INCIDENCE OF ROOT (WILT) AND LEAF ROT DISEASES AND *ORYCTES* INFESTATION IN KERALA

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ABSTRACT

The root (wilt) disease affected coconut areas in Kerala were surveyed adopting a multistage sampling procedure during 1971 - 76 to estimate the percentage of palms affected by root (wilt) and leaf rot diseases and infested by *Oryctes*. The incidence of disease was maximum in Alleppey district (54%) followed by Kottayam (50%) and Idikki (43%) districts and minimum in Trichur district (less than 5%) where the disease incidence was limited to the southern villages. The *Oryctes* infestation was as high as 75% in Quilon district and 70% in Alleppey district. It is the lowest in Trichur district (39%). In other districts the infestation varied from 59% to 66%. The association of *Oryctes* infestation with these diseases was also discussed.

INTRODUCTION

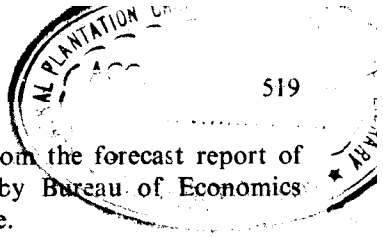
Lack of accurate estimates on the extent and intensity of incidence of most of the diseases and pests is one of the lacunae in agricultural research. This is an important handicap in the proper planning and execution of research work on any crop and particularly in plantation crops. Coconut is attacked by a large number of insect pests and pathogenic organisms. Of the major pests and diseases of the crop, the Rhinoceros beetle and the root (wilt) are the most important ones. Ramachandran (1961) observed that there was 4.9% reduction in yield due to *Oryctes* infestation. Root (wilt) and leaf rot are the major diseases of coconut palm in Kerala seriously affecting the yield of coconuts. The former is of unknown etiology and causes severe decline to the palm resulting in heavy loss in yield. The latter i caused by a fungus and is generally superimposed in wilt affected palms. A survey conducted at Central Plantation Crops Research Institute, Regional Station, Kayangulam (Gopinathan Pillai *et al.*, 1973) revealed that over 2.5 lakh ha of coconut plantations in seven districts of Kerala were affected by these diseases. In the north, disease was reported upto Irinjalakuda, 10 miles south of Trichur

Town and in the south in isolated pockets in Trivandrum district. In order to work out reliable estimates of the extent and intensity of root (wilt) and leaf rot diseases and *Oryctes* infestation, a survey was conducted and the results are discussed in this paper.

Materials and Methods

The root (wilt) affected coconut areas of Kerala consisting of Ernakulam, Alleppey, Kottayam, Idikki and Quilon districts in full and part of Trichur and Trivandrum districts were surveyed during the six-year period 1971—1976. Except in Alleppey district, two-stage random sampling procedure was adopted. About 20% of the revenue villages were selected at random as the first stage unit. From each of the selected villages, total area and the number of survey sub divisions in which coconut is grown were worked out. Four clusters of 5 consecutive survey sub divisions were selected at random. Total area and number of palms under each category viz., healthy, *Oryctes* infected, diseased early, diseased advanced with *Oryctes* infestation were recorded. A palm was considered as *Oryctes* infested if at least one leaf is attacked by the beetle. As leaf rot was generally found superimposed on root (wilt) affected palms, both root (wilt) and leaf rot affected palms singly or in combination were considered as diseased palms. The disease index (George and Radha 1973) was worked out for the diseased palms. The total number of palms healthy, *Oryctes* infested and diseased under different stages and the percentage of palms in each category were estimated using the formulae given in Sukhatme and Sukhatme (1970) for two stage sampling with suitable modifications.

The number of villages and clusters selected and the number of palms examined are presented in Table 1. In Trichur district only 50% of the villages which lie south of Trichur district and in Trivandrum district only villages containing all the disease pockets and the neighbouring villages were considered for the survey. In Alleppey district, 102 plots were selected by simple random sampling and a cluster of 20 palms were selected for the observations. The total number of palms in each category was estimated adopting the regression method taking the estimated



number of palms in Alleppey district from the forecast report of the land utilisation survey conducted by Bureau of Economics and Statistics as the population value.

Table 1. Number of villages and clusters selected and palms examined

Districts	Total Number of villages covered	No. of villages selected	No. of clusters selected	No. of palms examined
Trivandrum	57*	10	40	2448
Quilon	98	25	99	6535
Kottayam	74	16	64	7188
Idikki	41	7	28	1841
Alleppey	100	—	102	2046
Ernakulam	88	17	64	5372
Trichur	117	10	40	5532

*In Trichur and Trivandrum districts only 50% of the villages were covered under this survey.

Results and Discussion

Disease incidence

Disease incidence was found maximum (54.5%) in Alleppey district followed by Kottayam (49.8%) and Idikki (43.0%) districts (Table 2). These districts are in the middle of the disease tract and the percentage of occurrence and intensity of disease decreases towards the north and south of this area. The disease incidence is very low in Trichur district. Out of the 4.53% diseased palms in the surveyed area only 0.14% were found to be in the advanced stage (disease index being more than 50%). The remaining area (50%) of the villages is free from disease incidence and hence the estimates of disease incidence for the whole district will be almost half of the above.

