



Performance of T x T Coconut (*Cocos nucifera* L.) hybrids in Tamil Nadu

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Abstract

Eight T X T hybrids and seven parents were studied for their yield performance and manifestation of heterosis for yield of nuts and nut characteristics. Among the hybrids, three showed positive heterosis for yield of nuts and four showed positive heterosis for yield of copra. Manifestation of heterosis also differed significantly for nut characters. Hybrid combinations Laccadive Ordinary Tall X Cochin China Tall and Laccadive Ordinary Tall x Philippines Ordinary Tall were superior for yield of nuts and copra per palm/year. The study revealed the possibility of identifying certain T X T hybrid combinations giving high yield.

Key words: Coconut, hybrid, variability, heterosis

Introduction

Genetic improvement of coconut (*Cocos nucifera* L.) has not received the attention that it deserved mainly due to some unique problems encountered with the crop. The perennial habit, long juvenile period, out crossing and heterozygous nature, difficulties in clonal propagation and large area required for systematic experimentation are some of the barriers to achieve rapid progress in coconut breeding. Among the several breeding methods, exploitation of heterosis had the maximum impact in coconut improvement. Systematic work on hybridization in India was started in 1930's and the discovery of hybrid vigour (Patel, 1937) received considerable attention in the production of coconut hybrids. After that large number of hybrid combinations of Tall x Dwarf (T X D) and Dwarf x Tall (D X T) have been evaluated over the years and it resulted in the release of 12 hybrids for cultivation. The earlier breeding works were mostly on T X D and D X T combinations. But, the studies on Tall X Tall hybrids and their exploitation are scanty. So, an attempt was made to exploit the hybrid vigour in T x T hybrids and the results are discussed in this paper.

Materials and Methods

The experimental material comprised of eight inter varietal Tall X Tall hybrid combinations along with their parents. Seven tall genotypes viz., East Coast Tall (ECT), Sanblas (SNB), Federated Malayan States (FMST), Philippines Ordinary (PHOT), Java Giant (JVT), Laccadive Ordinary (LCOT) and Cochin China (COCT) were used as parents. The hybrid combinations and parents were planted during 1985 in RBD with three replications, 4 palms per replication. All the crop management and protection practices were done as per the recommendation. The data on annual mean nut yield (No. of nuts/palm/year), copra yield (kg/palm/year), length of nut (cm), breadth of nut (cm), whole nut weight (g), dehusked nut weight (g), and copra weight (g/nut) were recorded from four matured nuts harvested from each palm separately by using standard procedures given in coconut descriptors (Ratnambal *et al.*, 1995) during summer months. The heterobeltiosis was estimated in eight hybrids for all the seven characters.

Eight years with stabilized yield were taken to work out the mean annual nut yield and nut characters.

Statistical analysis was done as per the procedure. Phenotypic (PCV) and genotypic (GCV) coefficient of variation were worked out according to Burton (1952). Heterosis was worked out over the better parent (Heterobeltiosis) using the overall mean value of the characters.

Results and Discussion

Nut yield

Annual mean yield of nuts during the stabilized period of eight years is presented in Table 1. Among the eight hybrids studied, the hybrid combination Laccadive Ordinary X Cochin China recorded the highest average annual yield of nuts (138.8) and it was followed by Laccadive Ordinary X Philippines Ordinary (102.3). Among the parents, SNB showed the highest annual nut yield of 93.8 and it was followed by PHOT (92.5), FMST (91.1), ECT (86.3) and LCOT (85.5).

Copra yield

Among the eight hybrids studied for their copra yield, LCOT X COCT has registered the maximum of 24.6 kg/palm/year followed by JVT X SNB (19.1) and LCOT X PHOT (17.9). Among the parents, PHOT recorded the highest copra yield of 14.2 kg/palm followed by LCOT (13.7) and SNB (12.8).

