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Assessment of Coconut Genotypes for Growth and Yield Parameters

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ABSTRACT: The study was carried out at Coconut nursery, Department of Spices and Plantation crops, Horticultural College and Research Institute, TNAU, Coimbatore during the year 2018-2021 to evaluate coconut genotypes and hybrids for growth and yield. Fourteen genotypes were used for the study. The design of the experiment was Randomized Block Design with two replications with each genotype representing three palms per replication. Among the fourteen genotypes Andaman Ordinary recorded the highest tree height of 12.13 meters and trunk girth in Chandra Laksha ((102.76 cm). Andaman Ordinary recorded maximum number of inflorescence per palm per year((13.44)) followed by Laccadive Ordinary (13.08) and minimum number of inflorescence were recorded by Kulasekaran Dwarf Green (10.52). The genotype Andaman ordinary recorded more number of bunches per palm per year (12.52) whereas less numbers recorded in Kulasekaran Green Dwarf (9.56) and Malayan Green Dwarf (9.70). Whole nut weight (861.00 g) and dehusked nut weight (385.50 g) were recorded maximum in Laccadive Ordinary. Kernal weight was maximum in Andaman Ordinary (250.02 g) whereas it was minimum in Kulasekaran Green Dwarf (132.90 g). Andaman Ordinary is assessed to be more appropriate for further crop improvement programme under Coimbatore conditions.

Keywords: Tall coconut, Andaman Ordinary, Nut, Variability.

INTRODUCTION

Coconut (*Cocos nucifera*) is believed to be an important plantation crop in the world. The crop is cultivated in almost 93 countries of the world. Coconut production plays an important role in the national economy of India. In India coconut is cultivated in an area of 21.53 lakh hectare with a production of 19309 million nuts and productivity of 8966nuts/palm/year (https://nhb.gov.in/Statistics.aspx). Currently India ranks third in coconut production and productivity in the world. In India a reduction in coconut production has been noticed in recent times. It is because of the unprredicted fluctuations in climatic conditions, global warming, floods, insects and pests, aged plants, phytosanitary threats, infectious diseases, lethal diseases etc. As a plantation crop in home stead garden it is used as refreshing drink for consumption, endosperm for direct utilization and for oil extraction, fiber for commercial value, timber and shell for industrial use. Considering these uses, palm is refereed as Tree of life and Kalpavrisha meaning tree of heaven. Coconut belongs to the genus Cocos, which is monotypic belonging to the family arecaceae. There are two types in coconut Tall and Dwarf. Tall types are cross pollinated and dwarf types are self pollinated. Because of cross pollination behavior there will be lot of genetic variability. For selection of desired genotypes, variability is an important criteria. If variability is larger in the material greater will be the scope for improvement. Evaluation and utilization of existing genetic variability is the preliminary step in any crop improvement programme.

MATERIALS AND METHODS

To evaluate coconut genotypes and hybrids for yield and nut quality a field experiment was conducted at Coconut nursery, Department of Spices and Plantation crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during the year 2018-2021. Fourteen genotypes were used for the study. The design of the experiment was Randomized Block Design with two replications with each genotype representing three palms per replication. The genotypes were planted at a distance of 7.5 × 7.5m. Recommended cultural practices were followed for all the genotypes (Nampoorthiri *et al*., 2000). Observations were recorded from all the three palms representing each genotype in each replication on vegetative, floral, nut and yield characters and the mean values were arrived at. For three years (December 2018- November

2021) nut yield per palm was recorded periodically and pooled to get nut yield per palm per year. Data were statistical analysed as per the standard procedures (Panse and Sukhatme 1985). Estimation of similarities based upon marker results were conducted using the method (Nei and Li 1979).

Table 1: Genotypes and their origin.

