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ARECANUT YELLOW LEAF DISEASE

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CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
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Cover page Front:

A general view of an Yellow Leaf Disease-affected arecanut garden.

Back: A high yielding disease affected palm.

ARECANUT YELLOW LEAF DISEASE

ORIGIN, DISTRIBUTION AND SPREAD

Yellow leaf disease of arecanut *(Areca catechu Linnaeus),* known as 'Kattuveezhcha', 'Chovakedu' etc. in Malayalam and 'Chandiroga' in Kannada, was reported from Moovattupuzha, Meenachil and Chalakudi areas of Kerala in 1949. It was observed that the disease had some similarities with the 'root and leaf disease' of coconut prevalent in those areas. The malady does not kill the palm outright, but is only debilitating in nature.

A preliminary survey conducted in 1959–'60, showed that the disease had spread to all parts of Kerala with the maximum incidence in Quilon District, where up to 90% of the palms were affected. The disease was also reported from the central regions of Maharashtra, parts of Karnataka and Tamil Nadu. A comprehensive survey was undertaken in 1976 in the disease affected areas of Kerala and Karnataka. The survey revealed that the disease is prevalent in almost all the districts of Kerala in varying degrees of intensity with the maximum infection in the Districts of Idukki and Kottayam closely followed by Trivandrum and Quilon. The results of the survey are as follows.

TABLE I

Distribution of yellow leaf disease of arecanut

District	*Area under arecanut (ha.)*	*Percentage of area affected by the disease*
KERALA		
Cannanore	16580	1.20
Kozhikode	8100	0.70
Trichur	15100	6.30
Idukki	1700	97.00
Ernakulam	7800	34.10
Kottayam	5400	94.30
Quilon	9200	75.40
Trivandrum	4500	71.80
KARNATAKA		
Chickamagalur	—	24.40

Seedlings planted in the affected soils usually manifest the symptoms three years after planting. About 80% of the palms become diseased within a period of four years

from the appearance of the first symptoms, which indicates the rapidity of the spread of infection. The disease occurs in all types of soils and its spread does not follow any specific pattern.

SYMPTOMS

The symptoms of the disease are yellowing of leaves and shedding of both mature and immature fruits. The yellowing starts from the tips of the leaflets of the outer leaves gradually extending to the middle of the laminae (Fig. 1.1). The affected leaves often develop necrosis from their tips. The diseased leaves possess smaller epidermal cells, stomatal pores and midrib parenchyma cells. Degeneration of cortex and presence of tyloses are commonly seen in the diseased roots. In advanced stages, the leaves are reduced in size and become stiff and pointed. The crown gets reduced and ultimately falls off. Tips and absorbing regions of young roots become dark and gradually rot. The kernel of affected nuts shows discolouration and later turns blackish (Fig. 1.2). Such nuts are unsuitable for chewing. The reduction in yield over a period of three years immediately after the incidence of the disease is to the extent of 50%.

A formula for indexing severity of the disease has been developed. The formula is:

$I = \left(\frac{(Y + N)}{L} + R\right) 10$, where 'I' is the index, 'Y' and 'N' are the sums of grade points for yellowing and necrosis, respectively, 'L' half the number of total leaves in the crown and 'R' is the grade point for reduction in size of the crown.

CAUSE OF THE DISEASE

Though a number of biotic agents have been implicated, the exact cause of the disease is not yet known. The fungi found to be associated with the disease are *Diplodia* sp., *Fusarium* sp., *Colletotrichum* sp., *Acremonium* sp., *Pythium* sp., and *Phytophthora* sp. Treatment of the affected palms with seven chemicals had no ameliorative effect on disease expression though palms treated with blue copper- 50, Cupramar and Furadan recorded increase in yield upto 31%. A bacterium *Pseudomonas* sp. has been found to be associated with the disease. However, inoculation with bacterial isolates from disease affected roots failed to produce the foliar symptoms on arecanut seedlings. Though involvement of a virus or virus-like organism in the disease has been suggested, electron microscopic tests failed to show the presence of such particles in the diseased leaves. Presence of MLO in the sieve elements of disease affected palms has been reported. However diseased palms treated with tetracyclins for a period of two years failed to show any amelioration.

Radopholus similis, the burrowing nematode, was found in the roots of both the healthy and disease–affected arecanut palms, but its role in producing the disease is not yet clear.

Waterlogging was considered to be one of the predisposing factors in the incidence of the disease. Extensive surveys were conducted in healthy and disease affected gardens of Kerala and Karnataka. Tables II and III give the results of the survey.

TABLE II

Nutrient content of arecanut soils—PALODE

pH		*Organic carbon %*		*Available N*		*Available P_2O_5*		*Available K_2O*	
Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
5.4	5.3	1.7	1.6	145.8	130.1	2.9	3.3	61.7	57.1

TABLE III

Nutrient content of arecanut leaves—PALODE

Nitrogen		*Phosphorus*		*Potassium*		*Calcium*		*Magnesium*	
Healthy	Diseased	H	D	H	D	H	D	H	D
1.48	1.29	0.41	0.38	0.92	0.87	0.71	0.79	0.78	0.77

The nutrient contents did not differ significantly between samples of leaf and soils from the healthy and diseased palms.

MANAGEMENT OF DISEASE

Since the disease is not amenable to control by any conventional plant protection measures, other means of containing the disease have to be adopted. Yield of palms in the disease affected garden can be increased considerably by regular NPK manuring at the rate of 100g N, 40g P_2O_5 and 140g K_2O per palm per year coupled with irrigation at four days' intervals.