Fruit characters

The fruit components characteristics are presented in Table 1. The highest length of fruit was registered by PHOT X SNB (26.6) followed by JVT X ECT (25.3) and PHOT X ECT (23.2). Among the parents, ECT (23.8), JVT (22.5), SNB (22.3) and FMS (20.9) had lengthier fruits. None of the lengthier fruits has greater breadth, in both parents and hybrids. However breadth is higher in the hybrid PHOT X ECT (16.6 cm) and in parent Cochin China (18.4 cm). The whole nut weight is maximum in the hybrid FMST X ECT (1215 g) followed by PHOT X SNB (1180 g) and LCOT X PHOT (1029 g). Among the parents PHOT recorded the higher value for whole nut weight (1124 g) and dehusked nut weight (821 g). The same hybrid FMST X ECT showed the highest value for dehusked nut weight (727 g/nut). The copra weight was maximum in the hybrids JGT X SNB (225 g) followed by PHOT X ECT (194 g). Among the parents, JGT recorded the highest copra weight (200 g) followed by FMST (193 g).

The genetic variability study, revealed that the yield of nut has registered the highest phenotypic (20.87) as well as genotypic (20.49) coefficient of variation followed by dehusked nut weight and copra weight. Remaining characters viz., fruit length, fruit breadth, whole nut weight, dehusked nut weight and copra weight recorded

Table 1. Annual nut yield, copra yield and nut characters of hybrids and parents

Hybrids/ Parents	Annual mean nut yield	Copra yield kg/palm/year	Fruit length (cm)	Fruit breadth (cm)	Whole nut weight(g)	Dehusked nut wt. (g)	Copra wt. (g/nut)
FMST X ECT	69.0	11.9	21.1	15.6	1215	727.0	172.0
FMST X SNB	92.4	13.3	17.7	14.5	840	509.0	144.0
JVT X ECT	90.3	15.1	25.3	13.2	756	489.0	167.0
JVT X SNB	84.7	19.1	22.9	14.6	979	671.0	225.0
PHOT X ECT	76.0	14.7	23.2	16.6	938	543.0	194.0
PHOT X SNB	80.4	13.2	26.6	15.6	1180	664.0	164.0
LCOT X COCT	138.8	21.8	21.9	14.4	893	603.0	157.0
LCOT X PHOT	102.3	17.9	21.3	17.4	1029	666.0	175.0
ECT	86.3	10.7	23.8	14.4	961	471.0	124.0
SNB	93.8	12.8	22.3	15.5	986	598.0	156.0
FMST	91.1	12.4	20.9	15.3	1026	594.0	193.0
PHOT	92.5	14.2	18.0	15.9	1124	821.0	179.0
JVT	57.8	11.6	22.5	15.9	1095	615.0	200.0
LCOT	85.5	13.7	18.0	12.3	840	460.3	160.0
COCT	73.3	10.6	17.8	18.4	890	520.0	144.0
x	87.55	14.39	21.57	15.31	982.69	596.9	170.27
SE(d)	2.818	1.421	0.482	0.265	7.883	3.634	2.076
CD (5%)	5.773	2.751	0.987	0.543	16.148	7.446	4.253
CV (%)	3.94	1.01	2.74	2.12	0.98	0.75	1.49

Table 2. Heterobeltiosis of nut yield and fruit component characters of coconut hybrids

Hybrids	Mean annual nut yield	Copra yield	Fruit length	Fruit breadth	Whole nut wt.	Dehusked nut wt.	Copra wt. g/nut
FMST X ECT	-24.3*	-4.0	-11.3*	2.0	18.4*	22.4*	-10.9*
FMST X SNB	-1.5	3.9	-20.6*	-6.5*	-18.3*	-14.9*	-25.4*
JVT X ECT	4.6*	30.2*	6.3*	-17.0*	-31.0*	-20.5*	-16.5*
JVT X SNB	-9.7*	49.2*	1.8	-8.2*	-10.6*	9.1*	12.5*
PHOT X ECT	-13.1*	3.5	2.5*	4.4*	-16.5*	-33.9*	8.4*
PHOT X SNB	-14.3*	-7.0*	19.3*	-1.9	5.0*	-19.1*	-8.4*
LCOT X COCT	62.3*	79.6*	21.7*	-21.7*	-0.3	16.0*	-1.6*
LCOT X PHOT	10.6*	26.1*	18.3*	9.4*	8.5*	-26.6*	-2.2

