LAI decreased. The sowing in September 29th was found superior to other dates of sowings in respect of all the characters studied. This is in conformity with the findings reported by Major (1977) on rape.

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VHC 2 A NEW T X D HYBRID COCONUT FOR TAMIL NADU

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ABSTRACT

A new coconut hybrid VHC 2 was synthesised by combining ECT X MDY. This hybrid possessed high yield potential than the local ECT in terms of nut and copra yields. VHC 2 is characterised by low values for bunch buckling and leaf drooping which are the disadvantages commonly met in T x D hybrids. VHC 2 is recommended for commercial cultivation in Tamil Nadu.

KEY WORDS : Coconut hybrid, Nut yield.

The manifestation of hybrid vigour in coconut was first reported in India during 1932 (Patel, 1937). In intervarietal combination involving 'Tall' as male parent and 'Dwarf Green' as pollinator palms, hybrid vigour was found expressed in seedling characters. Heterosis was also observed in other economic characters at adult palm stage, such as high rate of growth, leaf production, nut yield and nut quality. Precocity was the most advantageous feature contributed by the dwarf pollinator. Since then, several hybrid combinations were synthesised in different parts

of our country. However, much importance was paid to the production and distribution of the hybrid seedlings only in early 70's in Tamil Nadu. Large scale production of T x D hybrids was made by involving local ecotypes of East Coast Tall and available dwarf parents, Green, Yellow or Orange types. Systematic efforts were initiated at the Coconut Research Station, Veppankulam to produce different hybrids of specific T x D combination with a view to identify the most suitable one. Ramanathan *et al*. (1982) reported the performance of a high yielding coconut hybrid, VHC 1. The investigations were further continued and the results indicated the superiority of another hybrid. Details of its performance are presented.

MATERIALS AND METHODS

Artificial emasculation and pollination were made between East Coast Tall (ECT) as ovule parent and Ayiramkachi (AY), Dwarf Green (DG), Malaysian Dwarf Green (MDG) collected from Adirampattinam and Malaysian Dwarf Yellow (MDY) obtained from Kulasekaram (Kanyakumari district) as pollinators. The hybrids were planted during 1972 in a completely randomised design without replication adopting a spacing of 7.5 x 7.5 m. For comparison, 10 East Coast Tall seedlings developed from the open pollinated nuts of the Tall females used in hybridisation were also planted. However, the population of East Coast Tall being low for comparison with the hybrids ECT X MDG (60) and ECT X MDY (50), twenty tall palms of the same age group in the adjacent block were also used as standard. The yield data for 12 years from 1976 (first bearing), the mean nut composition, extent of buckling and productivity characters collected for ECT X MDY, ECT X MDG and ECT are considered for discussion. Oil content was estimated by ether extraction process in Soxhlet apparatus.

RESULTS AND DISCUSSION

ECT X MDY commenced flowering in 43 months as against 45 in VHC 1 and 56 in East Coast Tall. Liyanage (1956) found that in the F_1 hybrid progenies, the mean age of first flowering was 48.6 months as against 74.3 months in Tall types. The yield performance over the entire period of bearing is presented in Table I. The ECT x MDY has recorded a mean nut yield of 106.7 as compared to 98.5 and 63.0 of VHC 1 and ECT respectively. It has been reported that the yield of hybrid coconut gets stabilised after eight continuous years from the first bearing. In the present study also, a similar trend is observed. Hence a critical comparison of yields obtained prior to (one to eight years) and after stabilisation (ninth to twelth year) was made in the present study and the results are furnished in Table 2. The analysis revealed the validity of comparison of the yields during the two periods separately as seen from the considerably low CV value in the stabilised period than the non-stabilisation. ECT X MDY recorded a mean of 147 nuts/tree over the four years (1984 - 1987) while VHC 1 yielded 131 nuts accounting for a yield gain of 12.2 percent over the latter. The main yield component in ECT X MDY was number of bunches / palm (Table 6). The yield of ECT during the above period was 82.2. The higher CV in respect of ECT for the above period indicated a high degree of intra population

