Kalparaksha, a new coconut variety, resistant to root (wilt) disease

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During the year 2005, Kalparaksha a selection from MGD was identified as a promising resistant variety with high yield suitable for large-scale cultivation in the root (wilt) prevalent areas. This observation was recorded from the Seed Production Farm of the Coconut Development Board Farm at Neriamangalam, Ernakulam District, Kerala.

Coconut root (wilt) is a serious disease of coconut, contiguously prevalent in eight southern districts of Kerala and also in parts of Tamilnadu adjoining Kerala state. In the contiguously diseased areas, vast majority of coconut palms have succumbed to the disease.

The disease is caused by phytoplasma and transmitted by insect vectors. As the disease cannot be controlled by conventional plant protection measures, development of a disease resistant/ tolerant variety is the most practical and ideal method for the management of this malady. Since 1951, 84 cultivars and 68 hybrids were screened for resistance to root (wilt) disease and none of them had the desirable level of resistance. Chowghat Green Dwarf (CGD) was identified from a screening trial as the first variety resistant to root (wilt) in December 1999. Even though CGD is becoming increasingly popular as a compound crop in homesteads in root (wilt) prevalent tracts, it suffers from important draw backs such as small size of nut and poor quality of copra.

During the year 2005, Kalparaksha a selection from Malayan Green Dwarf was identified as a promising resistant variety with high yield suitable for large-scale cultivation in the root (wilt) prevalent areas. This observation was recorded from the Seed Production Farm of the Coconut Development Board Farm at Neriamangalam, Ernakulam among the five dwarf varieties of coconut namely MGD, Malayan Yellow Dwarf (MYD), Malayan Orange Dwarf (MOD), Chowghat Green Dwarf (CGD), and Chowghat Orange Dwarf (COD).

Disease Incidence

Incidence of root (wilt) in the varieties studied varied from 19.9 % to 84.0 % indicating that there was wide variation in resistance to root (wilt) in the varieties studied (Table 1). With regard to resistance, CGD showed maximum resistance followed by Kalparaksha. Both CGD and Kalparaksha can be grouped as resistant on the basis of their percentage disease incidence. MYD showed 30.9 % disease incidence where as MOD showed 64.6% disease incidence. WCT palms, standing in adjacent farmer's plots, aged between 30 to 50 years showed 84.0% disease incidence indicating the susceptible nature of WCT to root (wilt) disease and the availability of sufficient inoculum for the spread of

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the disease among the experimental palms.

Disease intensity/index

Disease index was taken for all the susceptible palms of each variety (Table 1). Disease index among the varieties ranged only from 10.5 to 45. However, the disease index in CGD and Kalparaksha was 10.5 to 15.5 respectively, which indicates that most of the diseased palms are in the early stage of the disease. MYD and MOD varieties had disease index of 25 and 28 (disease middle), respectively, indicating that these two varieties had higher intensity of disease when compared to Kalparaksha and CGD. WCT with disease index of 45.0 showed maximum intensity of disease among the varieties included in this study.

Nut Yield

Yield in terms of nut, copra and oil of the six varieties are given in Table 2. Kalparaksha gave the maximum nut yield (64.5). In terms of copra content (table 3) WCT, MYD and Kalparaksha varieties gave 210.1, 202.2 and 185.1 grams, respectively. CGD had the lowest copra content of 96.8 gm/nut. Estimated values for copra/ha and oil/ha are given in Table 3. Kalparaksha gave the highest copra (2.09 t) and oil yield (1.36 t) per hectare followed by WCT. Kalparaksha out yielded WCT in terms of copra and oil yield mainly because of the higher nut yield and more bunches with nuts. This high nut yield can again be attributed to its higher level of resistance to root (wilt) disease compared to WCT. MYD, MOD and CGD gave an oil yield of 0.83, 0.66 and 0.61 tonnes/ha. Even though CGD had the highest level of resistance, its oil yield/ha was low because of the small size of nut and lower copra content.

There are several studies which showed Malayan Dwarf varieties, as giving almost double the yield of the traditional tall varieties in Jamaica, Ceylon and Trinidad. This is possible because of the closer spacing possible with Malayan dwarf due to its dwarf growth habit and relatively smaller crown compared to talls. Kalparaksha can be planted at shorter spacing of 7.0m x 7.0m instead of 7.5m x 7.5m required for talls. This advantage of

Table 1: Incidence and intensity of root(wilt) disease in coconut varieties

Varieties	Year of planting	Nos. observed	Number diseased		Disease incidence (%)		Disease index*
			2007	2008	2007	2008	
CGD	1993	261	25	52	9.6	19.9	10.5
Kalparaksha	1993/94	76	12	17	15.9	22.4	15.5
MYD	1993/94	202	43	62	21.3	30.9	25.0
MOD	1993/94	110	64	71	58.2	64.6	28.0
WCT	—	100	84	84	84.0	84.0	45.0

*Two parameters were scored for the evaluation of resistance (i) Disease Incidence calculated based on percentage of root (wilt) affected palms in each variety. (ii) Disease Index / Intensity calculated based on the modified method suggested by Nambiar and Pillai (1985). The following criterion was adopted for disease indexing. Disease index 0 - Total absence of all symptoms; below 20 - Disease early stage; 20 to 50 - Disease middle stage; above 50 - Disease advanced stage.