In Trivandrum district from the area surveyed (50% of the revenue villages) only 10% of the palms were found diseased under various stages of which only 0.33% were found to be diseased in the advanced stage. As all the disease suspected areas were covered in this survey the estimates of disease incidence in Trivandrum district as a whole will be almost half of the values

Table 2. Estimated percentage of palms under healthy, *Oryctes* infested and diseased (district-wise) conditions

Districts	Trichur	Ernakulam	Idikki	Kottayam	Alleppey	Quilon	Trivandrum
Healthy (H)	58.63 (17.85)	26.17 (5.03)	24.46 (11.43)	23.93 (4.23)	14.90 —	15.78 (2.87)	29.11 (5.95)
Oryctes infested (O)	36.84 (9.60)	47.73 (9.64)	32.52 (14.25)	27.06 (3.91)	30.6 —	56.80 (8.33)	60.95 (10.38)
Diseased early (D.E)	2.56 (1.32)	7.74 (2.49)	9.05 (5.02)	11.92 (2.58)	5.90 —	6.61 (1.80)	5.06 (2.03)
D.E. + O	1.79 (1.28)	9.71 (2.55)	18.38 (9.46)	20.13 (3.35)	16.40 —	12.51 (2.36)	4.63 (2.03)
Diseased Moderate (D.M.)	—	—	—	—	4.00**	—	—
D.M. + O	—	—	—	—	12.90	—	—
Diseased Advanced (D.A)	0.05 (0.14)	4.61 (2.09)	5.82 (4.52)	6.24 (1.98)	4.80 —	3.10 (1.13)	0.13 (0.28)
D.A. + O	0.09 (0.21)	4.55 (1.93)	9.76 (6.49)	11.46 (3.33)	10.50 —	4.70 (1.39)	0.20 (0.34)
O	38.72 (8.72)	60.68 (9.84)	60.66 (23.50)	58.69 (5.98)	70.40 —	74.58 (7.69)	65.75 (10.68)
D	4.53 (2.18)	25.67 (6.11)	43.02 (16.04)	49.75 (6.41)	54.50 —	27.05 (3.91)	10.06 (2.97)
O. + D.	1.82	14.26	28.14	31.59	39.80	17.21	4.83

Figures in parentheses are S.E. of the estimates.

*Relates to the surveyed portions only (50% of the villages)

**In Alleppey district alone the diseased palms were grouped as early, moderate and advanced.

presented in Table 2. In Ernakulam and Quilon districts, the disease incidence was found to be 26% and 27% respectively.

Oryctes infestation

Oryctes infestation was very severe in almost all districts surveyed except in Trichur (38.7%). Maximum infestation was

Table 3. Estimated number of palms ('000) under various categories of healthy, *Oryctes* infested and diseased (district-wise)

Districts	Tri-chur*	Erna-kulam	Idikki	Kotta-yam	Alle-ppey	Qui-lon	Trivan-drum*
Healthy (H)	3265	2073	520	2664	1951	1484	1298
(O)	(275)	(286)	(84)	(346)	—	(122)	(145)
Oryctes infested	1726	2794	681	2793	4006	5033	2542
	(520)	(256)	(97)	(245)	—	(385)	(270)
Diseased early	125	825	204	1309	768	631	239
	(12)	(129)	(30)	(136)	—	(56)	(31)
D.E. + O	70	693	386	2046	2155	1157	194
	(8)	(56)	(55)	(153)	—	(87)	(23)
Dis. Moderate (D.M.)	—	—	—	—	530**	—	—
D.M. + O	—	—	—	—	1683	—	—
Diseased Advanced	Neg.	429	125	635	627	288	7
	—	(53)	(26)	(60)	—	(30)	(2)
D.A. + O.	5	363	202	1028	1375	415	11
	(1)	(37)	(31)	(99)	—	(36)	(3)
Total	519	7177	2118	10475	13095	9008	4291
O.	1801	3859	1268	5860	9219	6609	2746
	(566+)	(397)	(196)	(598)	—	(476)	(289)
D.	207	2312	917	5018	7138	2498	452
	(23)	(187)	(143)	(396)	—	(197)	(55)

Figures in parentheses are S.E. of estimates

*Relates to the surveyed portion only (50% of the villages)

**In Alleppey district alone the diseased palms were grouped as early moderate and advanced.

estimated at 75% in Quilon district closely followed by Alleppey district (70%) (Table 2). In Trivandrum, Idikki and Ernakulam districts more than 60% of the palms were infested in varying intensities. In Quilon district out of the 6.5 million disease-free palms more than 5 million palms were found to be infested by *Oryctes* (Table 3). In Trivandrum district out of the 3.8 million disease-free palms about 2.5 million trees were infested by *Oryctes*,

Association of *Oryctes* infestation with disease

Out of the 13 million palms in Alleppey 39.8% of the palms were found to be diseased as well as infested by *Oryctes*. In Kottayam district also the extent of association was very high (31.6%). But in Trichur district only 1.82% of the palms were found diseased as well as infested by *Oryctes*. In the diseased tract as a whole out of the 51 million coconut palms 61% were found to be *Oryctes*-infested and 36% diseased.

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