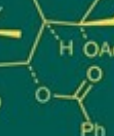
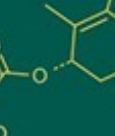
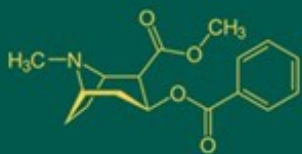


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
Indexing: Embase
IJABR 2026; SP-10(10): 567-570
www.biochemjournal.com
Received: 09-08-2026
Accepted: 25-09-2026
Published: 07-10-2026

P Latha

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

C Sudhalakshmi

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

P Ahiladevi

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

G Karthikeyan

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

K Angappan

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

M Shanthi

Department of Plant Pathology,
Tamil Nadu Agricultural
University, Coimbatore India

Improving the health of coconut trees through the management of root (wilt) disease

P Latha¹, C Sudhalakshmi², P Ahiladevi³, G Karthikeyan⁴, K Angappan⁵, M Shanthi⁶

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i10Sg.10342>

ABSTRACT

Coconut palm (*Cocos nucifera*, L.) is an important plantation crop of India and often described as 'Kalpavriksha' because of the multifarious uses of every part of it in the commercial sector. Coconut palms are normally affected by various diseases resulting into reduction in yields. Among them, root (wilt) is a systemic disease caused by phytoplasma is one of the most devastating diseases of coconut palms. Root (wilt) disease, a non-lethal but debilitating malady of coconut palm was first reported from Kerala State, India about a century and quarter years ago. Sparse and sporadic occurrence of the disease was also reported from other six northern districts of Kerala and from adjoining areas of neighbouring states of Tamil Nadu. The major symptoms of the disease in leaves are wilting, drooping, flaccidity, ribbing, button shedding, yellowing and necrosis of leaf rots. The pathogen is transmitted by insect vectors such as lace bug (*Stephanitis typica*) and plant hopper (*Proutista moesta*). In this regard, the survey was conducted in Coimbatore and Tirupur districts of Tamil Nadu to monitor the incidences of root (wilt) in coconut. Wherever the disease incidence was noticed, garden to garden survey was undertaken and individual trees infected with root (wilt) disease were identified and eradication was recommended as per the procedure. From the survey conducted in Tamil Nadu, Anaimalai and Pollachi block of Coimbatore District were found to be heavily infected with root wilt disease. In Anaimalai and Pollachi block, 35.6% and 32.2% of root (wilt) disease incidence were observed respectively. In Tiruppur district, highest root (wilt) disease incidence (15.7%) was noticed in Gudimanagalam block. The results of the experiment conducted at Alankadavu revealed that the soil application of recommended dose of fertilizers + soil application (SA) of microbial consortia @ 200 g (*Trichoderma asperellum* (Tv₁) and *Bacillus subtilis* (Bbv 57) each at 100 g + FYM @ 50 kg + Neem cake-5 kg + Green manuring + Providing drainage channels + TNAU Coccocon @ 2 litre / palm (at bimonthly interval) should be applied (Two times at six months intervals) (T₂) recorded the lowest percent disease index 30.04 PDI followed by T₁ 31.27 PDI of root wilt disease index against farmers practise (T₃) 34.79 PDI respectively.

Keywords: Coconut, Root wilt, Phytoplasma, Management

Introduction

Coconut palm (*Cocos nucifera* L.), a versatile tree crop with multifarious uses is important for the livelihood of millions of people in India. It is affected by more than 50 diseases in different parts of the world. Among the various diseases, the root (wilt) disease caused by phytoplasma and fungus is a major disease and it affects various plantation crops viz., coconut, arecanut, date palm, oil palm etc. Root wilt disease in coconut caused by an obligate Phytoplasma, is a serious problem in most of the coconut plantations of Kerala and currently fast spreading and becoming serious production constraint in many of the districts of Tamil Nadu. The pathogen is highly pleomorphic and reside endocellularly in insects and phloem tissues of coconut palms. The pathogen is spread by insect vectors and further no resistant varieties are available for this pathogen.

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) [1]. The RWD is non-lethal but causes a slow decline (debilitating) and the disease generally spreads slowly. The RWD has come to stay in eight southern districts of Kerala state. The disease is also noticed in isolated pockets in northern districts of Kerala and sporadically in Theni, Dindigul, Kanyakumari, Thenkasi and Coimbatore Districts in Tamil Nadu bordering Kerala.

The currently available chemical method by controlling the insect vectors is less effective. In order to prevent the further spread of the disease in the state, the present proposal on 'Safeguarding coconut plantations in Tamil Nadu from Root Wilt disease - A farmer participatory programme' is proposed. The infection of pathogen on palms results in the total loss to the farmer. The spread of root wilt in coconut can be reduced

Corresponding Author:**P Latha**

Department of Plant
Pathology, Tamil Nadu
Agricultural University,
Coimbatore India

only by removal of the infected palms. Despite decades of research, a complete control for phytoplasma is not yet available, but measures were made to reduce its rate of spread.

