

Spread and Distribution of Coconut Root (wilt) Disease in the Region of Theni - Dindigul Districts of Tamil Nadu

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Abstract

A sample survey conducted in Theni district of Tamil Nadu revealed the occurrence of coconut root (wilt) disease (RWD) in all blocks of the district. Severely infected gardens were observed in Cumbum block, followed by that of moderate incidence in Uthamapalayam block. Incidence of the disease - at sporadic level - was seen in all other blocks (Chinnamanur, Bodinayakkanur, Theni, Periyakulam, Andipatti and Kadamalaikundu) of the district. Sporadic occurrence of RWD was recorded for the first time in a region (Ayyampalayam) of Dindigul District. Spindle leaf samples drawn from RWD affected palms from several locations of these districts reacted positively and strongly against the RWD antiserum. In RWD affected palms of these districts, leaf rot disease (LRD) was also found to be superimposed. Association of various species of fungi with LRD was identified. Reasons for the spread of RWD complex, remedial measures required etc. are highlighted.

Introduction

Root (wilt) disease (RWD) has been recorded a century ago as serious malady of coconut plantations in Kerala State. The principal diagnostic symptom of the disease is flaccidity (ribbing) of middle whorl leaves followed by yellowing and marginal necrosis of leaflets in the older leaves. The spindle in RWD affected palm is weak, where softening and whitening of leaflets are invariably seen. It is a systemic disease, caused by phytoplasma. The pathogen is transmitted by insect vectors such as lace bug - *Stephanitis typica* and plant hopper - *Proutista moesta* (Solomon *et. al.*, 1999). In RWD affected palms, leaf rot disease (LRD), due to fungal complex occurs superimposed; indeed, LRD forms a part of RWD complex (Srinivasan and Gunasekaran, 1999). The RWD is non-lethal but causes a slow decline (debilitating) and the disease generally spreads slowly. The

palms affected by LRD deteriorates fast resulting in the decline of yield, leading to low productivity of the affected gardens.

The RWD has come to stay in eight

southern districts of Kerala state. As per the latest information, out of 102 million palms in the disease endemic region 24.05% palms are infected with RWD (Department of Agriculture, Government of Kerala, 1997). Sparse