Sr. No.	Genotype	Origin
1.	West Coast Tall	India
2.	East Coast Tall	India
3.	Andaman Ordinary	India
4.	Laccadive Ordinary	India
5.	Philippines ordinary	Philippines
6.	Cochin China Tall	Vietnam
7.	Malayan yellow Dwarf	Malaysia
8.	Malayan Green Dwarf	Malaysia
9.	Chowghat Orange Dwarf	India
10.	Kulasekaran Dwarf Green	India
11.	Kera Sankara	India
12.	Chandra Sankara	India
13.	Chandra laksha	India
14.	Laksha Ganga	India

RESULTS AND DISCUSSION

Significant variations in tree height, trunk girth, Number of leaves, and number of inflorescence per palm were found in the current study (Tables 2 to 6). The Andaman Ordinary recorded the highest tree height of 12.13 meters. The Kulasekaran Green Dwarf has the lowest trunk girth (64.01 cm) while Chandra Laksha had the most trunk girth (102.76 cm). The Andaman Ordinary had the highest recorded number of leaves (35.54), while the Chowghat Orange Dwarf and Kera Sankara had the lowest numbers (27.91 and 28.43, respectively). The leaf length and number of leaves are significant characteristics because they determine a leaf's capacity to support bunches in the axis and boost photosynthetic efficiency. Jeyalakshmi and Rengasamy (2002); Jerard (2002) ; Ramanandam *et al.* (2017) also reported similar results.

Andaman Ordinary recorded maximum number of inflorescence per palm per year (13.44) followed by Laccadive Ordinary (13.08) and minimum number of inflorescence were recorded by Kulasekaran Dwarf Green (10.52). Andaman ordinary recorded more number of bunches per palm per year (12.52) whereas less numbers recorded in Kulasekaran Green Dwarf (9.56) and Malayan Green Dwarf (9.70). Significantly highest pooled nut yield per palm was recorded by Andaman Ordinary (120.35 nuts) compared to lowest in Malayan Green Dwarf (61.51). Whole nut weight (861.00 g) and dehusked nut weight (385.50 g).was recorded in Laccadive Ordinary. Andaman Ordinary recorded more Kernal weight (250.02 g) whereas it was less in Kulasekaran Green Dwarf (132.90 g). Jayabose *et al.* (2008) ; Rachel *et al.* (2010) report similar increases in the weight of dehusked nuts, kernels, and shells. They reported that the weight of kernels is positively correlated with the weight of dehusked nuts.

The increase in inflorescence production per palm per year and the number of functional leaves per year could be the reason for the maximum nut yield which might have contributed to higher photosynthetic accumulation during the reproductive phase.. Variation of nut characters may be because of both hereditary factors and environment factors including soil dampness and nutrient supplement status (Selvaraj and Maheswarappa 2016). Significantly higher quantitative characters were recorded in Andaman Ordinary compared to other genotypes. Hence the study concluded that among the fourteen genotypes evaluated Andaman Ordinary is assessed to be more acceptable for further more crop improvement programme under Coimbatore conditions. In the similarity index values higher variation was found between different groups and less variation was found with in the groups (Table 7 & 8). The tall genotypes are having higher variation than dwarf genotypes because the dwarf varieties are highly homozygous pure lines while the tall genotype are naturally cross pollinating, heterozygous populations having varying degree of heterozygosity.

Table 2: Growth attributes of coconut genotypes.

Sr. No.	Genotypes	Palm height (m)	Trunk girth (cm)
1.	West Coast Tall	12.10	90.40
2.	East Coast Tall	11.50	85.53
3.	Philippines ordinary	10.60	90.64
4.	Andaman Ordinary	12.13	86.42
5.	Laccadive ordinary	11.28	93.01
6.	Cochin China Tall	10.57	84.63
7.	Chowghat Orange Dwarf	4.21	78.63
8.	Malayan Yellow Dwarf	11.60	87.54
9.	Malayan Green Dwarf	6.45	66.30
10.	Kulasekaran Green Dwarf	6.83	64.01
11.	Chandra Sankara	8.70	91.08
12.	Chandra Laksha	8.50	102.76
13.	Laksha Ganga	9.86	93.35
14.	Kera Sankara	9.00	90.95
	Mean	**9.52**	**86.08**
	SE (d)	**0.001**	**5.59**
	CD (0.05 %)	**0.002**	**11.56**

Table 3: Leaf characters of coconut genotypes.

