COCONUT ROOT (WILT) DISEASE - SURVEY AND ERADICATION

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The coconut root (wilt) disease recorded around 1874 from Erattupetta in the erstwhile Travancore State, India, became significantly noticeable after a flood in 1882. Since then, around 1897 it was reported independently from Kaviyoor-Kallooppara and Karunagappally, approximately 50km away from each other (Fig. 1). The disease subsequently started spreading to the adjoining areas from these foci. Observations reveal that the disease occurs in sporadic isolated pockets, spreading in all directions and in all soil types. Palms of all ages are susceptible and disease-free gardens occur rarely in the moderately and heavily diseased areas with apparently healthy palms in heavily infected gardens. It is not lethal, but debilitating and has geographical delineation. Symptoms are well defined and the nature of the causal agent clearly understood. The diseased tract has a contiguous core

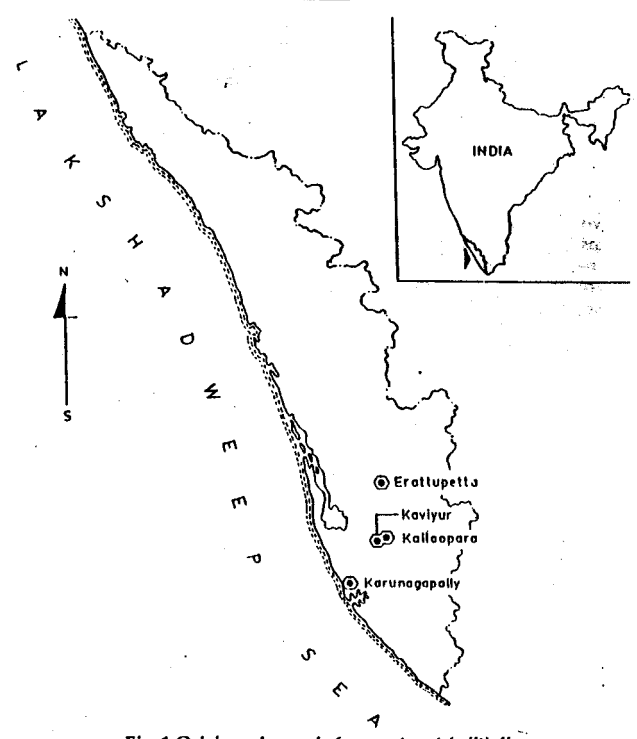

Fig. 1 Origin and spread of coconut root (wilt) disease

in the eight southern districts of Kerala State. It is also observed in a sparse manner in isolated pockets in the remaining districts in the north of Kerala and the adjoining districts of Kanyakumari and Coimbatore in the State of Tamil Nadu (Fig. 2). Coconut root (wilt) disease does not occur in any other part of the country.

SURVEY

An extensive survey on the intensity and production loss consequent on the development of the disease was undertaken in 1984 by the Central Plantation Crops Research Institute in collaboration with the Directorate of Agriculture, Directorate of Economics and Statistics, Special Agricultural Development Unit (all Government of Kerala), Kerala Agricultural University, Coconut Development Board, Central Plant Protection Station and the Centre for Development Studies (Trivandrum).

OBJECTIVES

The objectives were to estimate the extent of spread and intensity of the disease in the contiguously disease affected tracts, the

decline in yield in disease affected palms at an early and advanced stages and the production loss.

OPERATION

A two stage sampling design with Taluk as the stratum was adopted for enumerating the coconut palms. Fifty per cent of the revenue villages in each of the taluks in the districts specified were selected at random as the first stage units. From each of these villages six clusters of five survey sub-divisions were selected again at random as the second stage units. All the palms in these survey subdivisions were counted and categorised for disease status, age, and bearing and non-bearing status. In each cluster,a key plot with atleast six bearing palms was identified for enumeration of yield. Two palms each from root (wilt) free, disease-early and disease-advanced were selected at random, starting from the key plot. Observations were recorded in two rounds. During the first round, palms were classified as bearing and non-bearing. Subsequently they were identified as root (wilt) free, disease-early and disease-advanced. The number of nuts in bunches which are five months and above in maturity was counted and recorded. They were tagged for future observations. In the second round of observation carried out after a period of six months, the yield data of only the selected palms were recorded.

TRAINING

Systematic and exhaustive training was imparted to the participant personnel. Sub-divisional Agricultural Officers and Subject Matter Specialists on plant protection of the survey area were initially trained on theoretical aspects with an exposure to field operation at the Central Plantation Crops Research Institute, Regional Station, Kayangulam. Training was also imparted to the Agricultural Demonstrators of the Department who acted as the field enumerators. Classes were conducted at the various Agricultural Sub-divisions during the fortnightly training sessions by the Subject Matter Specialists and Junior Agricultural Officers. Special level field training camps were organized and experts from participating agencies were present in all the camps to monitor and guide the programmes.

