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COMPARATIVE PERFORMANCE OF RELEASED CULTIVARS AND HYBRIDS OF COCONUT FOR DRY MATTER PRODUCTION AND YIELD

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ABSTRACT

Coconut cultivars and hybrids viz., West Coast Tall, Chandra kalpa, Pratap, Kera ganga, Chandra sankara, Lakshaganga and Chandralaksha were evaluated for leaf traits, dry matter production and yield to identify the superior cultivar among the released ones. The cultivars and hybrid showed significant differences in the above parameters. Based on the results, the traits for higher dry matter production and yield have been delineated. Among the cultivars and hybrids the performance of Kera ganga (WCTxGBGD) and lakshaganga (LCTxGBGD) was found to be better than the others in terms of leaf traits, dry matter production and yield. The observations clearly indicated that total nut production *per se* is not an important criteria for crop improvement programmes, but harvest index (HI) which gives an indication of the partitioning of total dry matter (TDM) towards the economic yield (i.e,copra outurn) is the important trait for improving the production potential of the palms. Since the determination of TDM in coconut is very tedious and time consuming, partitioning of total nut dry matter towards copra can be used as an important trait for crop improvement programmes.

INTRODUCTION

In a perennial plantation crop like coconut wide variability exists in nut production and productivity can be improved only by planting location specific high yielding cultivars and hybrids. CPCRI and Agricultural Universities of Kerala and Tamil Nadu, through rigorous evaluation procedures, have released a number of cultivars and hybrids suitable for specific geographic locations. Some of the cultivars and hybrids released for large scale cultivation to various parts of the country are listed below. Yield characteristics were the main criteria used for the evaluation of these cultivars.

These cultivars and hybrids have been planted during 1988 in the institute farm for yield evaluation. Leaf area and dry matter production characteristics have been proved to be important yield determining traits in coconut (Ramadasan *et al* ,1985, Foale, 1993; Kasturi Bai *et al* 1996) and efficiency of dry matter production has been found to be a heritable trait (Ramadasan *et al*, 1985).

In this paper, an attempt has been made to investigate the variation, if any, among the released cultivars for the physiological trait related to productivity and to identify the superior cultivar/ hybrid among the relevant ones. The results will help in identifying most important yield limiting physiological trait, which can be used for the evaluation of higher yield potential in coconut.

MATERIALS AND METHODS

Coconut cultivars and hybrids comprising three Talls viz., WCT, LCT (Chandrakalpa) Benaulim (Pratap), and four hybrids, viz., WCT x GBGD (Keraganga), COD x WCT (Chandrasankara), LCT x GBGD (Lakshaganga) and LCT x COD (Chandra laksha) were the materials for the studies. These were planted during 1988 in a RBD design with three replications

Cultivar/Hybrid	Released as	Recommended for planting in
WCT	West Coast Tall	Kerala
Laccadive Ordinary Tall (LCT)	Chandra Kalpa	Kerala, Karnataka
Benaulim	Pratap	Maharashtra
WCT x Gangabondam (GBGD)	Keraganga	Kerala
Chowghat Orange Dwarf (COD x WCT)	Chandrasankara	Kerala, Karnataka
LCT x GBGD	Lakshaganga	Kerala
LCT x COD	Chandralaksha	Kerala, Karnataka

and seven palms per replication in red sandy loam soil as per the recommended management practices. The palms were given normal irrigation once in four days during summer months. The palms were monitored for its growth and development regularly. From each replication, two palms were taken for the studies . The observations on leaf traits, dry matter production and yield were recorded when the palms have started showing not much variation in yield. In the present paper, data collected for the last two years (2000 and 2001) on above traits have been used for the interpretation of the results. Leaf traits viz. total leaf on the crown, total canopy area , leaf area index (LAI) and specific leaf weight (SLW) were determined once in a year. Dry matter production characteristics viz. vegetative dry matter (VDM) and reproductive dry matter (RDM) were also determined in these palms as per Ramadasan and Jacob Mathew (1987). Total nut yield and partitioning of nut dry matter towards its components viz., husk, shell and copra have been worked out to identify the varieties with better nut composition. The data were analyzed statistically.

RESULTS AND DISCUSSION

Among the leaf traits recorded, except leaf production, significant differences in canopy area, leaf area index and specific leaf weight have been observed between the cultivars and hybrids. Canopy area per palm ranged between 117.5 m^2 (Chandrakalpa) and 153.2 m^2 (Keraganga). Similarly, lower LAI has been observed in the former (2.1) than the latter (2.6) (Table 1). The relationship between higher leaf area and yield has been reported by Chacko Mathew and Ramadasan (1975). SLW was found to be more in Pratap and Kera ganga than the others. Dry matter production characteristics showed significant differences only in VDM production (Table.2) and ranged between 27.8 Kgs. (Chandralaksha) and 33.3 Kgs (Keraganga). The components of VDM, i.e., LDM and SDM also showed significant differences

Table 1. Leaf traits in coconut cultivars and hybrids

Cultivar/hybrid	Leaves in the crown (No.)	Canopy area/palm (m^2)	LAI	SLW ($mg.cm^{-2}$)
WCT	26	126.1	2.2	14.2
Chandrakalpa	25	117.5	2.1	14.5
Pratap	26	127.2	2.3	14.9
Keraganga	27	153.2	2.6	14.8
Chandra sankara	27	141.4	2.4	14.5
Lakshaganga	26	131.9	2.2	13.5
Chandralaksha	27	127.7	2.3	13.8
CD-P=0.05	NS	10.74	0.171	0.609

Table 2. Dry matter production characteristics (Kg) and HI in coconut cultivars and hybrids

