INDIAN COCONUT JOURNAL

Occurrence of Root (wilt) Disease in Kasaragod District of Kerala State

Solomon, J. J., Rohini Iyer*., Thampan, C*., Rajeev, G., Sasikala, M. and Gunasekaran, M.
Central Plantation Crops Research Institute, Regional Station, Kayangulam, Krishnapuram - 690 533, Kerala

Introduction

Root(wilt) disease (RWD) of coconut was first noticed around 1882 from Erattupetta area of Meenachil taluk in Kottayam district and subsequently from Kaviyoor and Kallooppara areas of Thiruvalla taluk and Kayangulam of Karthigapally taluk (Butler, 1908; Pillai, 1911). Since then, the diseae has spread in all directions from the original foci of infection and is reported to be present in a contiguous manner in eight southern districts - Thriuvananthapuram, Kollam, Alappuzha, Pathanamthitta, Kottayam, Idukki, Ernakulam and Thrissur of Kerala (Anonymous, 1985, 1997) and in isolated pockets in five northern districts except Kasaragod district. It is also prevalent in the adjoining districts of Tamil Nadu bordering Kerala State (Subha Raja and Jaleel Ahamde, 1975; Rethinam, 1983; Anonymous, 1986; Srinivasan *et al.* 2000) and Goa (Koshy, personal communication).

A comprehensive survey conducted beyond Karuvannur river in Thrissur district in 1983 recorded the prevalence of the disease in isolated pockets in the five districts north of Thrissur namely Palaghat, Wayanad, Malappuram, Kozhikode and Kannur (Radha *et al.* 1985).

This paper reports the occurrence of root(wilt) disease in East and West Eleri Krishi Bhavan area and Kasaragod in Kasaragod district hitherto considered as disease free area.

Identification of RWD palms

Following a request from the Agricultural Officials of Krishi Bhavan in Chittarikkal, Kasaragod district, about the occurrence of palms with yellowing symptoms, a team of Scientists from CPCRI visited three gardens under East Eleri Krishi Bhavan, Chittarikkal, during January 1999. Three palms in a garden were found to exhibit flaccidity of middle and outer whorl of leaves, yellowing of the older leaves and marginal necrosis of leaflets (*Fig 1*). All the three palms were found to be free from leaf rot disease. The opened and unopened inflorescences were also not exhibiting any necrotic symptoms.

Spear leaves from the three palms and an apparently healthy palm in the garden were collected for serological testing. Leaf extracts were tested by double diffusion test on agar coated slides and the extrcts of the three symptomatic palms exhibited distinct precipitin reaction against the root(wilt) antiserum. While the extracts of a symptomatic palm did not show any reaction in the gel (*Fig 5*). The results thus confirmed the occurrence of RWD inthe garden. Another interesting observation was that the areca palms in the garden were found to be affected by yellow leaf disease. It was learnt from the farmer that yellowing was first observed in arecanut and later after four years the symptoms in coconut was evident. As early as 1908, Butler had indicated that on his enquiry with the ryots in Central Travancore that the yellowing symptom was first noticed in arecanut and later observed in cocorut. During the surveys conducted by CPCRI Scientists in the districts north of Thrissur, it was reported by the farmers that occurrence of YLD in arecanut always preceded RWD in Coconut (CPCRI, 1995).

In a subsequent survey of 16 gardens under East Eleri Krishi Bhavan of Kasaragod district (*Fig 2*), out of 2140 palms observed, 420 adult palms (18.8%) were found to be root (wilt) diseased. Leaf samples from 20 representative palms were serologically tested, of which 19 showed distinct precipitin reaction. The root (wilt) diseased palms identified are in the early to middle stage of the disease indicating the recent occurrence of the disease. Among the 402 palms, 23 were found

Fig 1. Root (wilt) diseased coconut palm in the garden with symptoms

* *Central Plantation Crops Research Institute, Kasaragod - 671 124, Kerala*

Table 1. Survey of root (wilt) disease suspected palms in Kasaragod district

Location	Garden	Extent of area (cents)	No of palms in the garden	Palms with CRWD symptoms	CRWD incidence (%)	Palms with LRD	LRD incidence (%)	No of arecanut palms	Arecanut palms with YLD	YLD incidence (%)
Eleri Krishi Bhavan (Chittari kkal)	16	6820	2140	402	18.8	23	5.72	6100	2532	41.5

to be affected by leaf rot disease also, a disease that occurs superimposed on RWD palms (*Table 1*). In the contiguously root (wilt) disease affected area, leaf rot disease occurs superimposed on 65% of the root (wilt) disease palms. In contrast, in the mildly affected area in Kasaragod, only 5.72% of root (wilt) diseased palms are affected by LRD (*Table 1*). *Fusarium* sp., a dominant fungus that occurs during dry season on leaf rot affected palms