Table 1. Yield performance of coconut hybrids with East Coast Tall

YEAR	ECT		ECT X MDY		VHC 1	
	Mean ± SE	CV(%)	Mean ± SE	CV(%)	Mean ± SE	CV(%)
1976	43.8 ± 8.5	88.2	49.4 ± 5.0	77.9	26.5 ±19.5	>100
1977	74.6 ± 4.1	37.2	76.4 ± 4.4	44.4	38.2 ±10.2	83.6
1978	96.3 ± 4.1	29.1	92.6 ± 3.8	31.4	60.5 ± 8.2	41.6
1979	77.3 ± 3.5	30.5	76.6 ± 3.7	37.1	36.5 ±12.3	72.3
1980	90.7 ± 5.0	37.6	84.5 ± 4.7	42.1	47.3 ± 9.1	61.1
1981	170.3 ± 6.0	24.0	131.3 ± 5.4	31.1	101.6 ± 8.4	26.2
1982	45.9 ± 6.2	92.5	41.3 ± 5.1	93.5	37.3 ±15.1	>100
1983	93.3 ± 4.8	35.5	103.9 ± 5.1	37.6	66.6 ±11.8	55.9
1984	126.1 ± 6.4	34.8	115.3 ± 4.8	32.1	44.8 ± 7.3	51.3
1985	147.5 ± 5.8	26.8	139.8 ± 5.9	32.3	128.3 ±10.2	21.9
1986	182.0 ± 7.8	30.0	157.0 ± 6.3	30.2	85.8 ±11.9	61.9
1987	132.7 ± 5.9	31.1	114.5 ± 7.2	45.3	82.1 ±14.3	74.9
Mean	106.7 ±13.1	41.4	98.5 ±10.2	44.6	63.0 ± 8.9	62.6

Table 2. Mean yield of stabilised and non-stabilised periods

Details	VHC2		VHC1		ECT	
	Mean	CV(%)	Mean	CV(%)	Mean	CV(%)
Stabilised period	147.1	30.9	131.4	35.0	82.2	53.3
Percentage on ECT	178.9		159.8		100.0	
Pre-stabilised Period	86.5	47.5	82.0	49.4	51.8	53.8
Percentage on ECT	167.0		158.3		100.0	

Table 3. Nut components and oil content.

Hybrid/ check	Whole nut weight (g)	Dehusked nut weight(g)	Meat weight (g)	Copra weight (g)	Oil content(%)	Estimated copra yield (Kg) for stabilised period
VHC2	1002 ± 79	615 ± 17.8	314 ± 13.9	159 ± 7.2	70.2	23.3
VHC1	992 ± 54	602 ± 30.3	280 ± 19.9	158 ± 4.0	68.6	20.7
ECT	945 ± 106	518 ± 58.3	253 ± 47.4	125 ± 7.2	63.5	10.3

Table 4. Extent of setting (mature nuts to buttons) and barrenness

Hybrid /Check	Percentage of	
	Setting	Barren nuts to total
VHC2	35.9	6.64
VHC1	34.8	5.38
ECT	34.0	7.35

Table 5. Extent of bunch buckling and leaf drooping

Details	No. of palms studied	Mean index	
		Leaf drooping	Bunch buckling
ECT X MDY (VHC2)	49	1.46	1.46
VHC1	382	1.91	2.62
ECT	90	1.62	1.28

1 : No buckling; 3 : Moderate buckling 5 : Heavy buckling

Table 6. Comparative performance of ECT X MDY with VHC1 and ECT (Hectare basis)

Details	ECT X MDY	VHC1	ECT
Nuts/ha (in'000)	18.25	17.00	10.83
Copra/ha (in MT)	2.90	2.70	1.35
No. of nuts required to make one tonne of copra	6289	6305	8000
Oil yield/ha (in MT)	2.03	1.85	0.86
Oil yield as percentage of ECT	236.0	215.1	100.0
Oil yield as percentage on VHC1	109.7	100.0	42.4

Table 7. Morphological and productive characters.

characters	ECT	ECT X MDY (VHC2)	MDY	VHC1
Girth at 1m from ground level (cm)	91.0	82.3	71.0	80.2
No. of leaf scars in 1m length	17.1	18.9	24.5	20.5
No. of leaves on the crown	28.8	34.8	29.5	32.7
Length of petiole (cm)	115.7	122.9	104.5	124.9
Length of leaf bearing portion (m)	4.57	4.78	4.10	4.70
No. of leaflets on one side	110	108	83	108