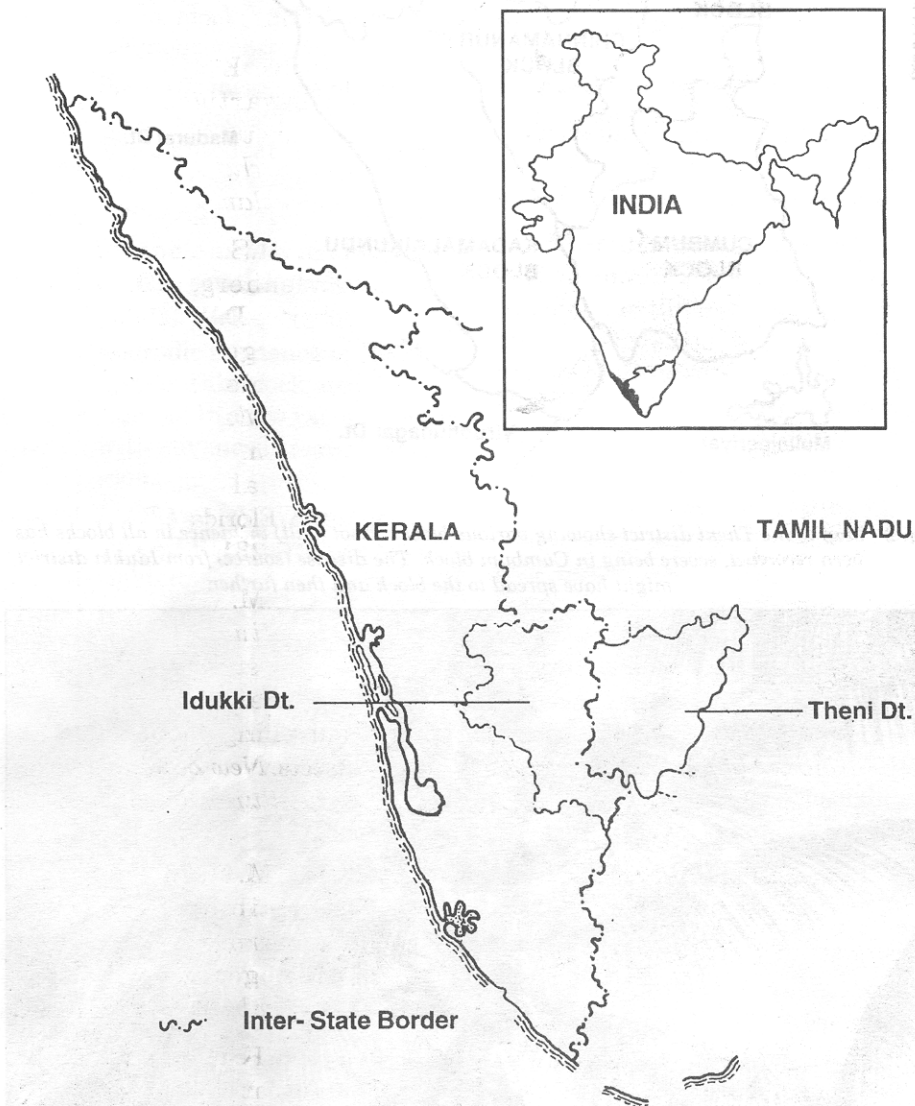


Fig. 1- Map showing geographical location of Theni district of Tamil Nadu that is in proximity of Idukki district of Kerala. Idukki is a part of root (wilt) disease endemic region

KERALA STATE
(IDUKKI DISTRICT)



Fig. 2 - Map of the Theni district showing various blocks. Root (wilt) incidence in all blocks has been recorded, severe being in Cumbum block. The disease (source) from Idukki district might have spread to the block and then further.



Fig 3.

occurrence of the disease in the northern districts of the state, even in northern most district of Kasaragod, has been detected in recent times, testifying to the spread of the disease. In the adjoining Tamil Nadu state also sporadic occurrence of RWD (in regions bordering Kerala) came to light in the past - as observed in 1971-72 in Sengottai (Tirunelveli District) and Kulasekaram (Kanyakumari District) Subbaraja and Jaleel Ahamed, 1975); in Coimbatore and Pollachi (Coimbatore District) (Rethinam, 1983); in Vallam village in the district of Tirunelveli and Ponmanai Village in Kanyakumari district (Jacob Mathew *et. al.*, 1998). In the regions of sparse/ sporadic disease occurrences, eradication (rouging) of RWD infected palms had been *in vogue* in order to contain its spread. Heavy incidence of RWD in Cumbum Valley (Theni district) of Tamil Nadu - was observed in December, 1998 and was recently reported (Srinivasan *et al.*, 2000). The disease incidence (palms also superimposed with LRD) in Cumbum Valley appeared to be very alarming. It is quite likely that RWD had spread into interiors of this region, owing to the expansion of coconut cultivation in Theni and Dindigul Districts. The incidence and spread of RWD in the region is a serious threat for the coconut cultivation. It was felt that a sample survey of the region would reveal the extent of disease spread and distribution. Results of such an attempt are presented here.

Materials and Methods

This sample survey was conducted with the co-operation of Tamil Nadu Agricultural Department Officials during 1999. A number of coconut plantations under various village / town jurisdictions covering all eight blocks of Theni district (Cumbum, Uthamapalayam, Chinnamanur, Bodinayakkanur, Theni, Periyakulam, Andipatti and Kadamalalkundu) were sampled for the presence of RWD (and

Table 1. Incidence of coconut root (wilt) disease (RWD) / leaf rot disease (LRD) as observed in various blocks of Theni district and in a region of Dindigul district of Tamil Nadu

Name of block (Theni District)	No. of gardens examined (under No. of places)	Occurrence pattern of RWD/LRD*
1. Cumbum	20 (9)	Severe - very severe incidence of RWD and LRD in several gardens of the block seen; even 100% incidence in certain gardens observed.
2. Uthamapalayam	12 (6)	Moderate incidence of RWD in several gardens seen; LRD sighted in such gardens.
3. Chinnamanur	15 (9)	Sporadic incidence of RWD in the block; LRD also frequently observed.
4. Bodinayakkanur	13 (8)	Sporadic incidence of RWD in several places; LRD also sighted; at least in one garden even palms in advanced stage of RWD noticed.
5. Theni	16 (8)	Sporadic incidence of RWD seen in several gardens; LRD also sighted.
6. Periyakulam	30 (15)	Sporadic incidence of RWD seen in this block also; LRD sighted; In a few gardens palms with advanced stage of RWD seen.
7. Andipatti	6 (3)	Incidence of RWD generally stray; LRD syndromes also sighted.
8. Kadamalaikundu	8 (6)	Incidence of RWD generally stray; LRD syndromes also sighted.
Dindigul District Ayyampalayam Region	10 (3)	Sporadic incidence of RWD, evident LRD also sighted; cases of advanced stage of RWD in a few palms noticed.