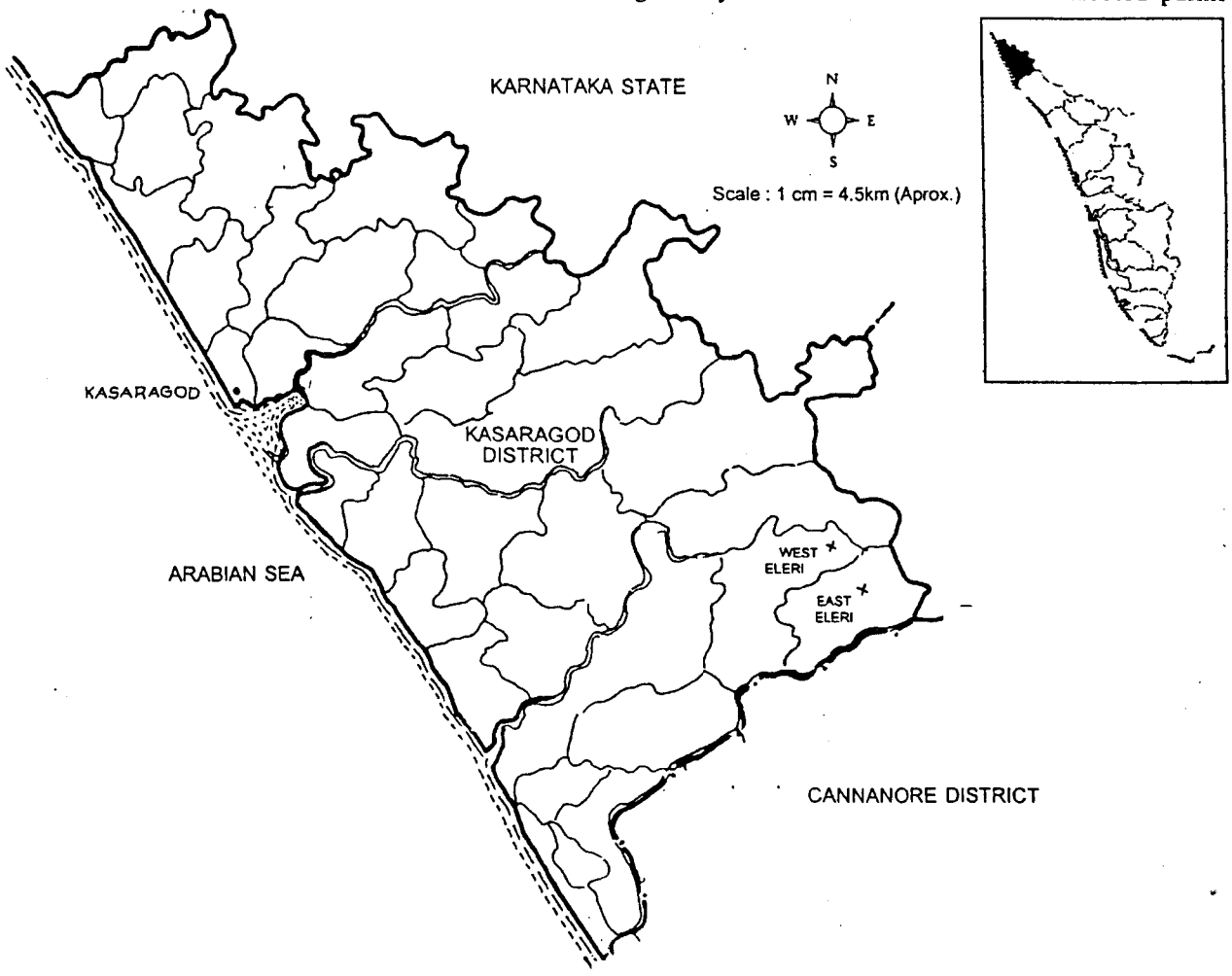

Fig 2. Distribution of Coconut Root (wilt) Disease in Kasaragod District

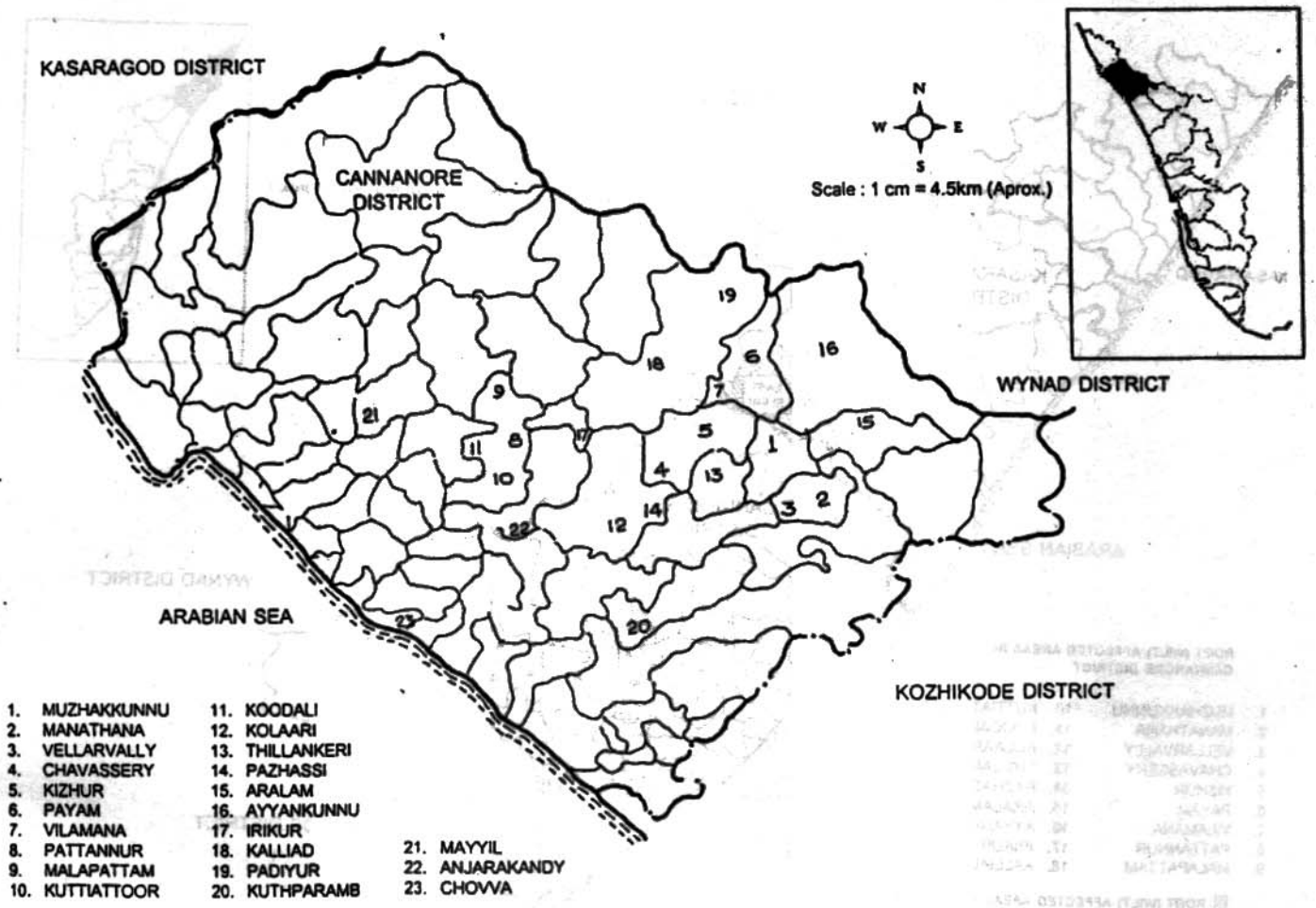

Fig 3. Distribution of Coconut Root (wilt) Disease in Cannanore District

(Srinivasan and Gunasekaran, 1996) was isolated from leaf rot affected leaves. In the gardens surveyed, 41.5% of the areca palms are also affected by yellow leaf disease (*Tabel 1*). Most of the YLD affected palms are in the middle to advanced stage of the disease indicating the possible prevalence of the yellow leaf disease for a long time. In a follow up to the aforementioned survey, training was imparted to Agricultural officials of Eeleri Krishi Bhavan in identification of root (wilt) diseased palms. Of the disease suspected palms identified by the officials, 17 were serologically tested and 16 reacted positively confirming the disease status. Root (wilt) diseased palms have since then located in Kasaragod also. Serolgocial testing of 17 disease suspects in Kasaragod revealed distinct precipitin reaction in 15 samples. To sum up, out of 58 disease suspects tested in East and West Eleri and Kasaragod, 53 reacted positively confirming the disease incidence (*Table II*).

