Distribution of Spear Rot Disease of Oil Palm (*Elaeis guineensis* Jacq.) and Its Possible Association with MLO Diseases of Palms in Kerala, India*

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Survey of oil palm plantations in Kerala indicates higher incidence of spear rot disease in Palode, Arippa and Chithara plantations adjacent to Yellow Leaf Disease of Arecanut (YLD) and Root (Wilt) Disease of Coconut (RWD) plantations. The disease incidence reduced with increase in distance from YLD–RWD palms, while it was totally absent in areas close to forests which are far away from the possible source of inoculum (viz., YLD–RWD). Further spread of the disease within the plantation was erratic and patchy. It is suggested to remove the diseased arecanut and coconut palms from the adjoining areas of oil palm plantations and also the affected oil palm within the plot, as a precautionary measure in containing the disease.

Oil palm, a new crop to India is commercially cultivated in the states of Andamans, Andhra Pradesh, Karnataka, Kerala and Maharashtra (Rethinam, 1992). The plantations in Kerala are located in six districts which are Yellow Leaf Disease affected Arecanut (YLD) and Root (Wilt) Disease affected Coconut (RWD) tracts. These diseases are caused by Mycoplasma-Like Organisms (Solomon, Govindankutty & Nienhaus, 1983; Mathen, Rajan, Nair, Sasikala, Gunasekharan, Govindankutty & Solomon, 1990; Nayar & Seliskar, 1978; Anonymous, 1992). Among the diseases and disorders of oil palm documented so far in India (Kochu Babu, 1989; Kochu Babu, Radhakrishnan & Ramachandran, 1990; Kochu Babu & Radhakrishnan Nair, 1992; Kochu Babu & Pillai, 1992), spear rot is the most important disease prevalent only in the plantations of Kerala. This disease is characterised by yellowing of the youngest whorl of leaves and rotting of spear leaves *(Figure 1)* which result in drastic reduction of vigour and loss in productivity. The disease is infectious. Mycoplasma-Like Organisms (MLOs) have been observed in the phloem tissues of the affected palms (Anonymous, 1992). The etiological role of MLOs is being investigated through the probable vector, *Proutista moesta* (Westwood) (Homoptera: Derbidae) and dodder transmission studies. This paper presents a brief account on the distribution, incidence in relation to YLD *(Figure 2)* – RWD *(Figure 3)* and pattern of spread of the disease.

MATERIALS AND METHODS

The oil palm plantations of Kerala were surveyed for spear rot disease during 1985–1992. Spear rot incidence was studied from areas adjoining YLD and RWD as well as from the interior portions of oil palm plantations.

To study the severity of the disease in relation to YLD–RWD, every five

rows of oil palm (9 m x 5 rows = 45 m wide), starting from the border areas having YLD–RWD and ending with forest reserve or rubber plantations were observed in four sites at Arippa, Palode and Yeroor. The number of oil palms in each group of rows varied from 38 to 735, depending on the size of the site.

RESULTS AND DISCUSSIONS

Extent of disease incidence

The survey carried out in various plantations revealed the occurrence of spear rot in all the six districts, but the disease is particularly severe in Kollam and Thiruvananthapuram districts, which have maximum number of oil palms *(Table 1)*. The highest incidence of spear rot 7.41 per cent is observed at the Central Plantation Crops Research Institute (Research Centre), Palode, where 24.12 ha is under oil palm.

Among the five plantations of Oil Palm India Ltd., Arippa estate has the highest incidence of 1.56 per cent, while Kulathupuzha estate has the lowest (0.25%), with an average of 0.79 per cent (4024/5,11 360 palms).

In the Oil Palm Station, Thodupuzha, the disease incidence is low at present, because many diseased palms were rogued earlier and the spread is arrested.

Among the 1627 oil palms located in Kottayam, Kannur and Alappuzha districts, eleven were diseased.

Disease incidence in relation to YLD–RWD

The data on disease incidence at Palode are presented in *Table 2*. The tissue culture-hybrid and *tenera* x *tenera* oil palm seedlings were planted in arecanut gardens affected by YLD and the other experimental materials were planted as a monocrop in plots having YLD–RWD at some peripheral portions. High incidence of spear rot occurred in the YLD affected arecanut gardens.

