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Growth and yield performance of coconut hybrids in *maidan* tract of Karnataka

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Coconut (*Cocos nucifera* L.) is one of the important plantation crops of Karnataka grown in an area of 3.33 lakh ha with a production of 1754 million nuts and productivity of 5255 nuts per ha (Anon., 2006). The local cultivars like Tiptur Tall in *maidan* tract and West Coast Tall in coastal areas of Karnataka are generally being grown under rainfed conditions. Development of high yielding varieties/hybrids is very important in this crop to achieve higher production and productivity. The discovery of hybrid vigour in coconut palms, first from India in 1937 (Patel, 1937), received considerable attention in the production of coconut hybrids. Hybrids usually express hybrid vigour in growth, precocity and higher yield. A large number of hybrid combinations of Tall x Dwarf (T x D), Dwarf x Tall (D x T) and Tall x Tall (T x T) have been developed and evaluated over years in different locations. As a result 14 hybrids have been released for commercial cultivation in India. The expression of hybrid vigour is influenced by the environment (Chapman *et al*., 2000) and hence the evaluation of hybrids in different locations is necessary to ascertain their suitability to a particular locality. In this direction, evaluation of different hybrid combinations of T x T, T x D and D x T was taken up to evolve suitable hybrid combinations for *maidan* tract of Karnataka.

The evaluation trial of nine coconut hybrids with Tiptur Tall as local check was initiated during 1987 at Horticulture Research Station, Arsikere, Karnataka under AICRP on Palms to assess their yield performance. The nine hybrids tested are Cochin China Tall x Laccadive Ordinary Tall (CCNT x LCT), Laccadive Ordinary Tall x Philippines Ordinary Tall (LCT x PHOT), Laccadive Ordinary Tall x Cochin China Tall (LCT x CCNT), West Coast Tall x Chowghat Orange Dwarf (WCT x COD), West Coast Tall x Gangabondam Green Dwarf (WCT x GBGD), West Coast Tall x Malayan Yellow Dwarf (WCT x MYD), Gangabondam Green Dwarf x Fiji Tall (GBGD x FJT), Gangabondam Green Dwarf x Philippines Ordinary Tall (GBGD x PHOT and Gangabondam Green Dwarf x Laccadive Ordinary Tall (GBGD x LCT). The hybrids were planted along with the local cultivar-Tiptur Tall in RBD with three replications.

The Horticulture Research Station, Arsikere is located in the *maidan* tract of Karnataka, which is the area lying to the east of *malnad* region (hilly areas) in Karnataka and characterized by open plain area with few hillocks. *Maidan* tract is the rain shadow area of Western Ghats and is generally much drier than coastal and malnad regions. The soil of the experimental site was clay loam with low in available N (182.5 kg/ha), medium in available P (12.5 kg/ha) and high in available K (280 kg/ha). The average annual rainfall is 694 mm received in 46 rainy days having bimodal distribution with peaks in May-June and September-October. Seedlings of different coconut hybrids and Tiptur Tall cultivar were planted during 1987 with a spacing of 7.5 m x 7.5 m. Each replication consisted of four palms. Recommended cultivation practices were followed for coconut palms. The palms were irrigated at 40-50 litres/day/palm through drip irrigation system.

The growth parameters like tree height, tree girth, number of functional leaves per palm and cumulative leaf production per palm were recorded during 2008-09 at the age of 22 years. The yield of nuts per palm was recorded periodically at each harvest from July to June and pooled to get nut yield per palm per year. Copra content per nut was recorded by drawing random sample of six nuts per hybrid or cultivar in each replication and drying the nuts in shade for 8-10 months. Copra yield per palm was calculated based on the copra content per nut in each treatment. The oil content in copra was analysed using Soxhlet apparatus by drawing pooled samples of each hybrid/cultivar over replications and oil yield per palm was computed. The yield data of four years

from 2005-06 to 2008-09 is used to draw conclusions. The data was analyzed statistically as per the procedure given by Gomez and Gomez (1984).

Growth parameters: The tree height and girth were not differed significantly between different hybrids of coconut (Table 1). The number of functional leaves in a palm were significantly higher in GBGD x PHOT compared to other hybrids and was on par with LCT x CCNT, GBGD x FJT and Tiptur Tall. The cumulative leaf production per palm (from planting to 22 years of age) was significantly higher with GBGD x PHOT compared to CCNT x LCT, WCT x COD and LCT x PHOT where as other hybrids and Tiptur Tall were on par with GBGD x PHOT.