Table 2. Results of the serological reaction of samples collected fromCRWD suspected palms in Kasaragod

Location	No. of palms tested	No.of palms with positive serological reaction
E.eleri	39	36
W. eleri	2	2
Kasaragod	17	15
Total	58	53

Spatial distribution of the disease

Surveys made in 1990 in the northern districts beyond Karuvannoor river revealed the prevalence of the root (wilt) disease in the five districts. In Kannur, 2707 palms located in 476

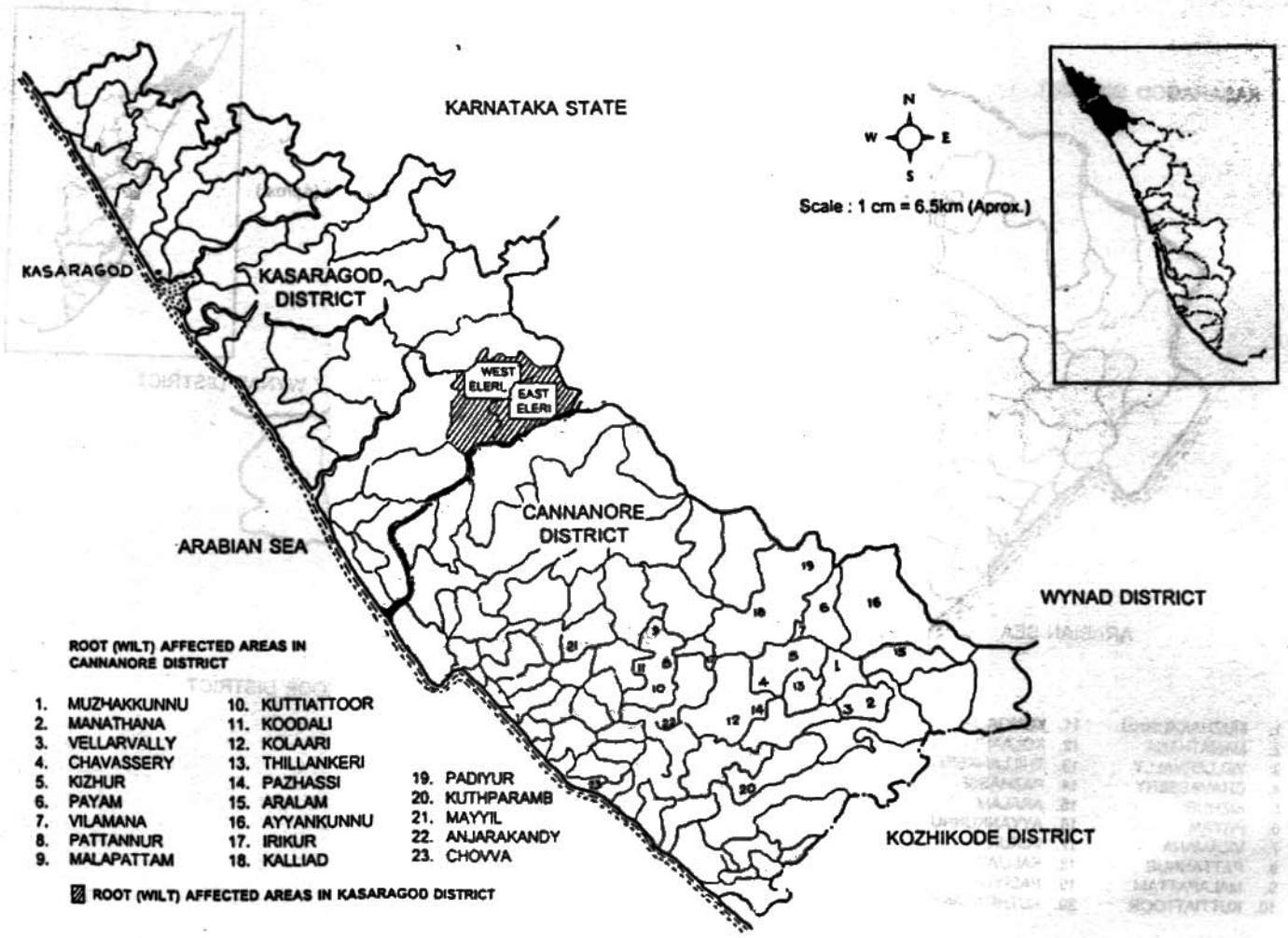

Fig 4. Spatial Distribution of Coconut Root (wilt) Disease in Kasaragod and Cannanore District

gardens of 23 villages were found to be diseased (*Fig. 3*). Out of this, 1729 palms were removed. The balance of 978 diseased palms could not be removed due to the absence of landlords, legal problems, non co-operation of the farmers and paucity of funds (CPCRI, 1995). The spatial distribution of RWD in Kasaragod and Kannur indicate that the nearest source of infection is in Kannur district - Irikur, Kalliad and Padiyur with reference to the E. Eleri is about 95 km. (*Fig 4*).