Similarly in the monocrop, incidence of spear rot was more at the peripheral portions having YLD–RWD source. For *eg.*, in the Genetic experimental plot, planted in 1976, where 79 diseased palms were identified, 62. 8 per cent was confined to a valley close to several YLD–RWD palms. The areas farther away from this location adjacent to forests were free from disease incidence.

The disease incidence in the different plantations of Oil Palm India Ltd. also indicated similar relationship with YLD–RWD source in the periphery. A typical example of the pattern of disease occurrence is given in *Figure 4*.

A few diseased palms identified at Elavattom, Kallar, Peringammala, Kayamkulam, Kumarakom, Harippad and Kottayam are the underplanted ones in RWD affected coconut gardens.

Among the four sites chosen for gradient studies *(Table 3)*, site 1 and 2 at Arippa have YLD–RWD in the valleys and oil palms on either side of the slopes. Site 3 at Palode has YLD–RWD at the periphery. In site 4 at Yeroor, YLD–RWD palms are located in the centre and oil palms are found all around. The number of spear rot diseased palms was higher in the two sites at Arippa which had more number of YLD–RWD palms when compared with site 3 and 4 indicating that higher incidence occurs with the abundance and proximity of YLD–RWD. The pattern of disease incidence in these sites also shows a gradient of infection declining from YLD–RWD areas to interior portions. This is in agreement with the report of Arcy and Nault (1982) who had in-

DISTRIBUTION OF SPEAR ROT DISEASE IN THE OIL PALM PLANTATIONS OF KERALA.

Name of plantation	*District*	*Area (ha.)*	*Total no. of palms*	*Source of planting material*	*Year of planting*	*Period of survey*	*Frequency*	*No. of spear rot palms*	*Percentage disease incidence*
Oil Palm India Ltd. Yeroor	Kollam	1 831.42	227 721	Malaysia, Nigeria, Papua New Guinea	1971–1980	1990	Annually	1 508	0.66
Chithara	Kollam	944.25	145 332	Rep. of Zaire, Cote d'Ivoire	1981–1984	1992	Annually	1 540	1.06
Arippa	Kollam	280.00	40 252	Cote d' Ivoire	1983–1984	1990	Annually	628	1.56
Kulathupuzha	Kollam	390.12	52 660	Rep. of Zaire	1982	1990	Annually	132	0.25
Maravanchira	Kollam	328.95	45 395	Rep. of Zaire	1982–1984	1990	Annually	216	0.48
CPCRI, Palode	Thiruvananthapuram	24.12	3 374	Nigeria, Rep. of Zaire, Cote d'Ivoire,	1976–1991	1985–1992	Monthly	250	7.41
Elavattom	Thiruvananthapuram		1	Malaysia	1984	1987	Annually	1	
Kallar	Thiruvananthapuram		1		1980	1989		1	
Peringamala	Thiruvananthapuram		2		1970	1989	Annually	1	
Harippad	Alappuzha	0.17	23	Palode	1989	1992	Annually	2	
Kayamkulam	Alappuzha	0.12	16		1969	1987	Annually	1	
Kottayam	Kottayam	2.85	385	Palode	1989	1992	Annually	5	
Kumarakom	Kottayam		3		1980	1992	Annually	1	
Thodupuzha	Idukki	32.35	3 256	Nigeria	1963–1967	1989	Annually	4	
Sreekandapuram	Kannur	8.8	1 200	Palode	1988	1992	Annually	2	
Total		3 843.15	519 621					4 292	(0.83)

TABLE 2.
SPEAR ROT DISEASE INCIDENCE IN THE OIL PALM PLANTATIONS OF PALODE

Planting material	*Year of planting*	*No. of palms*	*No. of spear rot palms identified during the year*									*Total*	*Percent disease incidence*
			1982–84	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*		
Genetic	1976	1 882	28	7	11	7	7	3	4	8	4	79	4.2
Germplasm	1982 1988	310 312	14	2	2	3	2	2	8	3	3	39	6.3
Tenera x Tenera progeny	1983	198	30	5	8	13	11	10	4	–	–	81	40.9
Dura x Dura plot	1990	414	–	–	–	–	–	–	–	11	3	14	3.4
Tissue culture hybrid plot	1988–1989	60	–	–	–	–	–	2	18	9	6	35	58.3
Tenera x Tenera progeny	1991	198	–	–	–	–	–	–	–	–	2	2	1.00
Total		3 374										250	7.41

Figure 1: Oil palm affected by spear rot disease.