Table 2. Nut yield of dwarf varieties in comparison to WCT at CDB Farm, Neriamangalam.

Year of planting: 1993-94

Variety	No of palms	2002-03 (nuts/palm)	2003-04 (nuts/palm)	2004-05 (nuts/palm)	2005-06 (nuts/palm)	2006-07 (nuts/palm)	Average
Kalparaksha	76	77.4 *51.8	51.5 *30.83	62.7 *43.93	58.4 *36.34	72.2 *43.34	64.5
MYD	202	41.0 *30.02	33.0 *24.06	28.0 *22.58	41.0 *34.98	49.0 *36.57	38.0
MOD	210	48.0 *44.31	25.0 *22.00	41.0 *37.71	30.0 *32.10	41.0 *37.20	37.0
WCT	90	44.9 *29.58	50.6 *28.55	40.2 *22.59	59.3 *32.25	48.5 *36.16	48.7
WCT		Collected from District Agricultural Farm, Neriamangalam (300 palms of around 25 years of age)					40.5
WCT		Collected from farmers plots adjacent to Coconut Development Board Farm, Neriamangalam (100 palms of around 42 years of age)					34.5

*Standard Deviation

Year of planting: 1993-94

Table 3. Nut, Copra and Oil yield of Kalparaksha in comparison to WCT

Variety	Yield (nuts/palm/yr)	Copra content (g/nut)	Copra/palm (Kg)	Copra/ha (t/ha)	Oil content (%)	Oil/ha (t/ha)
CGD	55.0	96.8	5.32	0.931	65.5	0.61
Kalparaksha	64.5	185.1	11.94	2.090	65.0	1.36
MYD	38.0	202.2	7.68	1.344	62.0	0.83
MOD	37.0	150.1	5.55	0.972	68.0	0.66
WCT	48.7	210.1	10.23	1.790	68.0	1.22

higher plant population will result in higher nut yield per unit area and profitability when compared to tall varieties such as WCT.

Nut characters

All the three dwarf varieties (Kalparaksha MOD and MYD) are similar with regard to the size and shape of nuts. The green dwarfs, CGD and Kalparaksha, possess green coloured nuts, but the nuts of Kalparaksha are distinctly bigger, oval to round sized, with larger copra content. MYD and MOD can be distinguished by the colour (yellow and orange) of the nuts. This variety has good quantity and quality of tender nut water. Tender nut water of Kalparaksha is sweet and tasty to drink (Table 4).

However, Kalparaksha with its higher yield, large size of nut, higher copra weight and oil yield/ha, will have distinct advantage over CGD for farmer's in the root (wilt) prevalent areas. All the four dwarf varieties are profuse bearers of nuts especially in disease-free areas. They are preferred world over when they are grown for ornamental purposes and tender nut water and for its suitability in avenue planting/ specimen planting in landscape architecture. They are also used in DxT hybrid production. Dwarf varieties of coconut can out yield tall varieties when they are grown under good management conditions. In many places in India, they are usually under planted in coconut garden or house compounds. They usually do not perform well under neglected conditions since they require full sunlight, irrigation and good manuring for optimum yield.

In root (wilt) disease prevalent areas, dwarf varieties like MGD will have a distinct advantage over the existing tall and dwarf traditional cultivars such as WCT, COD etc. because of the higher level of resistance and attractive yield of nuts and copra. Under good management conditions, especially in root (wilt) prevalent areas, MGD will have unique advantage because of its many desirable agronomic attributes especially resistance to root (wilt), high yield and acceptable qualities of nuts and intermediate plant height. Since the tender nut water is sweet and available in good quantity (290 ml) per nut, this variety can be cultivated in large scale for the purpose of tender nut water. Moreover, this variety is semi tall in nature. Hence, climbing for harvesting and plant protection operations will be easy, reducing the cost of cultivation.

These studies clearly show Kalparaksha as a promising variety suitable for large-scale cultivation in the root (wilt) prevalent areas. Considering the root(wilt) resistance of this variety and many other desirable attribute, this variety was recommended for release for cultivation in the root(wilt) prevalent tract of Kerala and notified vide Govt. of India Gazette No.999 dated 27th July 2008. Because of the high yield and resistance to root (wilt) disease, as observed in our study for the first time, large scale cultivation of Kalparaksha will substantially help in increasing the coconut production and productivity in the root (wilt) prevalent tracts of Kerala and adjoining states.

Acknowledgement

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Reference

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Table 4. Nut characters of dwarf varieties

Varieties	Length of fruit(cm)	Brea-dth of fruit(cm)	Weight of fruit (gm)	Thick-ness of husk (cm)	Weight of dehusked nut (gm)	% of huskto whole fruit	Thick-ness of kernel (cm)	Weight of kernel(gm)	Thickness of shell(mm)	Weight of shell(gm)	Qty of water(ml)
C.G.D	17.7	11.5	477	1.24	290	39.2	0.97	229	2.45	60.1	49.6
Kalparaksha	19.9	14.8	964	1.35	635	33.8	1.04	523	3.72	112.1	196.8
M.Y.D	17.5	15.0	1064	1.37	755	28.8	1.01	628	4.03	126.4	227.2
M.O.D	21.0	15.5	1157	1.38	801	30.4	1.10	676	2.66	124.9	232.3
W.C.T	19.5	16.3	1151	1.61	743	35.3	1.05	570	3.44	172.9	186.1