*Sizeable number of palms were felt as disease suspects in certain gardens/locations even though clear symptoms of RWD not established at the time.

Advanced stage of RWD in a few palms could be seen even in locations where disease incidence was generally sporadic/stray.

LRD invariably sighted in gardens where RWD symptoms clearly established.

LRD). Based on field observations the over-all incidence pattern of the disease in various blocks were categorised as stray, sporadic, moderate, severe or

very severe. The instances, disease suspects were also noted during the survey. Spindle leaf samples (from palms diagnosed as RWD) from various

locations the district were collected and subjected to serological confirmation (Sasikala *et al.*, 1998). A total of 31 spindles were collected from different locations (from five blocks) and tested against root wilt antiserum. Specimens of leaf rot tissue were checked for studying the fungi associated.

In order to draw early information of any RWD incidence in coconut gardens of Dindigul district which is adjacent to Theni district, a few gardens, especially in the coconut belt (Ayyampalayam - Pattiveeranpatti - Sithayankottai) in that district were also surveyed and palms examined. Spindle samples (from 13 palms) to represent Dindigul district was also collected and tested serologically.

The observations obtained from the survey and results of samples tested were tabulated for interpretation.

Results and Discussion

The number of coconut gardens examined in different blocks of Theni district as well as in Ayyampalayam region of Dindigul district of Tamil Nadu and the incidence pattern of RWD-LRD are presented in *Table - 1*

Occurrence of RWD in all blocks of Theni district was recorded (Fig. 1-5) Severe-very severe disease incidence was observed in Cumbum block. Several gardens in different localities of this blocks exhibited chronic symptoms of the disease. In gardens located especially at Lowercamp-Gudalur-Cumbum-Surulipatti-Kamayakaundenapatti belt, 80-100% palms in individual gardens exhibited severe RWD symptoms. LRD was also evident in RWD palms in several gardens. In other places of the block the disease incidence at mild-moderate level could be noticed. Mid-whorl yellowing symptoms was also found in several locations.

In Uthamapalayam block, in addition to the clear cases of RWD, a number of disease suspects were also marked. LRD was sighted in RWD

affected gardens. The root (wilt) incidence was generally sporadic in Chinnamanur, Bodinayakkanur, Theni and Periyakulam blocks. At least in one or few gardens in each of these blocks advanced stage of RWD in a few palms was noticed. In Andipatti and Kadamalaikundu blocks, generally stray incidence of RWD and LRD could be sighted. In Dindigul district also sporadic incidence of RWD (in gardens of all three places visited) was noticed. LRD incidence and advanced state of RWD in a few palms were found in this district too.

The results on serological reaction of spindle leaf samples are presented in Table 2. A very high per cent (98) of positive cases were recorded (Sasikala *et. al.*, 1998). Further the reaction intensity of the leaf extracts from these (diseased) samples has been graded as strong to very strong. This could be, perhaps due to high titre of the antigen available in the Tamil Nadu samples. Leaf rot affected spindle tissues were checked for the presence of fungi. *Colletotrichum gloeosporioides*, *Exserohilum rostratum*, *Glocladium vermoeseni*, *Fusarium solanum*, *Fusarium moniliforme*, *Thielaviopsis paradoxa* etc. were the fungi observed from among the LRD spindles (Srinivasan and Gunasekaran, 1996).

Over-all comparison of RWD status

Table 2. Serological reaction of spindles of coconut palms - with symptoms of root (wilt) as collected from Theni and Dindigul districts of Tamil Nadu - against root wilt antiserum*			
District/Block	Location of sample	No. of spindles collected/ subjected to serology	No. of spindles reacted positively**
<i>Theni District :</i>			
Cumbum	Cumbum	09	09
	Kamayakaundanpatti	03	03
Uthamapalayam	Rayappanpatti	03	02
	Bodinayakkanur	05	05
Theni	Kattapalam	01	01
	Boothipuram	01	01
	Veerapandi	03	03
	Bommaiyakaundanpatti	03	03
Periyakulam	Periyakulam	03	03
<i>Dindigul District:</i>			
	Sithayankottai	07	07
	Ayyampalayam	06	06
	Total	44	43

* In most of the sampled palms leaf rot was also observed.

