

# FIELD CONTROL OF LEAF ROT DISEASE OF COCONUT WITH FUNGICIDES

By

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## SUMMARY

Leaf rot is a disease of fungal complex super imposed on root (wilt) affected coconut palms in India. A field fungicidal control trial on the disease involving contact (indofil M-45, Fytolan) and systemic (Calixin) fungicides was conducted. Fungicidal treatments, spraying of Indofil M-45 and pouring of Calixin into axil of spindle, were found beneficial as the disease intensity reduced in newly emerged leaves. However, the extent of disease amelioration by fungicides was marginal to moderate level only. Importance of broad spectrum fungicide(s) and measures of disease protection are outlined.

## INTRODUCTION

Coconut leaf rot is a devastating disease superimposed on over 60% of root (wilt) affected palms in southern districts of Kerala State, India (Radha and Lal, 1968, Srinivasan, 1991). The early symptoms of the disease is usually manifested in spindle leaves leading to an extensive rotting of tissues; reinfections also occur commonly in emerging spindles bringing about a sharp deterioration of affected palms (Srinivasan and Gunasekaran, 1992). The complex nature of the disease has been described (Menon and Nair, 1951, Srinivasan and Gunasekaran, 1993, 1994; Srinivasan *et al.*, 1995).

Regular application of Bordeaux mixture (Menon and Nair, 1951; Nair and Radha, 1959) or spraying of copper based fungicides (Anonymous, 1963) was reported beneficial in reducing the disease. Contrasting results have been encountered on application of Bordeaux mixture, Dithane M-45 and cuman (Anonymous, 1970). Aerial spraying of oil based copper fungicides also lead to no consistent positive effect (Gregory, 1960; Samraj *et al.*, 1966; Anonymous, 1970). Neither complete control of the disease nor prevention of its incidence has been possible (Anonymous, 1982, 1983). Sequential spraying of diseased palms with certain fungicides, perhaps a permutation from earlier measures, is in vogue (Joseph and Rawther, 1991).

Since leaf rot is of complex nature, disease recurrence common and amelioration generally difficult, it is imperative more field trials are taken up. In this paper the results emanated from a field fungicidal trial is presented.

## MATERIALS AND METHODS

The leaf rot control experiment was conducted with naturally affected palms in CPCRI Regional Station Farm, Kayangulam for a duration of about three years.

### Selection of Palms and Disease Indexing

Twenty year old palms with clear symptoms were marked. Palmwise quantification of the disease intensity was computed by using an indexing method as given below:

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$$\text{Disease index (D. I.)} = \frac{\text{Total Numerical Ratings}}{\text{No. of Leaves} \times \text{max No. of Categories}} \times 100$$

The disease categories with corresponding percent leaf area affected are

- 0 : Healthy
- 1 : Upto 25 %
- 2 : 26-50%
- 3 : 51-75 %
- 4 : 76-100%

Leaves were individually graded and Total Numerical Ratings summed up to arrive the D.I. of palms.

### Treatment and recording of observations

The pre-treatment D.I. of palms was comprehended and palms distributed among treatments in such a manner that mean D.I. of treatments are closer as far as possible. The palms were numbered treatment wise and the youngest leaf (spindle) of each palm was marked with red paint indelibly for follow up, to monitor the disease status of subsequently emerging spindles.

One systemic (Calixin) and two contact (Indofil M-45 and Fytolan) fungicides were used. The treatment details are :

Treatment No.	Fungicide	Concentration Used (%)	Mode of application (IL of solution/palm)
I	Calixin (Tridemorph 80% EC)	0.1	Spraying onto crown
II	-do-	-do-	Pouring into axil around the spindle
III	Indofil M-45 (Mancozeb 75% WP)	0.3	Spraying onto crown
IV	-do-	-do-	Pouring into axil around the spindle
V	Fytolan (Copper Oxychloride 88% (W/W)	0.5	-do-
	Control		No application of fungicide

In addition Calixin 1 % (1 ml/100 ml of water) taken in polythene bags was applied to a group of palms through roots at 100 ml solution per palm.

Suspensions of fungicides were prepared afresh in clear water. The schedule of fungicidal application was thrice a year (June, September and January) covering the pre and post monsoon periods. The initial round of application was given in June, 1992. There were 10 replications per treatment comprising five palms each of West Coast Tall and Dwarf x Tall.

The disease grading of experimental palms were recorded prior to imposition of every schedule. The D.I. for newly emerged leaves (cumulative number of fresh leaves after pre-treatment) and also overall D.I. for palms at every round calculated separately. Trial was continued till all the leaves in the crown were completely replaced with newly emerged leaves since its start. The data were analyzed for assessing the trend of disease suppression by treatments.

## RESULTS AND DISCUSSION

Leaf rot index of emerged leaves of the whole crown of experimental palms, at different rounds in comparison to pre-treatment D.I., are presented in Tables 1 and 2 respectively.