TABLE IV

Average number of nuts per tree in different treatments

Treatment	*1968*	*1969*	*1970*	*1971*	*1972*
Control—no cultivation, no manuring	1.13	6.95	19.80	8.79	30.70
NPK with irrigation	88.60	278.92	208.80	154.33	208.40
NPK without irrigation	25.91	58.65	61.00	49.23	120.00
NPK + Micronutrients with irrigation	108.87	253.47	216.00	157.39	211.80
NPK + Micronutrients without irrigation	37.56	66.35	78.80	67.95	172.70

A comprehensive package trial conducted in ryots' gardens revealed that the treatments NPK + lime, NPK + lime + boron and NPK + lime + zinc increased the yield up to 20%. Seedlings treated with Agromycin (500 ppm), Bavistin (0.1%) and Temik (50g/seedling) since their planting in 1977 have not yet contracted the disease.

Fiftytwo collections (both exotic and indigenous), 21 varietal hybrids and seven crosses between a dwarf mutant and promising cultivars have so far been tested for their reaction to the Yellow Leaf Disease. The details regarding Dwarf hybrids are given in Table V.

TABLE V

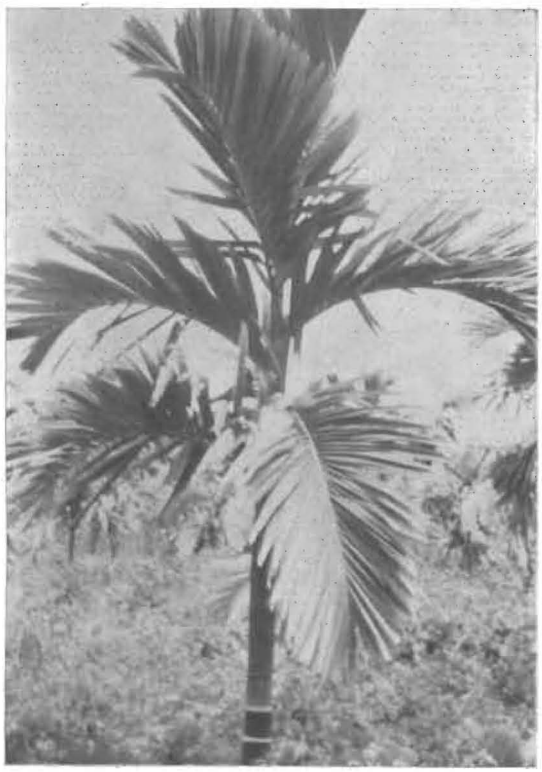
Reaction of arecanut dwarf hybrids to Yellow Leaf Disease

Hybrids/Parents	*No. of healthy palms*	*No. of diseased palms*	*% of palms affected*	*Average disease index*	*No. of inflorescences per palm/year*
Hybrids					
1. Mangala X Dwarf	33	3	8.3	0.28	0.7
2. VTL–13 X Dwarf	34	5	10.3	3.27	2.5
3. Mohitnagar X Dwarf	36	5	12.2	1.64	1.4
4. Dwarf X VTL–11	14	3	17.7	0.60	0.7
5. Thirthahalli X Dwarf	24	6	20.0	1.40	1.0
Parents					
6. Mangala	24	3	11.1	1.59	1.1
7. Dwarf	27	5	15.6	0.58	0.3
8. Control (South Kanara)	5	16	76.19	13.33	Not flowered

All the varieties and varietal hybrids succumbed to the disease though in varying degrees of intensity. However, in the Dwarf hybrids the intensity of disease incidence was less. These hybrids are now six years old. Their further performance is being watched.

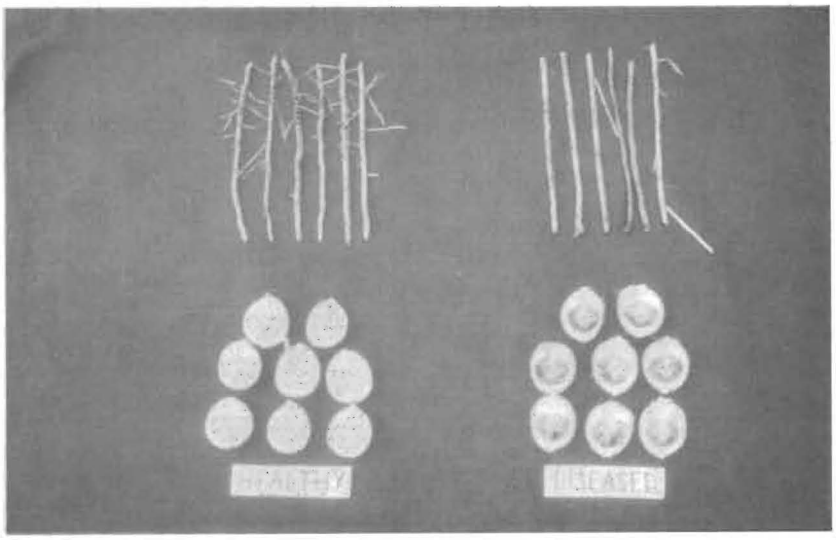
FUTURE THRUST

Since the disease is of a complex nature, a multi-disciplinary approach is essential for tackling the problem. The future stress will be in finding out the exact cause of the disease, evolving resistant varieties and adopting suitable agrotechniques for containing the disease in order to obtain economic yield.



A disease affected arecanut palm.

Arecanut leaf showing symptoms.



Nuts and roots from healthy and affected palms.

A high yielding disease affected palm.

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