown in Bhagalpur district of Bihar. Journal of Pharmacognosy and Phytochemistry. 2018;7(3):459-461.
- Anonymous. Annual Report, AICRP Palms, Kasaragod, India. 2001. p. 65-68.
- Augustine Jerard B. Studies on the mean performance, variability, association analysis, stability, and diversity in Coconut (*Cocos nucifera* L.) genotypes [PhD thesis]. Tamil Nadu Agricultural University, Coimbatore, India; c2002.
- Balakrishnan PC, Sumangala, Nambiar S, Rajan KM. Selection indices in Coconut. In: Abstracts of papers presented in the International Symposium on Coconut Research and Development, Kasaragod; c1991.
- Bhaskar K. India *Borassus flabellifer* L.: A tree behind the forest with multiple uses in rural areas: A case study from Nellore district, Andhra Pradesh, India. Imp. J. Interdiscip. Res. 2017;3(5):1486.
- Comstock RR, Robinson HF. Genetic parameters, their estimation, and significance. Proceedings of the 6th International Grassland Congress Vol 1. Nat. Pub. Co. Washington DC, USA; 1952. p. 248-291.
- Falconer DS. Introduction to quantitative genetics. 3rd ed. Logman Scientific and Technical, Logman House, Essex, England; c1989.
- Gomez KA, Gomez AA. Statistical procedures for agricultural research. 2<sup>nd</sup> ed. John Wiley & Sons, New York; c1988.
- Gummadi VP, Battu GR, Keerthana Diyya MS, Manda K. A review on palmyrah palm (*Borassus flabellifer*). International Journal of Current Pharmaceutical Research. 2016;8:17-20.
- Krishnaveni TR, Arunachalam R, Chandrakumar M, Parthasarathi G, Nisha R. Potential review on *palmyrah* (*Borassus flabellifer* L.). Advances in Research. 2020;21(9):29-40.
- Kumari S, Rani R, Sengupta S, Aftab A, Kumari N, Aman A, et al. Study of genetic variability of *palmyrah palm* on the basis of tree morphology and yield parameters in Bihar. International Journal of Current Microbiology and Applied Sciences. 2020;9:2522-2528.
- Mohan CHK, Soundarya V, Kumar R, Vasantha Kumar L, Kiran S, Sharathnath K, et al. In vitro anti-inflammatory activity of dried leaves of *Borassus flabellifer* L. Indo American Journal of Pharmaceutical Sciences. 2016;3:809-813.
- Natarajan C, Ganesamurthy K, Kavitha M. Genetic variability in Coconut (*Cocos nucifera*). Electronic Journal of Plant Breeding. 2010;1(5):1367-1370.
- Ponnuswami V, Chitra S. Variability and association among fruit traits in *palmyrah* (*Borassus flabellifer* L.). Electronic Journal of Plant Breeding. 2011;2(4):589-591.
- Ramachandran VS, Swarupanandan K, Renuka C. A traditional irrigation system using *palmyrah palm* (*Borassus flabellifer* L.) in Kerala, India. Palms. 2004;48:175-181.
- Renuga M. Studies on indexing economic characters of varieties and hybrids for the genetic improvement of coconut (*Cocos nucifera* L.) through selection [PhD thesis]. Tamil Nadu Agricultural University, Coimbatore, India; c1999.
- Sahni C, Shakil NA, Jha V, Kumar Gupta R. Screening of nutritional, phytochemical, antioxidant, and

- antibacterial activity of the roots of *Borassus flabellifer* (Asian palmyra palm). *Journal of Pharmacognosy and Phytochemistry*. 2014;58(34):58-68.
19. Singh RK, Chaudhary BD. *Biometrical methods in quantitative analysis*. Kalyani Publishers, New Delhi, India; c1985.
  20. Sivakumar V, Subramanian A, Geethanjali S, Praneetha S, Maheshwarappa HP. Assessment of genetic variability for growth, floral, yield, and its component traits in Coconut (*Cocos nucifera* L.). *Electronic Journal of Plant Breeding*. 2020;11(3):809-813.
  21. Suchithra M, Paramaguru P. Variability and correlation studies for vegetative, floral, nut, and yield characters in indigenous and exotic *coconut* genotypes. *Int. J Curr. Microbiol. App. Sci*. 2018;7(7):3040-3054.