Table 1. Growth of hybrid coconut palms during 2008-09 (Age of trees: 22 years)

Sl. No.	Hybrids/ Cultivar	Tree height (m)	Tree girth (cm)	Functional leaves (No.s/palm)	Cumulative leaf production (No.s/palm)
1	CCNT x LCT	5.74	92.72	28.94	196.22
2	LCT x PHOT	6.38	89.75	30.08	208.00
3	LCT x CCNT	6.66	94.92	32.83	211.30
4	WCT x COD	5.84	82.94	30.22	206.17
5	WCT x GBGD	7.00	93.58	32.00	229.08
6	WCT x MYD	6.22	86.92	31.50	221.83
7	GBGD x FJT	6.27	93.30	32.27	230.50
8	GBGD x PHOT	5.78	87.83	34.81	231.50
9	GBGD x LCT	5.77	87.83	31.39	225.22
10	Tiptur Tall	6.38	94.44	32.19	216.36
	S. Em ±	0.41	3.88	0.92	7.53
	CD (P=0.05)	NS	NS	2.73	22.36

NS= Non Significant

Yield of nuts: A wide variation was observed for nut yield in coconut hybrids in the present study (Table 2). Among different hybrid combinations, D x T combinations performed better than T x D and T x T combinations. The mean nut yield per palm over four years was significantly higher in GBGD x LCT which was on par with GBGD x FJT and GBGD x PHOT indicating the superior performance of D x T hybrid combinations involving GBGD as female parent. Similarly, higher nut yield per palm in GBGD x PHOT, GBGD x LCT and GBGD x FJT in coastal Andhra Pradesh (Rao *et al*., 2002; Anon., 2008) and GBGD x PHOT and GBGD x LCT in coastal Tamil Nadu due to higher percentage of heterosis over better parent has been reported (Anon., 2008). Heterotic effects in nut yield of coconut were also reported earlier by Satyabalan *et al*. (1970), Ramachandran *et al*. ((1975), Satyabalan and Rajagopal, (1987), Natarajan *et al*. (2006) and Jayabose *et al*. (2008).

Table 2. Yield of nuts, copra and oil in different hybrids of coconut (mean data of 4 years from 2005-06 to 2008-09).

Sl. No.	Hybrids/ Cultivar	Nut yield/ palm/year (No.'s)	Copra content (g/nut)	Copra yield (kg/palm/ year)	Oil content (%)	Oil yield (kg/palm/ year)
1	CCNT x LCT	50.01	126.3	6.49	66.35	4.31
2	LCT x PHOT	64.07	126.7	8.31	67.13	5.58
3	LCT x CCNT	70.03	143.2	10.37	62.51	6.48
4	WCT x COD	74.13	154.4	11.69	66.16	7.73
5	WCT x GBGD	70.54	160.5	11.68	63.80	7.45
6	WCT x MYD	75.95	155.0	11.86	65.36	7.75
7	GBGD x FJT	101.20	152.6	15.65	64.29	10.06
8	GBGD x PHOT	100.11	154.6	15.64	67.84	10.61
9	GBGD x LCT	104.88	159.4	16.91	66.38	11.22
10	Tiptur Tall	84.26	165.9	14.19	67.20	9.53
	S. Em ±	4.17	2.16	0.75	NA	0.49
	CD (P=0.05)	12.40	6.40	2.22		1.47

NA = Not analysed

Copra yield: The local cultivar Tiptur Tall recorded significantly higher mean copra per nut compared to hybrids under present evaluation except WCT x GBGD. The hybrid combination of WCT x GBGD recorded mean copra content on par with Tiptur Tall. The mean copra yield per palm was significantly higher with GBGD x LCT which was on par with GBGD x FJT and GBGD x PHOT. The higher copra yield in these hybrids can be attributed mainly to higher nut yield per palm compared to other hybrid combinations. Similar results of higher copra yield per palm in GBGD x PHOT, GBGD x LCT and GBGD x FJT hybrid combinations in coastal Andhra Pradesh and in GBGD x PHOT and GBGD x LCT in coastal Tamil Nadu were reported (Anon., 2008).

Oil yield: The mean oil yield per palm was significantly higher with GBGD x LCT which was on par with GBGD x PHOT and GBGD x FJT. The higher oil yield in these hybrid combinations can be attributed to higher copra yield per palm compared to other hybrid combinations.

The nut yield, copra yield and oil yield per palm were significantly higher in the hybrid combinations of GBGD x LCT, GBGD x FJT and GBGD x PHOT compared to other hybrids and Tiptur Tall. Hence these three coconut hybrids can be identified for cultivation in *maidan* tract of Karnataka.

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