Under the project, root (wilt) disease was identified some areas and to study the spreading pattern of the disease. Integrated Disease Management strategies including cultural, chemical and biological methods for root (wilt) in coconut in hot spot areas under farmer's holding will be developed and also needs to be disseminated through large scale demonstrations in farmer holdings. The outcome of the project will generate the best method for root (wilt) management/maintenance for field level adoption to the coconut farmers on Tamil Nadu. One of the significant features of the root (wilt) disease is that it is not lethal but a debilitating malady which responds to ideal management practices.

Materials and Methods

Observation on root (wilt) disease index will be recorded and the percentage of disease index will be worked out. The difference between the pre-treatment and post-treatment observations will give the reduction in disease severity. In order to save time, scoring can be restricted to the leaves in any of the five spirals (Pillai *et al.*, 1999).

The major foliar symptoms associated with the root (wilt) disease of coconut are flaccidity, yellowing and necrosis. Disease index will be calculated to quantify the disease intensity, by adding the weighted

average grade points of the different symptoms in all the leaves of a palm.

$$D.I = \frac{\sum (F + Y + N) \times 10}{L}$$

where F – Grade points assigned to flaccidity (0-5)

Y - Yellowing (0-3)

N – Necrosis (0-2)

L - Total number of leaves

Disease index can vary from '0' to '100' where

'0' represents the total absence of all the symptoms and

'100' means the presence of all the symptoms in the acute stage on all the leaves.

Disease Index below 20 - Early stage

Disease Index 20 to 50 - Middle stage

Disease Index above 50 - Advanced stage

(Radha *et al.*, 1972) [2]

Results and Discussion

Field experiment was laid out at Alankadavu village of Anaimalai block with three treatments and seven replications in Randomized Block Design during 2023-2026. The treatment details are presented in Table.1.

Table 1. Details of Treatment

S.No.	Treatment No.	Treatment details
1.	T ₁	Soil test based fertilizers + Micronutrient mixture @1 kg + Basal application of <i>Trichoderma asperellum</i> and <i>Bacillus subtilis</i> @ 200 g + Neem cake @ 5 kg + FYM @ 50 kg/palm/year (2 split) + Green manuring + Providing drainage channels
2.	T ₂	T ₁ + TNAU Cococon @ 2 litres / palm (at bimonthly interval)
3.	T ₃	Farmers' Practice

The treatments were imposed as the technical programme and the observation recorded on root wilt incidence using the formula as furnished below.

Where the grade points assigned to

F-Flaccidity (0-5)

Y-Yellowing (0-3)

		Sum (F+Y+N)
Disease Index	=	$\frac{\text{Sum (F+Y+N)} \times 10}{L}$

N-Necrosis (0-2)

L is the total number of leaves

Roving survey was carried out during 2023 to 2024 to assess the incidence of root (wilt) in different villages of Coimbatore, Tirupur, Dindigul, Theni, Thenkasi, Tirunelveli and Kanyakumari districts. The highest root wilt index of 54.63 and 54.42 Kuruthencode and Killiyoar blocks, Kanyakumari District followed by 43.41 per cent was recorded in Anaimalai block, Coimbatore District (Table 2).

Table 2. Incidence of coconut root (wilt) disease in different districts of Tamil Nadu from 2023-2024

Districts	Blocks	Root (wilt) Disease Index
Coimbatore	Pollachi North	32.8
	Pollachi South	42.52
	Anaimalai	43.41
	Kinathukadavu	8.23
	Mean	31.74 ± 2.06
Tirupur	Udumalpet	19.5
	Gudimangalam	22.04
	Tiruppur	0
	Avinashi	0
	Mean	10.385 ± 4.88
Dindigul	Palani	0

(continued on next page)

Districts	Blocks	Root (wilt) Disease Index
Theni	Ottenchithiram	0
	Reddiyarchathiram	0
	Nilakottai	0
	Mean	0.00 ± 0.00
	Cumbum	38.7
	Uthamapalayam	15.5
	Periyakulam	0
	Bodi	24.62
	Mean	19.705 ± 3.87
	Kadaiyanallur	9.2
Thenkasi	Vasudevanallur	0
	Thenkasi	37.75
	Senkottai	33.2
	Mean	20.0375 ± 2.3
	Ambasamudram	0
Tirunelveli	Radhapuram	0
	Mannur	0
	Vallioor	0
	Mean	0.00 ± 0.00
	Kurunthancode	54.63
Kanyakumari ⁷	Thovalai	10.94
	Rajakamangalam	9.01
	Killiyoor	54.42
	Mean	32.25 ± 2.25

Pre treatment and post treatment observation (one year after application) were recorded in the trial plot. The results of the experiment conducted at Alankadavu revealed that the soil application of recommended dose of fertilizers + soil application (SA) of microbial consortia @ 200 g (*Trichoderma asperellum* (Tv₁) and *Bacillus subtilis* (Bbv 57) each at 100 g + FYM @ 50 kg + Neem cake-5 kg + Green manuring + Providing drainage channels + TNAU Cococon @ 2 litres / palm (at bimonthly interval) should be applied (Two times at six months intervals) (T₂) recorded the lowest percent disease index (30.04 PDI) followed by T₁ (31.27 PDI) of root wilt disease against farmers practise (T₃) 34.79 PDI respectively (Table.3).