No. of spikelets	34.6	44.3	32.5	34.1
No. of spikelets with buttons	27.6	38.2	28.9	31.3
No. of buttons spathe	25.2	48.0	56.0	41.6
No. of nuts/bunch	6.3	7.5	6.9	8.5
No. of bunches/tree	10.4	14.9	13.9	14.1
Nut shape	Oblong/ round	Oblong	Oblong with prominent nipple	Oblong round
Crown shape	Circular	Circular/ Semi circular	Circular	Circular

variation due to non stabilisation. Satyabalan (1984) reported that yield of West Coast Tall gets stabilised only at the 19th year after first flowering. Thus precocious bearing and early stabilisation sought to be combined from dwarfs has been achieved in the present hybrid.

The intra population CV during the different years as well as CV between the mean yields of different years were estimated to understand the ability of the hybrid to withstand environmental variations. The CV was lowest in respect of VHC 2. This suggests that a higher degree of stability could be achieved in VHC 2 being the result of genetic homeostasis.

The analysis of nut components indicated that the copra content of the new hybrid (159 g/nut) is equal to VHC 1 but significantly superior to ECT (Table 3). The proportion of copra to whole nut weight in both ECT x MDY and VHC 1 is 15.9%. The improvement of copra content is a difficult process due to low heritability for this trait as reported by Meunier *et al.* (1984). The authors further suggested that improvement of copra yield/ palm could be realised by proportionate increase in nut yield which possessed three- fold heritability as that of copra content. In the present study also a higher copra yield is achieved in ECT X MDY by increasing the nut yield. The oil content in VHC 2 is marginally high. The extent of setting percentage (nuts realised to total buttoons produced) was more or less similar in the two hybrids. However the percentage of barren nuts is marginally higher in ECT X MDY (Table 4) which is expected in view of higher number of nuts realised from this hybrid.

Bunch buckling is a phenomenon most commonly observed in coconut, particularly in hybrids due to a higher number and weight of nuts and a relatively weaker peduncle. This was scored in the different genotypes. For VHC 1 and ECT, observations recorded on some of the palms in farmers' fields are also considered. In this respect also, VHC 2 had a lower negligible degree of buckling with a score of 1.46 for both bunch buckling and leaf drooping (Table 5).

Thus the new hybrid had distinct advantages over VHC 1 and ECT in respect of nut and copra yields, better stability and buckling of bunches over VHC 1. This was recommended for release in Tamil Nadu during the VIII workshop

meeting of All India Co-ordinated Research Project on Palms. ECT X MDY was released as VHC 2 (Veppankulam Hybrid Coconut 2) by the State Variety Release Committee of Tamil Nadu in 1988 The morphological and productive characters are enclosed (Table 7).

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N USE EFFICIENCY OF RICE AS INFLUENCED BY MODIFIED FORMS OF UREA AND $ZNSO_4$ APPLICATION IN VERTISOL

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ABSTRACT

Field experiments were conducted during Kuruvai 1986 in soils of Adanur, Kalathur and Sikar series with modified forms of urea and soil application of $ZnSo_4$. Among different modified forms of ures, viz., USG, NCU, CTU and mudball urea, the performance of point placed USG was more pronounced in the fine textured soils of Adanur and Kalathur series rather than in the medium textured soils of Sikar series as shown by the trend of values obtained for rice yield, apparent N use efficiency, uptake of N and available N content of the soils.

KEY WORDS : Rice, Urea forms, N Use efficiency, N uptake.

The utilisation of applied N by rice under submerged conditions is estimated to be low since the applied N particularly in inorganic form is very much vulnerable for leaching, volatilisation, denitrification and surface run off losses. Any attempt to increase the N use efficiency is advantageous both to the farmers as well as to the nation, particularly in saving the energy resources of the country. Having already identified the low N status of the Cauvery delta as one of the constrains in rice production, an attempt was made in the present investigation in the performance of different modified forms of urea in major rice growing soil series viz., Adanur,