RESULTS

In the contiguous disease affected tract stretching from Trivandrum in the south to Trichur in the north the estimated palm population is 59.2 million bearing and 32.4 million non-bearing ones (Table 1). The incidence and intensity of the disease varied among the districts. The extent of the incidence of the disease in both the bearing and non-bearing categories of palms together was the highest in Kottayam district (75.6%) followed by Alleppey (70.7%) Pathanamthitta (38.2%) and Ernakulam (34.5%). In Trichur district, the disease incidence was 2.6% and the lowest incidence of 1.5% was observed in Trivandrum district. Out of an estimated 32.4 million non-bearing palms, 16.8% were affected by the disease. Of these 13.5% was in the early stage and 3.3% in the advanced stage (Table 2). The estimated average yield per palm was the highest (77 nuts) in the district of Trivandrum and lowest in the dis-

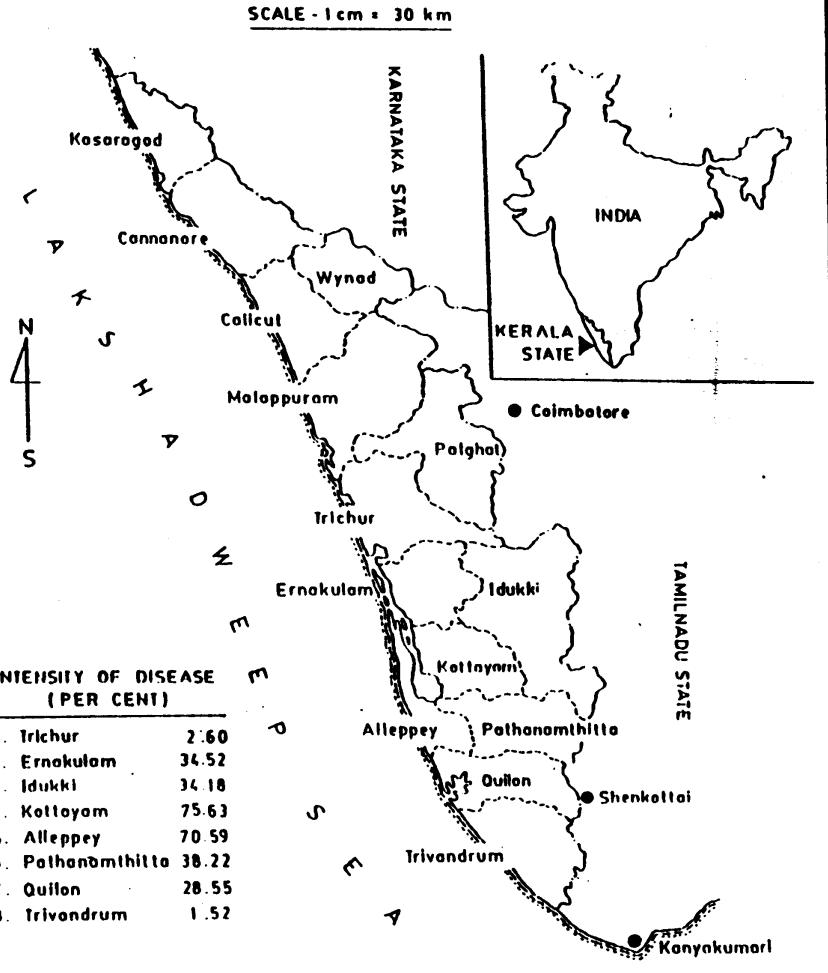

Fig. 2. Distribution of coconut root (wilt) disease

trict of Kottayam (35 nuts) (Table 3). The yield of root (wilt) affected palms is normally reduced with the increase in intensity of the disease. The extent of decline in yield is 43% in disease-early and 75% in the disease-advanced over the root (wilt)-free palms. The estimated loss in 1984-85 was to the order of 968.09 million nuts which is a little more than one-fourth of the expected production for the year (Table 4). The highest loss was recorded in Alleppey (271 million) followed by Kottayam (254 million) and the lowest in Trivandrum (11 million).