Cultivar/hybrid	LDM.)	SDM	VDM	RDM	TDM	HI based on	
						Nut dry weight	Copra outurn
WCT	24.0	5.8	29.8	51.9	81.6	0.59	0.18
Chandra kalpa	22.7	7.3	30.0	38.6	68.6	0.51	0.17
Pratap	24.8	5.7	30.5	48.1	82.8	0.54	0.18
Kera ganga	29.1	4.2	33.3	57.7	91.1	0.57	0.19
Chandra sankara	27.2	4,8	32.0	48.8	80.8	0.55	0.16
Laksha ganga	24.3	3.8	28.0	55.1	79.8	0.64	0.20
Chadra laksha	23.3	4.5	27.8	46.3	74.1	0.57	0.19
CD-P=0.05	2.46	1.10	2.77	NS	NS	0.053	0.016

among the cultivars and hybrids. LDM production was more in Keraganga (29.1 kgs.) followed by Chandrasankara (27.2) where as SDM production was more in Talls (range 5.7 to 7.3) than the hybrids (3.8 to 4.8). The higher LDM production observed in Keraganga implies the efficient assimilation capacity of this hybrid than the others.

RDM production which is the total of dry weights of nuts, bunches and spathes, was found to be higher in Kera ganga (57.7 kgs) followed by Lakshaganga (55.1 kg) than the others. Partitioning of TDM towards RDM was more in Laksha ganga and less in Chandra kalpa (Fig.1) and reverse trend was observed in partitioning towards VDM production. Higher nut yield has been observed in Pratap (110). However, significant differences have not been observed between the cultivars and hybrids (Table 3). Although higher nut yield was observed in Pratap, nut composition is very poor with low husk shell and copra content. Nut composition of WCT is comparatively better than all other cultivars with high husk, shell and copra content (Table 3). However, partitioning of total nut dry matter towards copra has been found to be more in Laksha ganga (40.6%) followed by Kera ganga (34.7%) (Fig.2). The importance of higher partitioning of total dry matter towards copra for crop improvement has been reported by Corley (1973). Copra out turn also was found to be more in the above two hybrids than WCT.

Taking into consideration the importance of each component of nut, a number of harvest idices can be calculated in coconut. In this paper, harvest indices have been calculated taking in to account the partitioning of total dry matter towards the total dry weight of the nut as well as towards the

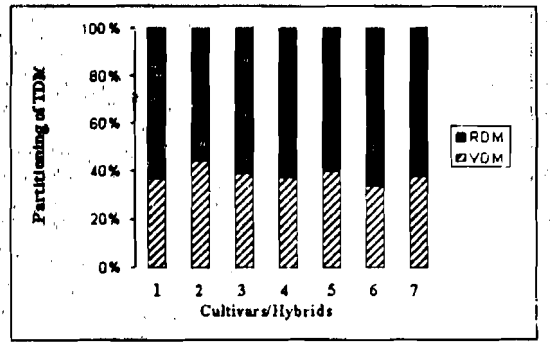

Fig.1: Partitioning of TDM towards VDM and RDM (%)
1- WCT , 2- Chandrakalpa, 3- Pratap, 4 - Keraganga, 5- Chandrasankara, 6- Lakshaganga, 7- Chandralaksha

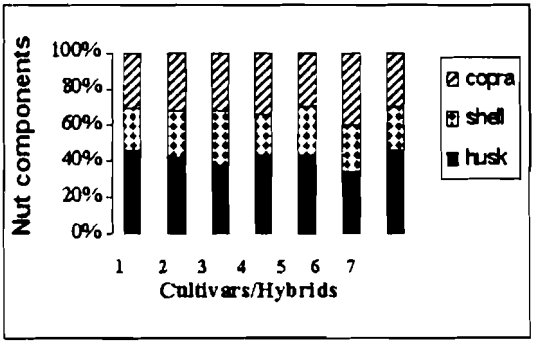

Fig.2: Partitioning of nut dry matter towards its components (%)
1- WCT , 2- Chandrakalpa, 3- Pratap, 4 - Keraganga, 5- Chandrasankara, 6- Lakshaganga, 7- Chandralaksha

Table 3. Nut components (Dry weights) in coconut cultivars/hybrids

Cultivar/hybrid	Husk (gm)	Shell (gm)	Copra (gm)	Total weight	Copra out turn/palm	Nut Yield/ palm/year
WCT	299.9	145.7	190.1	635.7	14.67	77
Chandra laksha	197.9	118.7	141.3	457.9	11.54	82
Pratap	157.2	114.9	131.6	409.7	15.82	110
Kera ganga	258.9	126.7	183.1	568.7	17.15	94
Chandra sankara	251.7	152.5	161.9	566.1	12.98	80
Laksha ganga	246.4	141.9	188.2	576.6	16.70	89
Chandra laksha	267.6	141.7	172.3	581.6	14.23	83
CD:P=0.05	44.87	13.91	17.44	65.10	NS	NS

copra outturn. Significant differences have been observed in the harvest indices calculated among the cultivars with high harvest indices in Lakshaganga than the others (Table2).

CONCLUSIONS

The results showed that among the cultivars and hybrids the performance of Kera ganga (WCTxGBGD) and Lakshaganga (LCTxGBGD) was found to be better than the others in terms of leaf traits, dry matter production and yield attributes. Further, the observations clearly indicated that total nut production *per se* is not an important criterion for crop improvement programmes. Harvest index (HI) which gives an indication of the partitioning of total dry matter (TDM) towards the economic yield is the important trait for improving the production potential of the palms. Since the determination of TDM in coconut is very tedious and time consuming, partitioning of total nut dry matter towards copra can be used as an important selection trait for crop improvement programmes.

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