Figure 2: Dwarf arecanut palm affected by yellow leaf disease.

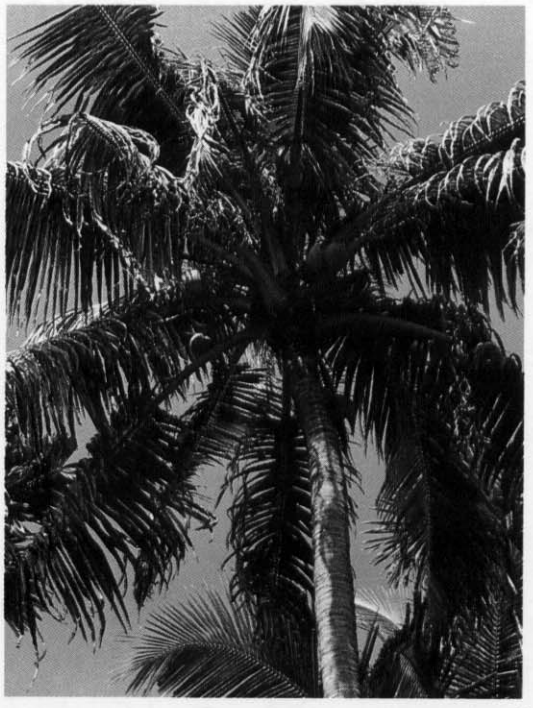

Figure 3: Coconut palm affected by root (wilt) disease.

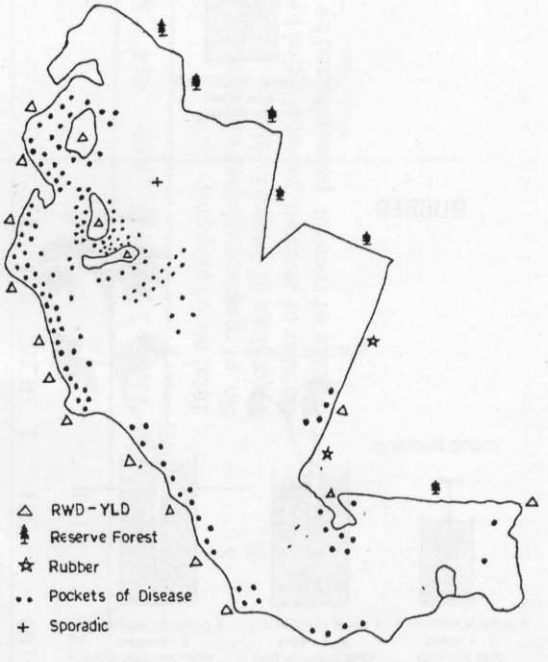

Figure 4: Spear rot disease incidence in relation to YLD–RWD in Chithara Estate.

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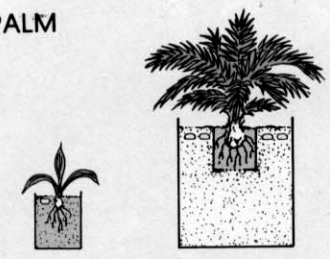

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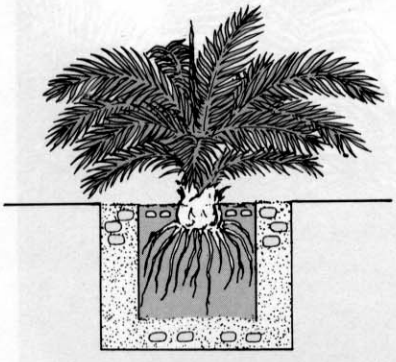