Leaf rot severity was lesser in Indofil M-45 spraying (17.2 - 34.3) with a mean of 25.7 D.I. and Calixin pouring (21.0 - 35.5) with a mean of 27.4 D.I. The disease intensity highest in control (37.4) was on par with other treatments. Between rounds also significant differences were observed. During the first three rounds a gradual reduction in the D.I. was observed but it shot up in the fourth round. Although the disease intensity came down in the next round, there after it was showing a rising trend. In palms under root absorption of Calixin, the D.I. among rounds was higher and the palms continued to decline.

Variation in post treatment D.I. of whole crown of the palms was also noticed. At fifth round of observation there had been a lesser D.I. in experimental palms. Thereafter a steady rise in D.I. set in. At final round of observation when all the leaves in the crown were replaced by newly emerged leaves, the D.I. among treatments was lesser by 5.1 to 10.6 from their corresponding pre-treatments values. Leaf rot suppression was attained at marginal to moderate extent. The extent of disease suppression by fungicidal application, with pre-treatment D.I. as base, was worked out to be 11.3-26.7% among treatments as on final round. In control palms the D.I. was slightly increased (2.3) and deterioration evident. In root absorption of Calixin also was no perceptible reduction in the D.I.

Earlier works (Menon and Nair, 1951; Nair and Radha, 1959; Anonymous, 1963) revealed general beneficial effect of fungicides in leaf rot control. Results of the present study are in conformity with such reports. Application of Calixin into axil around the spindle/spraying of Indofil M-45 resulted in the reduction of leaf rot among emerged leaves. The limited extent of disease amelioration could be the sequel of complex nature of the disease (Srinivasan and Gunasekaran, 1993; Srinivasan et al., 1995), vulnerability of root (wilt) diseased palms (Srinivasan, 1991), performance of fungicides under field conditions etc.

As the foci of infection by the pathogens is in young leaves, specially the spindles (Srinivasan and Gunasekaran, 1992), protective measures of such leaves is of importance. Fungicidal with broad spectrum potential combating predominant pathogens and systemic/eradicant action are likely to be more useful in the disease management. Srinivasan and Gunasekaran (in press) made in vitro assay of certain fungicides against the predominant fungi of leaf rot and deduced one such fungicide, Hexaconazole (Contaf 5 % EC), for possible utility in leaf rot control measures.

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Table 1. Leaf rot disease (D.I.) of emerged leaves of coconut palms under fungicidal control trial <sup>a</sup>

Treatment No.	Fungicide	D.I. of emerged leaves in different rounds of observation <sup>b</sup>									
		Sept. '92	Jan. '93	June	Sept	Jan. '94	June	Sept.	Jan. '95	Mean D.I.	L.S.D. (P=0.05)
I.	Calixin-Spraying	44	37.2	26.2	41.4	29.3	34.3	31.9	36.9	35.2	For treatments: (T) 5.4
II.	Indofil M-45- Spraying	34.3	20.9	17.2	25.4	20.4	28.2	29.9	29.1	25.7	
III.	Calixin-Pouring	23	24.2	21.2	35.5	21	28.1	32.8	32.4	27.4	Four rounds of Observation: 6.2) 6.2
IV.	Indofil M-45- Pouring	36	30.7	37.9	42.3	32.1	38	32.8	39.5	36.2	Interaction between T & R: 15.2
V.	Fytolan-Pouring	24.2	24.7	34.1	42.1	30	34.8	29	33.3	31.5	
	Control	35.0	35.7	35.5	39.8	31.6	37.5	36.2	47.5	37.4	
	Mean D.I.	32.8	29.1	37.8	37.8	27.4	33.5	32.1	36.5		
Observation Trial:											
	Calixin – root absorption	45.7	38.6	48.7	60.2	39.6	51.4	39.8	50.2	46.8	

a - means of 10 palms/treatment

b - leaves emerged after the initiation of experiment

Table 2. Pre and post treatment leaf rot disease indices (D.I.) whole crown of coconut palms under fungicidal control trial <sup>a</sup>

Treatment No.	Fungicide	D.I. of Palms (whole crown) in pre-treatment and different rounds of observation								
		Pre-treatment (June '92)	Sept.	Jan. '93	June	Sept.	Jan. '94	June <sup>b</sup>	Sept	Jan <sup>b</sup> '95
I.	Calixin-Spraying	42.2	39.9	46.4	42.3	52.7	32.5	35.0	32.2	36.9
II.	Indofil M-45-Spraying	39.7	41.1	42.1	38.8	43.0	22.0	29.5	29.8	29.1
III.	Calixin-Pouring	40.2	36.2	45.2	38.5	46.2	22.3	29.2	32.9	32.4
IV.	Indofil M-45-Pouring	44.6	47.7	48.2	53.4	55.1	34.0	40.4	32.9	39.5
V.	Fytolan-Pouring	39.7	39.1	44.9	48.7	53.4	30.1	37.6	29.8	33.3
	Control	45.2	47.3	50.5	51.4	53.3	37.7	38.8	36.3	47.5
Observation Trial:										
Calixin-root absorption		57.2	59.7	56.3	56.4	66.8	38.7	53.2	39.9	50.2

a - means of 10 palms/treatment

b - Analysed using the analysis of covariance technique taking the pre-treatment value as the covariate; Difference of D.I. no significant.