Sr. No.	Genotypes	Number of leaves	Number of leaflets	Leaf length (m)	Petiole length (m)
1.	West Coast Tall	31.32	218.85	4.52	1.16
2.	East Coast Tall	30.57	218.67	4.44	1.09
3.	Philippines ordinary	32.83	218.90	4.37	1.16
4.	Andaman Ordinary	35.54	225.60	4.63	1.17
5.	Laccadive ordinary	34.20	226.05	4.50	1.11
6.	Cochin China Tall	34.80	217.44	4.34	1.07
7.	Chowghat Orange Dwarf	27.91	219.49	4.42	1.17
8.	Malayan Yellow Dwarf	34.58	224.37	4.73	1.13
9.	Malayan Green Dwarf	32.22	216.99	4.06	1.03
10.	Kulasekaran Green Dwarf	30.89	211.37	3.97	0.94
11.	Chandra Sankara	32.88	236.11	4.47	1.64
12.	Chandra Laksha	32.44	236.65	4.35	1.30
13.	Laksha Ganga	31.03	229.12	4.31	1.19
14.	Kera Sankara	28.43	227.0	4.34	1.20
	Mean	**32.11**	**223.45**	**4.38**	**1.08**
	SE (d)	**0.35**	**2.39**	**0.04**	**0.09**
	CD (0.05 %)	**0.76**	**5.16**	**0.12**	**NS**

Table 4: Floral characters of coconut genotypes.

Sr. No.	Genotypes	Number of inflorescence	Number of female flowers	Spadix length (m)	Stalk length (cm)
1.	West Coast Tall	12.60	19.63	1.45	55.68
2.	East Coast Tall	12.50	19.38	1.31	52.09
3.	Philippines ordinary	12.21	18.53	1.23	49.04
4.	Andaman Ordinary	13.24	17.21	1.25	49.62
5.	Laccadive ordinary	13.08	13.26	1.25	49.19
6.	Cochin China Tall	11.92	18.28	1.15	46.20
7.	Chowghat Orange Dwarf	11.32	16.18	1.10	49.40
8.	Malayan Yellow Dwarf	11.37	19.27	1.16	48.80
9.	Malayan Green Dwarf	11.42	15.32	1.07	48.37
10.	Kulasekaran Green Dwarf	10.52	10.65	1.06	49.04
11.	Chandra Sankara	11.33	16.55	1.47	59.90
12.	Chandra Laksha	11.63	14.27	1.01	60.00
13.	Laksha Ganga	11.86	20.03	1.45	59.99
14.	Kera Sankara	11.49	18.22	1.35	59.49
	Mean	**11.07**	**16.91**	**1.23**	**52.71**
	SE (d)	**0.12**	**0.12**	**0.01**	**0.56**
	CD (0.05 %)	**0.27**	**0.24**	**0.03**	**1.22**

Table 5: Nut characters of coconut genotypes.

Sr. No.	Genotypes	Number of bunches/ year/palm	Number of nuts per bunch	Total number of nuts	Whole nut weight (g)
1.	West Coast Tall	12.10	11.03	101.28	844.62
2.	East Coast Tall	11.29	10.59	98.65	839.78
3.	Philippines ordinary	11.83	10.23	83.10	739.50
4.	Andaman Ordinary	12.52	12.50	120.35	719.65
5.	Laccadive ordinary	11.84	10.19	101.50	861.00
6.	Cochin China Tall	11.59	10.01	74.89	810.21
7.	Chowghat Orange Dwarf	9.90	10.16	76.20	609.52
8.	Malayan Yellow Dwarf	11.17	10.11	75.50	742.50
9.	Malayan Green Dwarf	9.70	8.96	61.51	612.32
10.	Kulasekaran Green Dwarf	9.56	8.38	64.25	510.25
11.	Chandra Sankara	12.39	10.14	73.86	780.87
12.	Chandra Laksha	11.29	10.30	76.56	752.51
13.	Laksha Ganga	11.21	10.07	85.20	871.12
14.	Kera Sankara	11.10	10.04	80.25	730.35
	Mean	**11.34**	**10.19**	**83.79**	**744.58**
	SE (d)	**0.16**	**0.30**	**0.94**	**8.35**
	CD (0.05 %)	**0.32**	**0.63**	**2.05**	**18.05**

Table 6: Nut characters and Quality characters of coconut genotypes.