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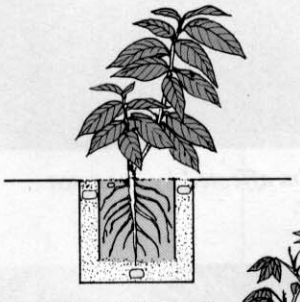

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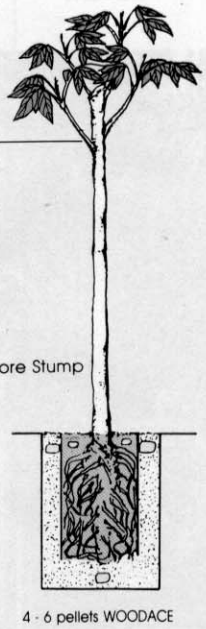

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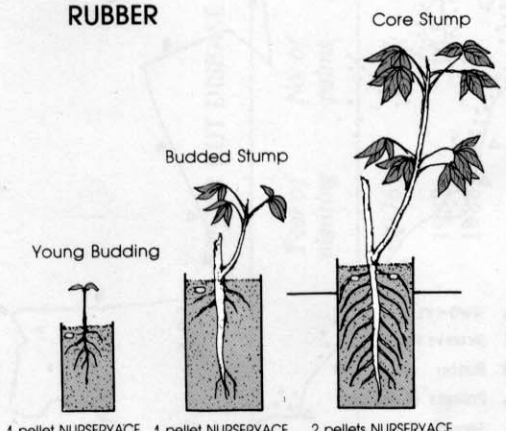

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1 pellet NURSERYACE
3 - 4 weeks
after transplanting

2 pellets NURSERYACE
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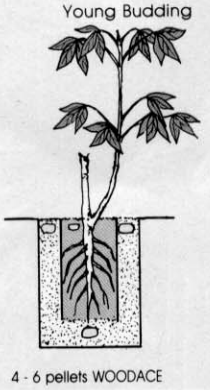

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TABLE 3.
GRADIENT OF SPEAR ROT INCIDENCE IN RELATION TO YLD – RWD

Distance from YLD – RWD (m)	*Site–1–Arippa YLD-1 140; RWD-86*						*Site–2–Arippa YLD-563; RWD-28*						*Site–3–Palode YLD-153; RWD-6*			*Site–4–Yeroor YLD-156; RWD-8*		
	Slope–1			*Slope–2*			*Slope–1*			*Slope–2*								
	T	*S*	*%*	*T*	*S*	*%*	*T*	*S*	*%*	*T*	*S*	*%*	*T*	*S*	*%*	*T*	*S*	*%*
0–45	488	151	30.94	735	67	9.12	180	53	29.44	38	40	45.45	143	28	19.58	125	8	6.40
46–90	512	46	8.98	735	41	5.58	117	11	9.40	108	27	25. 0	167	8	4.79	175	3	1.71
91–135	339	11	3.24	735	16	2.18	117	2	1.71	138	21	15.22	–	–	–	240	0	0
136–180	391	1	0.26	735	11	1.50	–	–	–	–	–	–	–	–	–	–	–	–
181–225	111	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total	1 841	209	11.35	2 940	135	4.59	414	66	15.94	334	88	26.35	310	36	11.61	540	11	2.04

T – Total no. of oil palms
S – No. of spear rot affected oil palms
% – Percentage of disease incidence
YLD – Number of arecanut palms affected by Yellow Leaf Disease
RWD – Number of coconut palms affected by Root (wilt) Disease

dicated a spatial gradient of infection in the case of diseases spread by insects if the source of inoculum of a disease is outside but close to the crop. The erratic and patchy spread of spear rot within oil palm plots is also in confirmation with the observations of the same authors.

Though the cross transmissibility of MLOs in the three palm species needs experimental evidence by dodder or vector transmission, based on the occurrence of spear rot in relation to YLD–RWD, it is suspected that MLOs of YLD and/or RWD may be serving as the source of inoculum for the spear rot disease of oil palm. Hence as a precautionary measure periodical removal of spear rot affected oil palms and RWD–YLD palms from the border areas of the oil palm plantations is suggested to minimise the spread from outside and within the plantations.

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