STRATEGIES

In order to formulate an appropriate strategy to deal with the malady in the contiguous core, it is necessary to evaluate certain relevant observations. The causative Mycoplasma-like organism is susceptible to tetracyclines but the employment of these antibiotics to cure the disease is not possible. However, encouraging results are available to support the concept of 'living with the coconut root (wilt) disease' in the heavily affected areas. Being a debilitating disease, different packages of practice suitable for different situations consisting of balanced fertilization, weed control, recycling of organic matter including basin management of green manure crops, multiple cropping, mixed farming and irrigation are observed to improve the health and yield of the disease affected palms. But palms in the advanced stages of the disease do not respond to these packages. In this context, it was also observed that juvenile palms that had contracted the disease before the onset of flowering showed delayed flowering with relatively poor yield. It is essential therefore to eradicate both the disease-advanced palms and all the diseased juvenile palms.

The possibility of checking the spread of the disease was attempted during 1971 by the eradication of sporadic diseased palms at Shenkotta of Tamil Nadu. No reapppearance was noticed. This observation had led to the establishment of a Field Station of the Central Plantation Crops Research Institute in the comparatively mildly affected district of Trichur with Karuvannur river as a protective belt. The area of operation was confined originally to 10 villages along the northern side of the protective belt and the programme was extended to the districts of Palghat, Malappuram, Calicut and Cannanore. During the past decade 3704 diseased palms have been eradicated in the belt area in Trichur district. Out of the 341 gardens located in 10 villages during 1979-82, only 15 gardens spread over in three villages had the recurrence of the disease during 1989-90 (Table 5). At the same time in areas away from the operational zone towards sparsely affected region, the recurrence has been confined only to 10 gardens of one village out of the 14 gardens located in 26 villages (Table 6). During 1981-84 no recurrence has been observed in Palghat, Malappuram and Wynad districts. Absentee landlordism, legal problems and the non-cooperation on the part of the farmers are the major constraints in the total removal of all diseased palms, irrespective of intensity and yield in the sparsely affected area. Removal of these palms has to be done on a war footing to prevent the disease to newer areas.

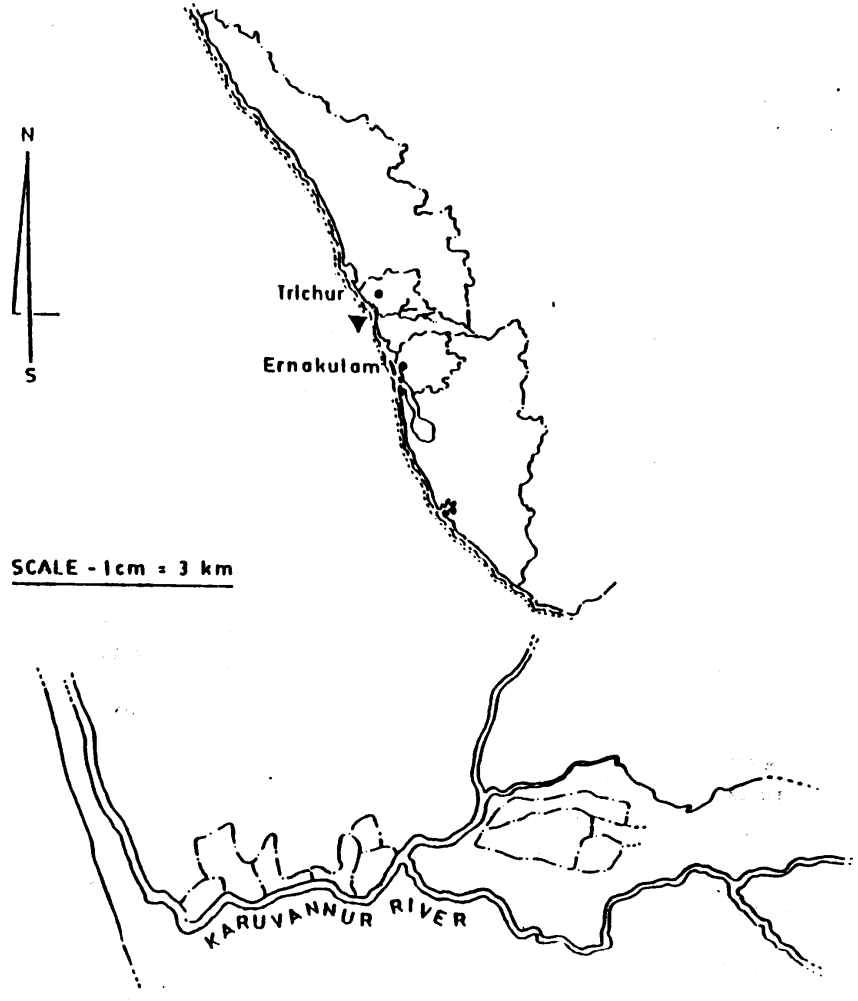

Fig. 3. Area of operation to contain the disease

Table 1.

