

EFFECT OF SOIL APPLICATION OF SEVEN CHEMICALS ON DISEASE INCIDENCE AND YIELD OF YELLOW LEAF DISEASE AFFECTED ARECA PALM (*ARECA CATECHU* L.)

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ABSTRACT

The yellow leaf disease affected areca palms in early stages of the disease were treated with seven chemicals, viz. quintozene ('Brassicol 75 WP'), carboxin (Vitavax), carbendazim (Bavistin WP'), copper oxychlorides ('Cupramar' and 'Blue Copper-50'), carbofuran ('Furadan 3G') and metham sodium. The chemicals were applied to the soil as drench at quarterly intervals for three years. The yield data of the palms were recorded before and after treatment. Pre and post-treatment disease incidence were recorded every year soon after the monsoon. The results showed that the application to the soil of the above seven chemicals had no effect on the incidence of yellow leaf disease although there was an increase in yield in the Cupramar, Blue Copper-50 and Furadan 3G treated plots. The increase in yield in these plots may point to the efficacy of chemicals in increasing yields, if not in checking the disease. These preliminary observations reveal that efficacy of chemicals in increasing yields in early stages of the disease calls for a detailed investigation.

INTRODUCTION

Yellow leaf disease is a serious malady taking a slow but heavy toll of the arecanut palms in Kerala, Coastal regions of Bombay, parts of Karnataka and Tamil Nadu (Menon, R. 1962, 1963; Reddy *et al*, 1978; Srivastava *et al*, 1970; Yadava *et al*, 1973). Menon, R (1963) described the symptoms of the disease in detail. Other workers like Nambiar and Srinivasan, 1951; Dastagir, 1963; Nambiar, 1971 and Yadava *et al*, 1973 also described the symptoms of the disease. Yellowing of the leaves followed by reduction in size of the crown, reduction in size of the fruits and premature fruit fall are the major symptoms of the disease. In advanced stages the leaves fall off leaving only the

bare pointed trunk. The young roots turn dark and gradually rot. Rotting of the root system increases as the disease progresses (Rawther, 1976).

The aetiology of the disease is unknown. There are no effective curative measures at present. Therefore any increase in yield in early stages of this malady is very important for the farmer. However, little is known about the effect of soil application of chemicals on yellow leaf disease of areca palms.

MATERIAL AND METHODS

The field trial was conducted during the period 1976—78 in a 20 years old areca garden at Central Plantation Crops Research Institute, Research Centre, Kannara, Trichur district, Kerala State, where the palms are in the early stage of yellow leaf disease.

The experiment was laid out in randomised block design with three replications. Each plot was 44 m² in size and consisted of 6 palms. The chemicals tested were: Brassicol 75 WP (0.75%), Vitavax (0.1%), Bavistin WP (0.1%), Cupramar (0.3%), Blue copper-50 (0.3%), Furadan 3G (6 kg ai/ha) and metham sodium (1%). Before applying the chemicals to the soil the basin of each palm was opened and the area between the palms was forked up. The chemicals Brassicol 75 WP, Vitavax, Bavistin WP, Blue Copper-50 and Cupramar were applied as aqueous suspension of appropriate strength at the rate of 100 l/plot. But 4.4 l Metham sodium was added to 440 l water and applied to each plot. Furadan 3G being a granulated formulation, was mixed with fine sand and applied at the rate of 6 kg ai /ha. In each case 60% of the chemical was applied to the base of the palms around the root zone and the remaining 40% in between the palms. After the application of the chemicals the opened bases were covered with soil in all treatments and the rest of the area of each plot was forked again. A water seal was given to the Metham sodium treated plots and covered with dried areca leaves. Each control plot received 100 l water alone. The treatments were given four times a year at quarterly intervals for 3 years.

Observations on disease incidence were recorded before the first application of chemicals and thereafter every year in the month of September, when the symptoms were very clear. The disease incidence was determined by using the following formula (Personal communication with Mr. T.S.S. Rawther, CPCRI, Research Centre, Palode) and are presented in table I.

Table I Effect soil application of six chemicals on disease incidence of yellow leaf disease affected areca palms.