Since total eradication of the diseased palms identified was not completed in Kannur district, it is possible that the disease could have further spread from the initial foci of infection to newer areas in Kasaragod district. Although mounting evidences in favour of the RWD of coconut and YLD of arecanut both caused by phtoplasma are related to each other, it was never advocated to remove YLD affected palms to contain RWD. It is possible that the YLD affected palms might have served as a source of infection for the rapid spread of the disease in these areas. In the garden inE,.Eleri, where the RWD was first observed in coconut and YLD in arecanut, the planting materials of both coconut and arecanut were brought from Thodupuzha - a heavily diseased area in Central Travancore. It is possible that the disease could have occurred in this garden first and later spread radially to other surrounding gardens.

Future strategy to contain the disease should be comprehensive programme of removing not only RWD affected coconut palms but also to eradicate the YLD affected palms to eliminate the source of inoculum and surveillance of the

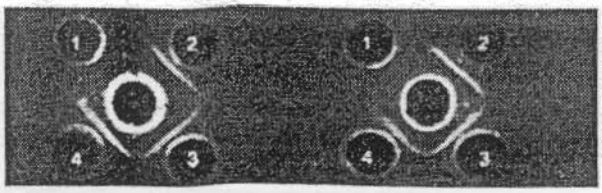

Fig 5. Double diffusion test on agar coated slides showing precipitin reaction against root (wilt) antiserum. Centre well filled with root (wilt) antiserum, Wells 2-4 filled with extracts of symptomatic palms and well 1 with extract of asymptomatic palm.

eradicated gardens at least for 5 years to locate fresh incidence if any and their prompt removal. Plant quarantine measures should be strictly enforced to prevent the movement of planting materials from diseased to disease-free area.

Acknowledgement

The authors are thankful to Dr. K.U.K. Namppothiri, former Director, CPCRI, Kasaragod and Dr. P. K. Koshy, Head, CPCRI (RS), Kayangulam for their encouragement to conduct the study. The help extended by Shri. Biju Joseph, Agricultural Officer, East Eleri Krishi Bhavan in conducting the survey is also gratefully acknowledged. The authors also wish to thank Mr. Jacob Mathe, Principal Scientist and Mr. C. K. Nampoothiri, Stat, Asst., for analysis and interpretation of the data.

References

Anonymous (1985). Coconut root (wilt) disease. Intensity, production loss and future strategy, CPCRI, Kasaragod pp 45.

Anonymous (1986). Coconut root (wilt) disease - present status of research and managment - Technical Bulletin 14 pp 10. Central Plantation Crops Research Institute, Kasaragod, Kerala, India.

Anonymous (1997). Coconut root (wilt) survey - 1996. Dept. of Agriculture, Govt. of Kerala pp 55.

Butler EJ, (1908). Report on Coconut palm disease in Travancore. *Agric. Res. Inst. Pusa Bull.* No. 9 : pp 23.

CPCRI (1995). Annual Report for 1994-95. Central Plantation Crops Research Institute, Kasaragod, Kerala, India pp.

Pillai, NK (1911). "Naleekeram" Vidyabhivardhini Press, Quilion pp. 112.

Radha K, Kochubabu M, Rethinam P, Antony KJ and Sukumaran CK, (1985). 'Contain' Coconut root (wilt) disease by eradication of diseased palms. *Indian Coconut Journal* 16 (6) : 1-8.

Rethinam, P (1983). Problems of root (wilt) disease of coconut in Tamil Nadu. *Indian Coconut Journal* 13 (9) : 21-23.

Srinivasan N and Gunasekaran M 1996. Incidence of fungal species associated with leaf rot disease of coconut palms in relation to weather and stage of lesion development. *Annals Applied Biol.*, 129 (3) : 433-449.

Srinivasan N, Koshy PK, Kamalakshiamma P G. Sasikala M, Gunasekaran M and Solomon JJ, 2000. Appraisal of the distribution of coconut root (wilt) and heavy incdience of the disease in Cumbum valley of Tamil Nadu. *Indian Coconut J.*, 31(1) : 1-5.

Subha Raja, KT and Jaleel Ahamed, N. (1975). A preliminary report on the occurrence of Kerala root (wilt) disease of coconut in Tamil Nadu. *Madras Agricultural Journal*, 62:83-84