DISTRIBUTION OF NONBEARING AND BEARING PALMS IN RELATION TO THEIR CONDITION AND INTENSITY OF DISEASE
(in thousands)

Sl. No.	DISTRICT	RWF			DE			DA			TOTAL DISEASED			TOTAL		GRAND
		NB	B	TOTAL	NB	B	TOTAL	NB	B	TOTAL	NB	B	TOTAL	NB	B	TOTAL
1.	TRIVANDRUM	6370	10111	16481	13	182	195	5	55	60	18	237	255	6388	10348	16736
2.	QUILON	5102	5735	10837	916	2255	3171	263	896	1159	1179	3151	4330	6281	8886	15167
3.	PATHANAMTHITTA	1967	2099	4066	257	1179	1436	118	961	1079	375	2140	2515	2342	4239	6581
4.	ALLEPPEY	1848	1410	3258	1243	4550	5793	332	1734	2066	1575	6284	7859	3423	7694	11117
5.	KOTTAYAM	1208	1483	2691	903	5046	5949	232	2168	2400	1135	7214	8349	2343	8697	11040
6.	IDUKKI	1028	973	2001	105	675	780	16	243	259	121	918	1039	1149	1891	3040
7.	ERNAKULAM	4530	4821	9351	910	3329	4239	81	611	692	991	3940	4931	5521	8761	14282
8.	TRICHUR	4883	8347	13230	20	265	285	8	60	68	28	325	353	4911	8672	13583
	TOTAL	26936	34979	61915	4367	17481	21848	1055	6728	7783	5422	24209	29631	32358	59188	91546

Table 2.

Percentages of non-bearing and bearing palms under various categories of disease

Sl. No.	District	Non-bearing palms				Bearing palms				
		RWF	DE	DA	Total diseased	RWF	DE	DA	Total diseased	Overall* diseased
1.	Trivandrum	99.69	0.22	0.09	0.31	97.54	1.88	0.58	2.45	1.52
2.	Quilon	83.03	13.49	3.48	16.97	68.13	22.68	9.19	31.87	28.55
3.	Pathanamthitta	81.26	12.90	5.84	18.74	44.88	29.53	25.59	55.12	38.22
4.	Alleppey	59.64	29.75	10.61	40.36	19.84	56.77	23.39	80.16	70.69
5.	Kottayam	53.19	37.38	9.43	46.81	14.44	61.56	24.00	85.56	75.63
6.	Idukki	94.90	4.69	0.41	5.10	64.70	27.01	8.29	35.30	34.18
7.	Ernakulam	78.61	19.64	1.75	21.39	51.43	39.91	8.66	48.57	34.52
8.	Trichur	99.42	0.42	0.16	0.58	95.39	3.75	0.86	4.61	2.60
	Overall*	83.24	13.50	3.26	16.76	59.10	29.54	11.36	40.90	32.37

RWF = Root (wilt) Free, DE = Diseased Early, DA = Disease Advanced

The figures given for the overall mean are weighted means

Table 3.
Estimated average yield (nuts) per palm

Sl. No.	District	Average yield per palm			
		RWF	DE	DA	Overall
1.	Trivandrum	78	34	9	77
2.	Quilon	66	37	22	54
3.	Pathanamthitta	78	52	27	59
4.	Alleppey	86	48	22	49
5.	Kottayam	68	36	13	35
6.	Idukki	67	34	20	49
7.	Ernakulam	80	37	12	59
8.	Trichur	63	50	31	63
	Overall	72	41	19	57

Table 4
Estimated loss in production (in million nuts)

Sl. No	District	Loss in production
1.	Trivandrum	11.34
2.	Quilon	110.56
3.	Pathanamthitta	99.39
4.	Alleppey	271.02
5.	Kottayam	254.39
6.	Idukki	31.11
7.	Ernakulam	177.13
8.	Trichur	12.65
	Total	968.09

Table 5
Details of disease recurrence - Trichur Dist. (along the belt 1979-82/89-90)

Year	Villages	Gardens	Palms
1979-82	10	341	730
1983	8	18	21
1984	1	5	8
1985	6	17	21
1986	4	19	22
1987	3	12	25
1988	7	21	39
1989-90	3	15	21

**Total number of diseased palms eradicated in the begining*

Table 6.
Details of disease recurrence - Trichur district
(Away from the Belt - 1981-84/89-90)

Year	Village	Gardens	Palms
1981-84	26	142	362
1985	3	4	5
1986	1	4	8
1987	1	1	3
1988	3	15	28
1989-90	1	10	26