** The reaction graded as strong to very strong.

specially among the blocks in Theni district would reveal the most severe form of disease occurrence in Cumbum block. From this block, a disease gradient is apparent with at least sporadic / stray incidence of RWD in other directions / blocks of the district. Thus current studies have shown the pattern of distribution of root (wilt) in

all blocks of Theni district and also has brought out for the first time the disease incidence in Dindigul district. As leaf rot has been sighted in most of the gardens where root (wilt) symptoms were observed, the interrelation of LRD with RWD in Tamil Nadu is further confirmed (Srinivasan, 1991).

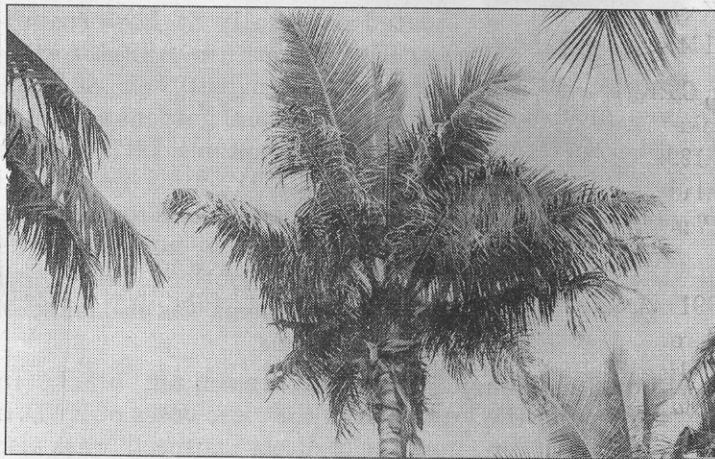


Fig 4.



Fig 5.

Analysis of the details accrued ought to indicate that earliest incidence of the disease in the region might be in Cumbum block. This block is in south-west part of Theni district adjacent to Idukki district of Kerala (Figs. 1 and 2). As Idukki district forms a part of RWD endemic region in Kerala, the disease source has been constantly available (Department of Agriculture, Government of Kerala, 1997) in close proximity. With the current knowledge on aetiology of RWD/LRD (Solomon *et al.*, 1999; Srinivasan and Gunasekaran, 1999) and the results now generated strengthen the view that the RWD complex has spread from Kerala into this part of Tamil Nadu. Consequently, the disease further spread in various locations.

It is further shown that thousands of palms are affected in this region of Tamil Nadu causing considerable loss in yield. As infection courts are distributed in different locations, the possibility of disease-spread to more palms cannot be ruled out. Occurrences of the disease in other locations of Dindigul district is also possible. Also the coconut palms in other adjoining districts such as Madurai, Virudhunagar etc. could be threatened. During the course of the present study, awareness about the disease has been created among the farmers of Theni and Dindigul districts and Agricultural Department officials were oriented towards disease identification, garden to garden survey etc. It is brought to the knowledge of the senior author recently that RWD complex has again appeared in Sengottai region (Achanputtur Village) in Tirunelveli district Hence the necessity of evolving strategies, surveillance - monitoring (Srinivasan *et al.*, 2000) of all vulnerable districts of Tamil Nadu to check the spread of root wilt and seek remedial measures are very relevant.

Acknowledgements

The authors are thankful to Dr. K.U.K. Nampoothiri, Director,

CPCRI; Dr. P. K. Koshy, Head of Station; Dr. (Mrs.) Rohini Iyer, Head of Division of Crop Protection - for their interest in this study. Thanks are also due to Dr. K. Arulmozhi, Director of Agriculture, Government of Tamil Nadu, Chennai and all those officials of the Department of Agriculture, Tamil Nadu - Theni and Dindigul districts for their support and active co-operation during the investigation. The help rendered by Dr. J. J. Solomon in this study is duly acknowledged.

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Milky White Mushroom on Fermented Coir Pith

Milky White mushroom, *Calocybe indica* P & C was successfully cultivated using fermented coir pith as substrate. Casing was done with sand + garden soil mixture (1:1) ratio amended with 5% calcium carbonate. Biological efficiency of 45.3 to 49.91 per cent was obtained in the fermented coir pith. The edible mushroom produced large and milky white fruiting bodies with delicious flavour and long shelf life