Sr. No.	Genotypes	Dehusked nut weight (g)	Kernal weight (g)	Oil content (%)
1.	West Coast Tall	346.38	219.50	66.64
2.	East Coast Tall	346.17	215.72	67.70
3.	Philippines ordinary	346.51	204.69	68.80
4.	Andaman Ordinary	340.58	250.02	68.26
5.	Laccadive ordinary	385.50	208.07	71.50
6.	Cochin China Tall	339.42	201.53	67.50
7.	Chowghat Orange Dwarf	316.55	187.60	65.28
8.	Malayan Yellow Dwarf	319.63	167.85	67.40
9.	Malayan Green Dwarf	310.72	151.42	65.30
10.	Kulasekaran Green Dwarf	291.46	132.90	63.07
11.	Chandra Sankara	330.64	188.78	68.13
12.	Chandra Laksha	300.57	185.57	66.65
13.	Laksha Ganga	334.90	173.90	69.70
14.	Kera Sankara	307.45	172.65	67.23
	Mean	**329.74**	**190.01**	**67.36**
	SE (d)	**7.62**	**2.52**	**0.06**
	CD (0.05 %)	**10.63**	**5.44**	**0.13**

Table 7: Similarity indices for coconut genotypes and Hybrids.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
A1	1.00	0.80	0.80	0.70	0.60	0.50	0.20	0.40	0.30	0.10	0.50	0.60	0.40	0.50
A2		1.00	0.60	0.80	0.50	0.40	0.30	0.50	0.40	0.20	0.40	0.50	0.50	0.60
A3			1.00	0.80	0.60	0.40	0.20	0.10	0.20	0.10	0.60	0.50	0.30	0.40
A4				1.00	0.70	0.50	0.30	0.20	0.10	0.20	0.50	0.40	0.40	0.30
A5					1.00	0.70	0.20	0.10	0.30	0.40	0.60	0.50	0.60	0.40
A6						1.00	0.30	0.20	0.40	0.40	0.60	0.40	0.50	0.30
A7							1.00	0.80	0.70	0.60	0.80	0.50	0.50	0.40
A8								1.00	0.80	0.80	0.60	0.60	0.40	0.50
A9									1.00	0.70	0.50	0.40	0.30	0.50
A10										1.00	0.20	0.30	0.20	0.40
A11											1.00	0.80	0,70	0.50
A12												1.00	0.80	0.70
A13													1.00	0.60
A14														1.00

Table 8: Distance of dissimilarity index for coconut genotypes and Hybrids.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
A1	0.00	0.20	0.20	0.30	0.40	0.50	0.80	0.60	0.70	0.90	0.50	0.40	0.60	0.50
A2		0.00	0.40	0.20	0.50	0.60	0.70	0.50	0.60	0.80	0.60	0.50	0.50	0.40
A3			0.00	0.20	0.40	0.60	0.80	0.90	0.80	0.90	0.40	0.50	0.70	0.60
A4				0.00	0.30	0.50	0.70	0.80	0.90	0.80	0.50	0.60	0.60	0.70
A5					0.00	0.30	0.80	0.90	0.70	0.60	0.40	0.50	0.40	0.60
A6						0.00	0.70	0.80	0.80	0.60	0.40	0.60	0.50	0.70
A7							0.00	0.20	0.30	0.40	0.20	0.50	0.50	0.60
A8								0.00	0.20	0.20	0.40	0.40	0.60	0.50
A9									0.00	0.30	0.50	0.60	0.70	0.50
A10										0.00	0.80	0.70	0.80	0.60
A11											0.00	0.20	0.30	0.50
A12												0.00	0.20	0.30
A13													0.00	0.40
A14														0.00

A1 West Coast Tall
A2 East Coast Tall
A3 Philippines ordinary
A4 Andaman Ordinary
A5 Laccadive Ordinary
A6 Cochin ChinaTall
A7 Chowghat Orange Dwarf
A8 Malayan Yellow Dwarf
A9 Malayan Green Dwarf
A10 Kulasekaran Green Dwarf
A11 Chandra Sankara
A12 Chandra Laksha
A13 Laksha Ganga
A14 Kera Sankara

CONCLUSIONS

It can be concluded from this experiment that among the coconut hybrids/varieties evaluated, Andaman Ordinary was found to be superior in terms of number of bunches per palm per year ,number of nuts per bunch and nut yield over the other varieties and Hybrids. Hence, the variety Andaman Ordinary was considered to be the most suitable for cultivation in Coimbatore conditions Identification of high yielding

varieties/hybrids suitable to a particular area is very important to achieve higher production and productivity in coconut.

FUTURE SCOPE

One of the main objective in coconut breeding is to increase nut yield which is a complex character dependent on interaction of number of component characters. Selection of characters could be done only if there is genetic variation. Andaman Ordinary can be used for further breeding programme as one of the parent to get more yield and quality components of the nut.

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