Srinivasan (1999) [3] reported some of the management strategies which include; application of balanced fertilizers, control of leaf rot disease, application of farm yard manure, provision for drainage, growing green manure crops, raising intercrops and removal of disease affected palms. Srinivasan *et al.* (2010) [4] reported that, the soil application of *Pseudomonas fluorescens*, *Bacillus subtilis* and *Trichoderma viride* in coconut palms to manage root (wilt) associated leaf rot symptoms in field conditions. Ramjagatheh *et al* (2012) [5] reported good management practices in the RWD in coconut palms it can reduced the disease incidence.

Table 3. Management of Coconut Root Wilt in Alankadavu Village, Coimbatore district

Treatments	*Root (wilt) Disease Index (Before Imposing treatment)	Root (wilt) Disease Index (one year after application)	Available macronutrients			Functional leaves	Nut yield (nuts/ palm / year)
			NN	PP	K K		
T ₁	31.84 ^b (32.57)	31.27 ^b (32.68)	141.4	10.6	99.7	27.8	96.4
T ₂	31.58 ^a (32.22)	30.04 ^a (32.75)	175.6	11.7	109.8	28.2	98.2
T ₃	32.65 ^c (34.36)	34.79 ^c (37.75)	128.3	6.5	66.20	25.3	90.8
SEd	0.48	0.35	--	--	--	-	-
CD (0.05%)	1.04	0.78	--	--	--	-	-
CV (%)	2.59	1.57	--	--	--	-	-

Conclusion

Roving survey was carried out during 2023 to 2024 to assess the incidence of root (wilt) in different villages of Coimbatore, Tirupur, Dindigul, Theni, Thenkasi, Tirunelveli and Kanyakumari districts. The highest root wilt index of 54.63 and 54.42 Kuruthancode and Killiyoor blocks, Kanyakumari District followed by 43.41 per cent was recorded in Anaimalai block, Coimbatore District. Soil applica-

tion of recommended dose of fertilizers + soil application (SA) of microbial consortia @ 200 g (*Trichoderma asperellum* (Tv₁) and *Bacillus subtilis* (Bbv 57) each at 100 g + FYM @ 50 kg + Neem cake-5 kg + Green manuring + Providing drainage channels + TNAU Cococon @ 2 litre / palm (at bimonthly interval) should be applied (Two times at six months intervals) was effective in reducing the root (wilt) incidence. The awareness programmes were conducted further trickle down to other farmers through the participants of these

programmes.

Acknowledgement

The authors are thankful to the Coconut Research Station, Aliyarnagar, Tamil Nadu for providing assistance during the research programme.

References

1. Solomon JJ, Nair CPR, Srinivasan N, Gunasekaran M, Sasikala M. Coconut root (wilt)-The malady and remedy. *J Plantation Crops*. 1999;27(2):71–92.
2. Radha K, Lal SB. Diagnostic symptoms of root (wilt) disease of coconut. *Indian J Agric Sci*. 1972;42:410–413.
3. Srinivasan N. Occurrence and distribution of root (wilt) disease. Kayangulam: CPCRI, Regional Station. 1999:14.
4. Srinivasan N, Chandra Mohanan R, Bharathi R, Radhika NS, Issak S. Mass production and use of biocontrol agents in the integrated management of coconut leaf rot disease – technology popularization through participatory programmes in disease affixed regions. International conference on “Coconut biodiversity and Prosperity”. Kasaragod, Kerala: Central Plantation Crop Research Institute. 2010:147.
5. Ramjegathesh R, Karthikeyan G, Rajendran L, Johnson I, Raguchander T, Samiyappan R. Root (wilt) disease of coconut palms in South Asia – an overview. *Archives Of Phytopathology And Plant Protection*. 2012;45(20):2485-2493.
6. Pillai NG, Chowdappa P, Solomon JJ, Jacob M. Remission of symptoms of root (wilt) disease of coconut injected with Oxytetracycline HCl. *J Plantation Crops*. 1991;19:14–20.

How to cite this article: Latha P, Sudhalakshmi C, Ahiladevi P, Karthikeyan G, Angappan K, Shanthi M. Improving the health of coconut trees through the management of root (wilt) disease. *International Journal of Advanced Biochemistry Research*. 2026;SP-10(10):567-570. doi: <https://www.doi.org/10.33545/26174693.2026.v10.i10Sg.10342>