* Values are significant at 5% level

moderate coefficient of variation at phenotypic and genotypic level. Ranges of these characters are between 10.03 and 15.63. The lowest variation was found in fruit breadth (PCV-10.27 and GCV-10.03). Too much of narrow variations may be due to least interactions of environment for expression of the above characters.

Exploitation of heterosis for commercial cultivation of coconut is gaining momentum in recent years. It was in India that manifestation of hybrid vigour in coconut was first reported (Patel, 1937). D X T hybrids were found to be early bearing and high yielding. The superiority of T X D hybrids has subsequently been confirmed by many workers (Satyabalan, *et al.*, 1970; Ramanathan *et al.*, 1987; Ramachandran *et al.*, 1990; Natarajan *et al.*, 2001). Among the different dwarfs tested as male parents, Chowghat Orange Dwarf (COD) and Gangabondam (GBGD) were found to be superior to Chowghat Green Dwarf (CGD). The superiority of Gangabondam, a dwarf variety from Andhra Pradesh with good combining ability has been reported from Nileshwar by Krishnan and Nambiar (1972). On the other hand Ramachandran *et al.* (1974) established the superiority of local Green Dwarfs and Malaysian Yellow Dwarf (MYD) as the best combiners with Tall cultivars. Satyabalan (1991) after his detailed studies made on different combinations of palms from both the tall and dwarfs suggested that certain combinations are more promising than others. The present study was under taken since it is necessary to identify parental combinations for the production of promising hybrids. Heterosis was worked out for yield and nut characters (Table 2).

The heterobeltiosis for annual nut yield ranged from -24.3% to 62.3%. Among the eight hybrids studied, three showed positive heterosis and five showed negative heterosis. Hybrid combinations LCOT X COCT has recorded the highest positive heterosis of 62.3% followed

by LCOT X PHOT (10.6%) for yield of nuts. Ganesamurthy *et al.* (2004) also reported significant positive heterosis for yield of nuts. For yield of copra, the hybrid combinations LCOT x COCT (79.6%), JVT X SNB (49.20%), JVT X ECT (30.2%) and LCOT X PHOT (26.1%) showed significant and positive heterosis. The hybrid combination LCOT X COCT also exhibited the highest heterosis for fruit length (21.7%). Most of the hybrids registered negative heterosis for fruit breadth and fruit weight including the hybrid LCOT X COCT. Two hybrids *viz.*, FMST X ECT and LCOT X COCT showed heterotic advantage for dehusked nut weight. The following hybrids *viz.*, JVT X ECT (4.5%), LCOT X COCT (3.3%) and LCOT X PHOT (1.0%) registered positive heterosis for kernel thickness. Three hybrids *viz.*, JVT X SNB (12.5%) LCOT X COCT (10.6%) and PHOT X ECT (8.4%) exhibited heterotic vigour for copra content. In the present study, it is interesting to note that the parent LCOT produced better hybrid combination with other tall varieties.

The present investigation revealed that the T X T hybrids *viz.*, LCOT X COCT and LCOT X PHOT showed its superior performance in mean annual nut yield and copra yield. These T X T hybrids also exhibited heterotic vigour for yield of nuts and yield of copra as that of T X D and D X T hybrids. Maliwan Pattanapruk *et al.* (1985) reported better performance of some T X T hybrids. The present paper also highlighted the performance of T X T hybrids.

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