Treatment	Disease index*			
	Pre-treatment	Post-treatment		1978
		1976	1977	
Brassicol 75 WP	25.59	18.78	20.83	18.49
Vitavax	19.76	23.12	15.63	17.68
Bavistin WP	16.99	15.39	15.77	17.01
Cupramar	23.81	19.01	21.83	21.30
Blue copper-50	23.71	18.55	17.8	22.67
Furadan 3G	28.04	20.73	20.29	24.97
Control	20.72	18.58	15.53	18.64

*Mean of 3 replications

$$\text{Disease index (I)} = \frac{Y + N}{L} + R \quad 10$$

Y Total score for yellowing for all the leaves

N Necrosis for all the leaves

R Value for reduction in size of the crown

L Total No. of leaves at the time of taking observation.

Symptoms	Score value
Yellowing	0 — 8
Necrosis	0 — 1.0
Reduction in the size of the crown	0 — 1.0

Pre-and post-treatment yield data were also recorded every year. The results are presented in Table II.

RESULTS AND DISCUSSION

Pre-and post-treatment disease intensity and yield data for every year are given separately in table I and II respectively. It may be seen from the results presented in table II that there was increase in yield in terms of number of nuts and wet weight of nuts in Cupramar, Blue Copper-50 and Furadan 3G treated plots, when the percentage increase or decrease over pre-treatment yield was calculated. In the other treatments the yields were almost on par with the untreated plots but were significantly (at $P = 0.05$) less than those from Cupramar, Blue copper-50 and Furadan 3G treated plots. However, Brassicol 75 WP, Vitavax and Bavistin WP. in the concentration used were least effective in increasing the yield of yellow leaf disease affected areca palms.

The palms in the Metham sodium treated plots showed wilting and drying of leaves and the palms ultimately died. This may be due to the phytotoxicity of the chemical.

Under the conditions of these experiments the application to the soil of the 7 chemicals tested had no effect on the incidence of the disease, although there was increase in yield in the Cupramar, Blue copper-50 and Furadan 3G treated plots. Since the aetiology of the disease is not known, the failure of these chemicals in controlling the disease in the present trials cannot be explained on the basis of these studies. But the application of the chemicals to the soil might have reduced the root rot, which is one of the major symptoms of yellow leaf disease, thereby increasing the uptake of nutrients, and in turn, the yield.

However, the indication of an increase in yield in the Cupramar, Blue Copper-50 and Furadan 3G treated plots may point to the efficacy of chemicals in increasing yields, if not in checking the disease. This line of investigation may result in development of some measures of restoring the declining yields, at least in the yearly stages of the malady. And, in the meanwhile through inter and mixed cropping system, a farmer can prepare himself for the worst; yellow disease affected palms die only after a protracted 'illness'

Table II Effect of soil application of six chemicals on yield of yellow leaf disease affected areca palms.

Treatments	Pre-treatment		Post-treatment		1978		Mean for 3 yrs. (post-treatment)		% increase/ decrease in yield over pre-treatment*	Wet weight of nuts/palm		
	No. of nuts/palm	Wet weight of nuts/palm	No. of nuts/palm	Wet weight of nuts/palm	No. of nuts/palm	Wet weight of nuts/palm	No. of nuts/palm	Wet weight of nuts/palm				
Brassicol 75WP	219.20	5.32	227.92	6.66	139.25	5.08	72.24	2.43	146.47	4.72	-25.21 (-18.14)	-19.03 (-10.63)
Vitavax	305.5	7.58	263.61	7.81	281.97	8.31	121.47	4.04	222.35	6.72	-31.63 (-27.50)	-15.70 (-7.32)
Bavistin WP	236.47	5.79	233.28	6.88	213.46	6.91	61.17	1.89	169.3	5.23	-19.84 (-11.52)	-18.47 (-10.04)
Cupramar	164.35	4.61	195.22	5.94	249.92	8.06	114.56	3.60	186.56	5.87	+18.44 (+10.01)	+33.97 (+31.22)
Blue Copper-50	250.98	6.88	338.28	10.33	323.09	10.82	156.08	4.85	272.48	8.67	+10.32 (+3.21)	+29.69 (+24.53)
Furadan 3G	200.5	5.26	357.22	10.40	208.82	7.1	105.39	3.49	223.81	7.00	+11.29 (+3.83)	+32.21 (+28.57)
Control	289.42	7.21	217.72	6.41	272.55	8.65	114.76	3.43	201.68	6.16	-33.43 (30.36)	-21.75 (-13.73)
CD (P = 0.05)										33.79		

* After arcsin transformation; figures in brackets denote the retransformed mean value
 + Increase in yield; * decrease in yield.

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